TEXTBOOK OF

Pediatric Psychosomatic Medicine

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Textbook of Pediatric Psychosomatic Medicine

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Textbook of Pediatric Psychosomatic Medicine

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Dedicated to

Dr. med. univ. Hans Steiner,
who taught and mentored a generation of child and adolescent psychiatrists
regarding the complex interaction of biological, psychological, and social variables
in the etiology, pathogenesis, diagnosis, and treatment
of mental disorders;

and to the memory of

Dr. Leon Eisenberg,
who saw the necessity of evidence long before others,
argued for the significance of social context when others found evidence,
and mentored colleagues across the globe regarding the importance
of returning humanism to the field of medicine.

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Foreword

Gregory K. Fritz, M.D.

I was a general psychiatry resident in 1974 and new to the psychiatric consultation service at a large public hospital. As I was preparing to do one of my first consultations, my attending, in an effort to be helpful, said, "You're in luck: an asthmatic patient. Asthma is a psychosomatic illness." He went on to describe the specific intrapsychic conflict that was said to be the psychological cause of asthma (a hostile/dependent relationship between mother and child; the wheeze was a suppressed cry for nurturance). I remember being both relieved and skeptical that such rote theory would make my job as a psychiatric consultant so simple. Fortunately for my own professional self-esteem, I cannot remember the outcome of that consultation.

My attending was not far off base from the psychoanalytical thinking of the time. The writings of a few of the "specificity theorists" in psychosomatic medicine, most notably Franz Alexander and Flanders Dunbar, were distilled by lesser minds into the dogma of the day: that there were seven psychosomatic illnesses—asthma, peptic ulcer, essential hypertension, migraine, atopic dermatitis, ulcerative colitis, and Graves' disease—with a psychological etiology that were the purview of psychiatrists. Issues specific to children were not even considered.

Despite my somewhat disdainful recollection, my early exposure to the field of psychosomatic medicine did not sour me. Quite the contrary: I have spent the last 30 or so years immersed in pediatric psychosomatic medicine, as a consultation-liaison child and adolescent psychiatrist practicing in children's hospitals and as a clinical researcher studying aspects of chronic pediatric illness. The last three decades have witnessed dramatic changes in how we understand mind-body interactions in disease states and in the interdisciplinary efforts to apply this understanding clinically for the benefit of our patients. This *Textbook of Pediatric Psychosomatic Medicine* is both a reflection of the advances that have taken place and a major contribution to ensure continued progress.

I can think of no one in the world of child mental health better qualified to undertake creating such a textbook than my long-term friends and colleagues Richard Shaw and David DeMaso. Both are seasoned clinicians who continue to be on the front lines of pediatric consultation work in major children's hospitals. Over the years, they have seen it all: incredible cases, inspiring resiliency, heartbreaking complications, and all manner of mental health interventions provided with varying degrees of success. Applying the skepticism and curiosity of true academics, they have carried out systematic studies in clinical research, digested a growing body of scientific literature, and determined not to make the same mistake twice. With their immensely useful first book, the *Clinical Manual of Pediatric Psychosomatic Medicine,* and now this textbook, Drs. Shaw and DeMaso have taken the ultimate scholarly step to share their hard-won clinical wisdom with those of us who can apply it.

Modern psychosomatic medicine is concerned with all diseases. The challenge is to identify the meaningful mind-body interactions through which

one can help a particular patient. There is now a strong interest in understanding the psychophysiological mechanisms that provide the links among external environmental variables, internal psychological variables, and medical disease. Modern psychosomatic medicine recognizes that mind-body interactions are bidirectional; for example, the influence of systemic steroids on mood level is as important as the impact of anxiety on asthma. Perhaps the most significant change of all in the evolution of psychosomatic medicine is the desire for empirical evidence to replace unproven theories as the basis for psychosomatic treatment.

Nothing is more tedious and unsatisfying for a teacher than having to find, collect, copy, and distribute salient or seminal articles on the discussion topic before every seminar. Sadly, up until now, teachers of pediatric psychosomatic medicine have had to bear that burden, and too often, time pressures or an incomplete search prevented them from doing it well. With the publication of this textbook, those days are gone. This comprehensive book, organized around referral questions, specialty areas, and treatment options and incorporating the expertise of national and international authorities, would have been a welcome alternative to the theoretical musings of my attending years ago. Today's psychosomatic practitioners and trainees will be the beneficiaries.

Preface

Richard J. Shaw, M.B., B.S.
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The inspiration to create the *Textbook of Pediatric Psychosomatic Medicine* evolved from our experience with its predecessor volume, the *Clinical Manual of Pediatric Psychosomatic Medicine* (Shaw and DeMaso 2006), published by American Psychiatric Publishing. The *Clinical Manual* was a relatively easy book to create, given the notable absence of teaching guides aimed at trainees and clinicians working in the field of pediatric psychosomatic medicine. Much of the material was drawn from our accumulated teaching, clinical, and research experience in our respective institutions. Our goal was to create a book that was of immediate practical use, with chapters dedicated to each of the most common mental health consultation questions in the pediatric setting.

The response to the *Clinical Manual* has been overwhelmingly positive. It has become one of the standard training texts in pediatric psychosomatic medicine in institutions across the United States. It has been used as a basic introductory text for medical students and psychology interns and has served experienced mental health clinicians in the development of new clinical services. The book also has had enthusiastic responses internationally, from countries in Europe, Asia, and Australia: It has been translated into and published in Chinese, and an edition in Spanish is planned.

In formulating our plans for this textbook, we were mindful of several adult texts, most notably the *American Psychiatric Publishing Textbook of Psychosomatic Medicine,* edited by James Levenson (2005), which served as a template for this book. We also drew inspiration from the *Textbook of Consultation-Liaison Psychiatry,* edited by James Rundell and Michael Wise (1996), and *Psychosomatic Medicine,* edited by Michael Blumenfield and James Strain (2006). These individuals have all been pioneers in the adult field and have helped consolidate the specialty of psychosomatic medicine. Our sources in pediatric practice were more limited, but two publications, *Child and Adolescent Mental Health Consultation in Hospitals, Schools, and Courts,* by Gregory Fritz and colleagues (1993), and the *Handbook of Pediatric Psychology,* edited by Michael Roberts (2003), deserve special mention.

In the current volume, our goal has been to help articulate the current evidence base for pediatric psychosomatic medicine. Although the relatively recent establishment of the certification process of psychosomatic medicine by the American Board of Psychiatry and Neurology has drawn increased attention to psychosomatic medicine, we felt that it was important that pediatric issues receive their own unique and separate attention. This opinion has been further strengthened by our experience in developing the textbook's first chapter, which reviews the international practice of pediatric psychosomatic medicine. The widely varied allocation of resources to address the psychological issues of

physically ill children across countries and continents emphasized for us the fact that support for our specialty cannot be taken for granted. We believe it is imperative not only to continue but also to intensify efforts to establish the clinical and economic benefits of mental health intervention in the medical setting.

In developing an outline for this textbook, we decided to focus primarily on evidence-based work in the field. This objective is in contrast to the more practical applications that were emphasized in the *Clinical Manual.* In addition, due to constraints on length, we selected the most common clinical areas to cover in depth rather than conducting a more superficial review of the entire field. For this reason, certain topics—including spinal cord injury and several disorders in the specialties of hematology, rheumatology, and dermatology—are notably absent. We made a conscious decision to omit topics that are classically associated with child and adolescent psychiatry, such as enuresis, encopresis, and attention-deficit/hyperactivity disorder. Although patients with these disorders frequently present in the medical setting, we believe that numerous outstanding texts are available on the management of these disorders. For similar reasons, mental retardation, autism, and developmental disorders are not specifically addressed.

This textbook is organized into four main parts. As in the *Clinical Manual,* the first four chapters provide a general introduction to the specialty of pediatric psychosomatic medicine, a discussion of the areas of adaptation and coping, an exploration of assessment, and an examination of legal and forensic concerns. In Part 2, "Referral Questions," the authors of Chapters 5–13 cover the common psychiatric consultation requests in the inpatient and outpatient setting. Part 3, "Specialties and Subspecialties," includes Chapters 14–27 and addresses the most common pediatric subspecialties. In the final section, "Treatment," the authors of Chapters 28–31 discuss evidence-based treatments of the physically ill child.

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Many critical teachers and mentors have supported our work on the interface of psychiatry and pediatrics. In psychiatry, there have been Drs. Thomas Anders, William Beardslee, Myron Belfer, Leon Eisenberg, Gregory Fritz, Frederick Melges, and Margaret Stuber. Dr. Thomas Wise, the former editor of *Psychosomatics,* deserves special recognition. In pediatrics, there have been Drs. Harvey Cohen, Frederick Lovejoy, Alexander Nadas, and David Nathan. All of our colleagues and collaborators have been truly invaluable, although Drs. Pamela Beasley, Rebecca Bernard, Michelle Brown, Leslie Campis, John Campo, Stuart Goldman, Joseph Gonzalez-Heydrich, Richard Martini, Enrico Mezzacappa, Eva Szigethy, and Heather Walter stand out.

Clearly, our strongest recognition is for the accomplished and dedicated group of authors who contributed to the textbook. The authors were selected based on their talent, reputation, and national and frequently international reputation in their respective specialties. Our proudest and most gratifying accomplishment has been to assemble a cast of leaders in the field to create this volume. We acknowledge their patience, diligence, and excellence.

We are especially grateful to editorial director John McDuffie and senior editor Rebecca Richters of American Psychiatric Publishing, Inc., for their invaluable support and expertise throughout the development and creation of this textbook. We thank our families, who have helped in many practical as well as inspirational ways. Finally, this book could not have been written without the many children and families with whom we have had the privilege of working. It is through the sharing of their lives with us, in our work in pediatric psychosomatic medicine, that we learned about the adversity and resiliency found in children and adolescents facing physical illnesses. Our understanding of and responses to the stories of these families form the bedrock of this textbook.

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PART I

Introduction to Pediatric Psychosomatic Medicine

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Pediatric Psychosomatic Medicine

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The Dutch Study Group on Pediatric Consultation/Liaison Psychiatry

Pediatric psychosomatic medicine is the term used to describe the subspecialty of child and adolescent psychiatry that is dedicated to providing mental health services to youngsters with physical illness. Lipowski (1967) defined the specialty as including those diagnostic, therapeutic, teaching, and research activities provided by psychiatrists in the nonpsychiatric part of the general hospital. Herzog and Stein (2001) outlined the goals of a pediatric consultation-liaison psychiatry service as follows: 1) to facilitate the early recognition and treatment of psychiatric disorders in physically ill children and adolescents; 2) to help differentiate psychological illnesses presenting with physical symptoms; 3) to help avoid unnecessary diagnostic tests and procedures; 4) to support pediatric patients and their families in coping with their disease and its treatment; and 5) to assist the medical team in understanding the reactions and behaviors of physically ill children, adolescents, and their families.

Patients seen in this subspecialty commonly fit into one of three categories: 1) patients with comorbid psychiatric and physical illnesses that complicate each other's management, 2) patients with somatoform and functional disorders, or 3) patients with psychiatric symptoms that are a direct conse-

quence of a primary physical illness or its treatment. The term *coincidental comorbidity* may be used to describe patients with unrelated psychiatric and physical illnesses, whereas *causal comorbidity* refers to instances in which the psychiatric disorder is a direct result of physical illness or has a significant impact on the course or severity of the illness. Causal comorbidity also captures psychological symptoms that develop as a direct result of the stress of the illness or its treatment (Shaw and DeMaso 2006).

This chapter provides a brief historical overview of the field of pediatric psychosomatic medicine and the development of the specialty within the United States. This section is followed by a description of how services are organized based on a small number of national surveys, including data on issues related to funding and reimbursement. The chapter concludes with a section describing the psychosomatic services from an international perspective.

Historical Overview

The history of child and adolescent psychiatry as a medical specialty in the United States dates back to the beginning of the twentieth century (Rothenberg 1979). Several historical events have marked the progress of the specialty, including the establishment of the first child guidance clinic in Chicago in 1909 and, in 1930, the first full-time psychiatric clinic in the department of pediatrics at the Johns Hopkins School of Medicine. An influential 1932 report on the relationship between pediatrics and psychiatry advocated for greater integration of mental health disciplines into the pediatric hospital and the development of liaison programs to help increase awareness of the psychological issues affecting physically ill children (Fritz 1993; Work 1989). In 1935, Leo Kanner published the first edition of his textbook, *Child Psychiatry*, and the Rockefeller Foundation funded the development of several psychosomatic medicine units in U.S. teaching hospitals. In 1953, The American Academy of Child and Adolescent Psychiatry (AACAP) was founded, followed shortly afterward by board certification in child psychiatry. Further growth of the specialty occurred following the decision of the National Institute of Mental Health to fund training grants and research during the 1970s and 1980s.

Psychosomatic medicine has more recently been recognized as a separate psychiatric subspecialty by the American Board of Medical Specialties. In the past, it has been designated by several other names, including *consultation-liaison psychiatry, medical-surgical psychiatry, psychological medicine, behavioral psychology,* and *pediatric psychology.* The field overlaps with the pediatric specialty of developmental and behavioral pediatrics. In 2001, the Academy of Psychosomatic Medicine applied to the American Board of Psychiatry and Neurology (ABPN) for recognition of the name *psychosomatic medicine* as a subspecialty, using the name that was introduced by Felix Deutsch in 1922 and that has been associated with the ABPN's history, national organizations, and journal publications (Deutsch 1922; Lipsitt 2001).

Training in pediatric psychosomatic medicine, which generally occurs in a pediatric consultation-liaison service, is a mandatory component of training in ABPN-accredited residency programs in child and adolescent psychiatry. Recently, investigators have developed specific diagnostic criteria for psychosomatic research to help researchers and clinicians with operational criteria for psychosomatic syndromes most commonly identified in the medical setting (Fabbri et al. 2007).

In 1967, Logan Wright introduced the term *pediatric psychology.* The field of pediatric psychology experienced rapid growth associated with the formation in 1968 of the Society of Pediatric Psychology, an independent section of the Division of Clinical Psychology of the American Psychological Association. In addition, a number of national and international organizations are dedicated to the specialty, including the Academy of Psychosomatic Medicine, American Psychosomatic Society, European Association for Consultation-Liaison Psychiatry and Psychosomatics (EACLPP), International Organization for Consultation-Liaison Psychiatry, and Society of Pediatric Psychology. The EACLPP has taken a number of initiatives to help establish consensus on the contents and organization of training in psychosomatic medicine within the European Union (Söllner and Creed 2007). The AACAP also sponsors two committees, the Committee on the Physically Ill Child and the Committee on Collaboration with Medical Professionals, that focus on clinical and research issues specifically related to pediatric psychosomatic medicine. A number of journals specialize in topics related to the field, including *Psychosomatic Medicine, Psychosomatics, Journal of Psychosomatic Research,* and *Journal of Pediatric Psychology,* and various specialized journals focus on specific disorders, such as oncology and transplant psychiatry.

Structure of U.S. Pediatric Psychosomatic Medicine Services

Psychiatric consultation for physically ill children and adolescents is provided by a number of professional disciplines, often with different service models. Traditional pediatric psychosomatic medicine services, more commonly referred to as pediatric consultation-liaison services, are generally located in large academic medical centers or pediatric hospitals (Campo et al. 2000). Such services are usually housed administratively within a department of psychiatry under the directorship of a child and adolescent psychiatrist. Services are often multidisciplinary in nature, with representation from child and adolescent psychiatry as well as pediatric psychology. These services commonly have a strong teaching role with trainees from both disciplines.

Recent data on the composition and staffing of such services are limited, although Shaw et al. (2006) reported that results from a national survey indicated that pediatric programs have a relatively low staff-to-patient ratio compared with comparable adult services. The ratio of pediatric attending consultation-liaison staff to number of hospital beds is also significantly lower than that recommended by Fink and Oken (1976) for adult services. Campo et al. (2000) reported that psychiatry consultation services are in deficit in the vast majority of children's hospitals, and 43% of the U.S. pediatric psychosomatic programs reported inadequate staff to meet clinical need (Shaw et al. 2006).

Consultation to pediatricians is also commonly provided by pediatric psychologists, who may be hired by a hospital or a pediatric department (Campo et al. 2000). Pediatric psychologists may consult to a single program, providing both inpatient and outpatient services, and may or may not be affiliated administratively with an academic department of psychology or psychiatry. National data on the location and composition of these services is limited, although the volume of service provided in these arrangements is likely greater than that provided by the traditional hospital-based pediatric psychosomatic medicine services. Social work clinicians are also an important group who provide mental health services, including triage and assessment of physically ill children. Lack of integration of such services may result in duplication of effort and confusion related to the referral of patients for mental health consultation. Models of outpatient psychosomatic medicine services vary widely, depending on the roles of and the nature of relationships between pediatric and mental health care providers (Dolinar 1993).

Funding of Pediatric Psychosomatic Medicine Services

Funding has been cited as a major problem for pediatric psychosomatic medicine services, and a long-standing disagreement exists over who should be financially responsible for psychiatric consultation services in the pediatric setting (Campo et al. 2000). A survey by Anders (1977) found that cross-departmental financial support between pediatrics and psychiatry for consultation services was rare. More recent surveys suggest that these issues persist and that the majority (40%) of pediatric consultation-liaison funding comes from departments of psychiatry (Shaw et al. 2006).

Although funding from patient fees appears to have increased in recent years, reimbursement rates for psychiatric consultation services average only 30%, limiting the extent to which hospital-based pediatric psychosomatic medicine services can be financially self-sufficient. Campo et al. (2000), in a survey of 45 U.S. general children's hospitals, reported that one-half of psychiatry programs operated at a deficit and required subsidy. Many program directors have commented on the difficulty of negotiating with managed care companies to obtain reimbursement for psychiatric services. Pressure to generate billing income by seeing more patients potentially reduces time available for nonbillable liaison activities.

Confusion often occurs as to whether psychiatric services for hospitalized medical patients should be paid by the medical part of the patient's health care plan or by the psychiatric benefits, which are often carved out to paneled providers who may not be credentialed by the hospital. Frequently, neither side is willing to pick up the payment, and the consultant is left with the dilemma of whether to provide services that will not be reimbursed (Goldberg and Stoudemire 1995). These complicated payment arrangements interfere with continuity of care for patients after discharge from the hospital. In addition, it should be noted that psychologists providing inpatient mental health consultations are often limited in their ability to bill for their services, because they cannot use traditional evaluation and management codes.

Referral Patterns

Most surveys of pediatric psychosomatic medicine services suggest an increasing demand for consultation in recent years (Shaw et al. 2006). Wiss et al. (2004), in a French study, reported an increase in activity of 33% between 1994 and 2000. Services most commonly requested from and provided by departments of psychiatry in children's hospitals are inpatient and outpatient consultation-liaison psychiatry services (Campo et al. 2000). Despite this increasing demand, other studies suggest that referral rates for psychiatric consultation for pediatric patients average only 2% of the hospital population, indicating that psychiatric illness in many physically ill children and adolescents goes unrecognized (Frank and Schäfert 2001).

Rates of referral may be even lower in countries with less established psychiatric consultation services. For example, in a study of 18,808 pediatric inpatients in Mexico, Burián et al. (1978) reported a referral rate of only 0.31%. However, McFadyen et al. (1991) found that both awareness of psychological issues and referrals for psychiatric consultation can be increased as a result of administrative decisions to expand and improve psychiatric services in a general hospital. In the group of patients that are referred for consultation, school-age children and adolescents tend to be overrepresented, whereas preschool children are commonly underrepresented. Physicians, most commonly pediatricians, generate the bulk of referrals, with a smaller number coming from nurses, social workers, child life specialists, and family members (Black et al. 1990; Ramchandani et al. 1997).

Most pediatric psychosomatic medicine services report a high frequency of referrals for the assessment of suicide attempts and adjustment to illness (Black et al. 1990; Shaw et al. 2006; Wiss et al. 2004). According to Burket and Hodgin (1993), the major reasons for psychiatric consultation are behavior problems, suicide evaluation, depression, and reaction to illness. The high frequency of requests for consultations regarding parents' adjustment to a child's illness suggests that recognition of the effect of the child's illness on parental adaptation is increasing. Another important role of pediatric psychosomatic medicine services is that of staff education and support (Chan 1996). Table 1–1 lists the most common reasons for pediatric psychiatric consultation.

Table 1–1. Common reasons for pediatric psychiatry consultation requests

Adjustment to illness
Delirium
Differential diagnosis of somatoform disorder
Disposition and referral
Disruptive behavior
Medication consult
Nonadherence with treatment
Pain management
Parental adjustment to illness
Procedural anxiety
Protocol assessment
Suicide assessment

Source. Reprinted from Shaw RJ, DeMaso DR: "Pediatric Psychosomatic Medicine," in *Clinical Manual of Pediatric Psychosomatic Medicine: Consultation With Physically Ill Children and Adolescents.* Washington, DC, American Psychiatric Publishing, 2006, p. 11. Copyright American Psychiatric Publishing, 2006. Used with permission.

International Perspectives on Pediatric Psychosomatic Medicine

International practices of pediatric psychosomatic medicine vary widely. In an effort to capture the complexity and diversity of these regional differences, we have compiled data based on an informal international survey of practice patterns. Topics covered in the survey include organization of services, funding, training, and research. The countries selected are diverse not only in terms of geographic location, which encompasses five continents, but also in terms of the size, population density, and economic resources dedicated to health care services by each respective government.

United Kingdom

The practice of psychosomatic medicine was somewhat slower to develop in the United Kingdom than in the United States, and until the 1940s, nearly all British psychiatry was practiced in mental hospitals, often in rural areas (Lloyd 1987). The first reports of collaboration between psychiatrists and physicians

in the United Kingdom did not appear in the literature until the 1960s. Health care in the United Kingdom is publicly fuded by the National Health Service (NHS), and although a substantial number of people now have access to privately funded health care, mental health consultation services are almost exclusively in the domain of the NHS.

Organization of Services

In the United Kingdom, wide variability exists in the organization of pediatric psychosomatic medicine services (termed *consultation-liaison services* in the United Kingdom), with no standard or agreed-upon format. The professions involved include child psychiatry, clinical psychology, nursing, social work, and child psychotherapy. In London, 92% of consultation-liaison services have a child psychiatrist, 46% a clinical psychologist, and 31% either a nurse or a child psychotherapist. Consultation-liaison services are located primarily in the major NHS hospitals or university medical centers.

In general, the provision of child and adolescent mental health care is multidisciplinary, and inpatient consultation-liaison services are supported by approximately 20 hours/week of nursing time and 15–20 hours/week of clinical psychology and child psychiatry. The larger services located in London teaching hospitals may have an additional 10 hours/week of time from a child psychotherapist. All major hospitals have funding for 24-hour emergency room care, but the comprehensiveness of the child and adolescent mental health care varies widely. Some subspecialty units, such as pediatric oncology or rheumatology, may have a dedicated mental health professional, usually a clinical psychologist, although funding for such arrangements is inconsistent and variable. A multidisciplinary approach is the recommended service model.

Most pediatric patients who require inpatient care are hospitalized in a general or specialty pediatric unit under the care of a pediatrician, or with joint care also provided by child and adolescent mental health services. Patients with diagnoses of conversion disorder or severe chronic fatigue syndrome may also be hospitalized in adolescent psychiatry units. Some centers have developed adolescent medical wards, which have proven very helpful for adolescents with complex combined medical and psychiatric needs. One academic unit, directed by Professor Elena Garralda at Imperial College, London, has a particular interest in psychosomatic medicine.

Funding of Services

In the United Kingdom, primary care trusts purchase health care for the local population and are the primary funding source for all clinical services. Most consultation-liaison services are administered through the child and adolescent mental health budget, although a small number are located in pediatrics departments. Most child and adolescent mental health practitioners in the United Kingdom are employed by the NHS, and although a small proportion are employed by universities or medical schools, funding for their time is recouped from the NHS.

Training

All physicians training in either general adult psychiatry (registrar or resident) or child psychiatry (senior registrar or resident) are expected to have significant exposure to the specialty of consultation-liaison psychiatry. For adult psychiatry, training consists of one 6-month full-time consultation-liaison rotation, whereas for child psychiatry training, a more common experience is a 1-year part-time rotation (1.5 days/week). Training of psychiatrists is organized by the Royal College of Psychiatrists (R.C.Psych.), and graduates are eligible to take the Membership examination offered by this organization (M.R.C.Psych.). Training of clinical psychologists in psychosomatic medicine is more variable due to other training demands. No formal training is offered in adult or pediatric psychosomatic medicine.

Professional Organizations and Journals

For psychiatrists, the major professional organization is the Royal College of Psychiatrists. This organization has a liaison section, referred to in the United Kingdom as a special interest group, which provides peer support, disseminates professional information, and organizes an annual conference. For clinical psychologists, the major professional organization is the British Psychological Society. Comparable organizations are the Association for Child Psychotherapy for child psychotherapists and the General Social Work Council for social workers. Journals that publish in the field include the *Archives of General Pediatrics, British Journal of Psychiatry, Child and Adolescent Mental Health,* and *Journal of Child Psychology and Psychiatry.*

The U.K. government has developed professional standards of health care (Department of Health 2003) that include guidelines for pediatric mental health care. Details of these guidelines are discre-

tionary rather than mandatory. Initial impressions suggest that the guidelines are facilitating the development and greater standardization of consultation-liaison services.

Research

Research in the United Kingdom is funded by a number of funding organizations, including the Department of Health, the Wellcome Trust, and the Medical Research Council. Additional research is funded by special-interest charities dedicated to such diseases as diabetes mellitus or Crohn's disease. Major topics of research interest include recognition of mental health problems by family doctors and pediatricians, chronic fatigue, and the epidemiology of pediatric mental health.

The Netherlands

The Netherlands, a multicultural Western European country with 16.5 million inhabitants, has a high standard of medical and mental health care, with eight major university medical centers (UMCs). Annual health care spending is 13.1% of the gross national product (74 billion euros, or 92 billion U.S. dollars). Approximately 55 community mental health care centers and 25 child psychiatric hospitals, run by about 20 organizations, are distributed across the country but concentrated in the major cities. The Netherlands has approximately 500 child and adolescent psychiatrists (equal to 250 full-time equivalents [FTEs]) working in community mental health care, child psychiatric hospitals, private practices, and UMCs.

Organization of Services

The composition of the multidisciplinary pediatric psychosomatic medicine services (also termed *consultation-liaison services* in the Netherlands) varies greatly in terms of the degree of organization and integration of activities. The most comprehensive levels of service are offered in the UMCs. Typical staffing patterns are as follows: child psychiatrist (0.3–0.5 FTE), resident in child psychiatry (0.3–0.5 FTE), medical social workers (0.4–2.0 FTE), and child psychologists (2.0–4.0 FTE). Although inpatient consultation is generally multidisciplinary in nature, outpatients are most commonly managed by child psychologists and medical social workers. In the pediatric intensive care unit, patients always have access to 24-hour emergency services and to a dedicated psychosomatic medicine team, which is often directed by a child psychiatrist. Although good collaboration exists among pediatric colleagues, the same is not always true with the separately organized departments of medical/health psychology and behavioral medicine. Some UMCs have pediatric medical-psychiatric units or specialized treatment programs for eating disorders, somatoform disorders, and elimination disorders.

Funding of Services

Funding of both inpatient and outpatient consultation services is included either in the standard daily pediatric bed costs or in child psychiatry health care costs. In some cases, child psychiatrists and psychologists are assigned to a pediatric service from their own department of psychiatry in either formal or informal arrangements. In some institutions, mental health insurance contracts help fund outpatient consultation services.

Training

Although medical students receive no formal training in pediatric psychosomatic medicine, most residents in psychiatry receive a 6-month course in consultation-liaison psychiatry that focuses on adult and geriatric patients. Training in adult psychosomatic medicine includes some general requirements, such as the assessment and management of delirium, suicide assessment, altered mental status, refusal of medical treatment, and acute grief reactions. However, there are no formal training requirements specific to children. Although residents can take a final written examination in consultation-liaison psychiatry, there is no board certification. Since the 1980s, a 2-year training course has been available for board certification in general child and adolescent psychiatry.

Professional Organizations

The Nederlandse Vereniging voor Psychiatrie (NVvP), or Dutch Society of Psychiatry, has a membership of approximately 3,000 psychiatrists and several divisions, including those of child and adolescent psychiatry (≈350 members) and consultation-liaison psychiatry (≈150 members). The NVvP holds two annual scientific meetings and publishes a monthly scientific journal. The child and adolescent psychiatry group also organizes two scientific meetings each year and publishes a newsletter every 3 months. The Dutch Study Group on Pediatric Consultation Liaison Psychiatry is an unofficial group of consultation-liaison child psychiatrists

with approximately 14 members from UMCs and major child psychiatric hospitals. Members of this group meet four to six times per year and collaborate on clinical, funding, political, and research topics, as well as the preparation of clinical protocols, consensus documents, workshops, and presentations. Study groups are active in individual Dutch hospitals, working on clinical and research issues related to pediatric psychosomatic medicine. Dutch child psychologists have the option of membership in the Pediatric Psychology Network—The Netherlands. Finally, the European Association of Consultation Liaison Psychiatry and Psychosomatics (EACLPP) has a small but rapidly expanding informal subsection for European consultation-liaison child psychiatrists, and as of summer 2009, two child psychiatrists have been elected to the EACLPP board. The EACLPP organizes an annual scientific meeting in Europe and has an official journal, the *Journal of Psychosomatic Research.* As of fall 2009, a consultation-liaison child psychiatrist is also on the board of the European Delirium Association.

Journals and Publications

The Netherlands has national consensus reports on such topics as child abuse, gender identity disorder, and anorexia nervosa, and the Dutch study group has produced an internal consensus report on pediatric delirium. The major national Dutch journal is called *Tijdschrift voor Psychiatrie.* A Dutch textbook of pediatric psychosomatic medicine is currently in preparation, with publication scheduled for spring 2010.

Research

The major research initiatives in the Netherlands are located in UMCs with funding from the Ministries of Health and/or Education and Research and Science. Several institutes and groups conduct research in the field of pediatric psychosomatic medicine, including such topics as psychosocial outcomes following meningitis, gender identity disorders, quality of care, anorexia nervosa, morbid obesity, pain of unknown origin, and pediatric delirium.

Germany

Germany is a large industrialized country with 82 million inhabitants. Germany's health care system is almost entirely premium funded through compulsory health insurance. Physicians practicing in an outpatient setting are obligated to be members of the Kassenärztliche Vereinigung, an association of statutory health insurance physicians that is mandated to guarantee adequate medical care for all insured patients. Payments are transferred from health insurance to the Kassenärztliche Vereinigung and then distributed to individual physicians. Reimbursement for inpatient care is negotiated between hospitals and insurance companies. For medical treatment, reimbursement rates are determined by diagnosis-related groups; for psychiatric treatment, reimbursement is based on number of hospital days.

In addition to the system of inpatient care for children and adolescents that focuses on acute illness and that of outpatient care that focuses on prevention, two other systems of pediatric care exist in Germany: 1) a nationwide network of inpatient rehabilitation facilities for children with chronic physical illness, with an average length of stay of 3–4 weeks, funded either by health insurance or by pension schemes, and 2) outpatient centers for social pediatrics established for the diagnosis and treatment of children with physical disabilities. Rehabilitation for children with chronic illness is funded not only by health insurance but also in part by the Federal Agency for Work, the Accident Insurance for Children in Kindergarten and Schools, the pension scheme, the law for compensation for victims of violence, the youth welfare system, and local social security.

Organization of Services

In Germany, most pediatric psychosomatic medicine services are provided in pediatric hospitals, commonly staffed by a psychologist, and less frequently by a child or adolescent psychiatrist, with support from social workers, educational specialists, and teachers. Cooperation between disciplines is dependent on personal relationships between providers and a shared philosophy of patient care. A majority of pediatric hospitals run specialized medical-psychiatric units, which have longer lengths of stay than pediatric medical and surgical units. Typical problems addressed in these units include internalizing disorders, such as somatization and conversion disorders. By contrast, children with externalizing and psychotic disorders are more likely to be treated in a child psychiatric hospital. For inpatient psychiatric care, which may include medical-psychiatric units for psychosomatic disorders, legally prescribed standards dictate the nature of services that must be provided, include detailed task descriptions for each member of the multidisciplinary team, and indicate precise staff-to-patient ratios.

Outpatient treatment is provided by interdisciplinary teams in social psychiatry practices run by child and adolescent psychiatrists, or in psychiatric outpatient departments associated with a child and adolescent psychiatric hospital (Institutsambulanz). Services are reimbursed using time-based rates, although in university hospitals, lower and often inadequate reimbursement is provided using a flat rate for prescribed services. Data from German studies suggest a lack of coordination and integration of services, and often parallel systems of care (Ullrich 2004).

Funding of Services

Funding of psychiatric services within medical settings is negotiated between health insurance companies and hospitals on an individual basis without clear-cut regulations. Consultation between different services may have a system of internal financial reimbursement. One of the major impetuses for pediatric hospitals to run medical-psychiatric units rather than limited consultation services is to generate and maximize revenues.

Training

In some medical schools, departments of psychosomatic medicine, medical psychology, or oncology offer training to medical students in doctor-patient communication (e.g., on the topic of breaking bad news to patients and family members) (Kopecky-Wenzel et al. 2007, 2009). Training in child and adolescent psychiatry and psychotherapy lasts a minimum of 5 years, 4 of which must be done under the auspices of a person accredited as a program director by the Board of Physicians. One year must be completed either in pediatrics, psychiatry, or adult psychosomatic medicine. Training concludes with a certification examination administered by the Board of Physicians. Adult psychiatry has two distinct recognized specialties, one of psychiatry and psychotherapy and one of psychosomatic medicine and psychotherapy, each with a 5-year training program. General practitioners may practice "psychosomatic basic care" after completing 30 hours in a Balint group focused on aspects of the doctor-patient relationship, 20 hours of theory, and 30 hours of acquiring skills in techniques of verbal intervention (Rüger et al. 2002).

Professional Organizations

Pediatric professional organizations in Germany include the German Society for Scientific Child and Adolescent Medicine, the German Society for Pediatric Surgery, the German Society for Social Pediatrics and Youth Medicine, and the Association of Pediatricians in Private Practice. Organizations for child and adolescent psychiatrists include the German Society for Child and Adolescent Psychiatry, Psychosomatics and Psychotherapy; the Association of Child and Adolescent Psychiatrists in Private Practice; and the Association of Program Directors and Heads of Hospitals for Child and Adolescent Psychiatry and Psychotherapy. Psychologists practicing psychotherapy are associated with the German Organization of Psychotherapists and the Association of German Psychologists. Each professional association organizes congresses and scientific meetings that may include topics in psychiatric consultation or psychosomatic medicine. In addition, a small circle of psychologists and child and adolescent psychiatrists is engaged in a psychosomatic medicine work group that meets regularly to exchange ideas.

Journals and Publications

In Germany, practice guidelines are coordinated by an association of 153 scientific medical associations from all fields of medicine (Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften 2008) that represents Germany in the Council for International Organizations of Medical Sciences. Included are guidelines on consultation in psychosomatic medicine. National guidelines on the management of asthma and diabetes include a section on children, but no specific recommendations are provided covering children's mental health issues.

The major journals include *Zeitschrift für Kinder- und Jugendpsychiatrie und Psychotherapien* (Journal for Child and Adolescent Psychiatry and Psychotherapy), *Praxis der Kinderpsychologie und Kinderpsychiatrie* (Practice of Child Psychology and Child Psychiatry), *Kindheit und Entwicklung* (Childhood and Development), and *Monatsschrift Kinderheilkunde* (Pediatrics Monthly). Major German textbooks include those by Herpertz-Dahlmann et al. (2003), Warnke and Lehmkuhl (2003), and Herpertz-Dahlmann and Warnke (2006).

Research

German research in pediatrics and child and adolescent psychiatry has a strong interest in genetics, molecular metabolism, and psychophysiology. Research is funded by the German Research Council and the Federal Ministry of Education and Research. Research in the field of psychosomatic med-

icine has included studies on eating disorders, obesity, and gender identity disorders.

India

India is one of the largest and most rapidly growing countries in the world, with a population of 1 billion people. Health care services in India are provided through the public health care system of general hospitals as well as a network of private hospitals and clinics. India is going through an exciting surge of development in various fields, including health care. The impact of globalization has led to greater awareness and openness to psychological issues, particularly in urban areas.

Organization of Services

Although India has well-established adult psychiatric services for individuals with major psychiatric illnesses, some disparity exists in terms of the availability and delivery of services in rural versus urban areas. Pediatric psychiatry, however, is still a developing specialty in India. Very few established programs are dedicated exclusively to the psychiatric treatment of children and adolescents or their families. India has no private hospitals dedicated exclusively to the provision of inpatient care for children and adolescents with psychiatric issues and no medical-psychiatric units. However, a few university hospitals have established departments of child and adolescent psychiatry that provide both inpatient and outpatient services as well as traditional inpatient-based consultation-liaison services. These hospitals play an important role in resident education. Because specialized accredited training programs in child and adolescent psychiatry do not exist, the major teaching hospitals provide electives in child and adolescent psychiatry for adult psychiatry residents.

In general, pediatricians, general practitioners, and adult psychiatrists are the primary care providers for children and adolescents with psychiatric issues. However, referrals of children and adolescents for psychiatric treatment tend to be limited as a result of stigma attached to psychiatric illness and poor training at the graduate level of education. Families are more inclined to seek help for a child's academic difficulties and are more willing to pursue treatment options, including medication use, in the context of academic progress. In recent years, especially in metropolitan cities like Bangalore, practitioners have been receiving increasing referrals regarding learning disabilities, attention-deficit/hyperactivity disorder, and developmental disorders such as autism. Nonetheless, behavioral issues and psychosomatic illnesses are quite common presentations in the urban areas and are well documented in the Indian literature. Psychosomatic presentations commonly encountered in children and adolescents include psuedoseizures, headaches, stomachaches, difficulty in breathing, and limb pain. Alternative traditional modes of treatment, such as yoga, meditation, homeopathy, and Ayurveda (an ancient form of medical practice, primarily using herbs and extracts of various medicinal plants), are often pursued.

In rural areas, pediatric services are provided by medical officers, traditional healers, and medical trainees in the primary health centers, as well as by outreach programs run by either governmental or nongovernmental organizations. Psychosomatic presentations in rural settings can take the form of illness related to religious customs (such as being possessed by demons or a god) and are most often treated with traditional forms of therapy, as earlier mentioned, based on beliefs in the community. Patients in urban and metropolitan areas have greater access to psychiatric services, in particular in the outpatient setting. Significant growth has occurred in office-based practices in the past decade. Rates of psychiatric hospitalization and medication use in children and adolescents are low compared with those in Western countries.

Funding of Services

Funding for health services in government-run hospitals versus those in private settings varies. Government-run hospitals provide services free of cost or at minimal cost to patients. In contrast, patients pay the costs of inpatient treatment in private hospitals. The concept of private health insurance has become more common with the expansion of multinational companies, which provide their employees with insurance coverage for inpatient care hospitalization. However, private insurance plans, when available, do not provide coverage for outpatient treatment.

Training

Medical schools in India require a mandatory psychiatry rotation during the final year. Residency training in adult psychiatry, offered in teaching and university hospitals to graduates who have completed the M.B.B.S (Bachelor of Medicine, Bachelor of Science), includes a 2-year course leading to a Diploma in Psychiatric Medicine and a 3-year course

leading to an M.D. in Psychiatry. Board certification examinations for the above programs are mandatory after completion of residency training. Specific fellowship programs in child and adolescent psychiatry are not available, but residents with a specific interest often work in departments of child and adolescent psychiatry in order to gain exposure to child-related issues. Plans are under way to introduce child and adolescent fellowship programs at the university level, but the subspecialty of child and adolescent psychiatry has not yet been established. A department of child and adolescent psychiatry is available in only few centers. Subspecialties of pediatric psychiatry such as pediatric psychosomatic medicine have yet to be developed. Similarly, board certification in psychosomatic medicine does not exist.

Professional Organizations

The Indian Psychiatric Society and Indian Association of Private Psychiatry are the major Indian professional organizations. These associations have regional chapters and are integrated within the World Psychiatric Association. These groups also organize regular scientific meetings and opportunities for continuing medical education. The Indo-American Psychiatric Association is a collaborative organization that holds regular meetings in association with the annual meeting of the American Psychiatric Association in the United States. Other collaborative professional groups include the British Indian Association of Psychiatry, the Indo-Canadian Psychiatric Association, and the Indo-Australian Psychiatric Association. In addition, the Association for Asian Psychiatrists and the Association for Community and Social Psychiatry represent the interests of populations in other southern Asian countries.

Journals and Publications

The Indian Psychiatric Society, and Indian Association for Child and Adolescent Mental Health publish monthly journals with updates on research and clinical practices. Most of the commonly used reference textbooks are published by Western authors. Reference textbooks by Western authors and Indian authors are available and are widely used. The ICD-10 (World Health Organization 1992) diagnostic system is preferred over DSM-IV (American Psychiatric Association 1994). Clinical practice guidelines for the management of psychiatric disorders in the Indian context have been compiled by the Indian Psychiatric Association; four volumes (2005–2008) have been published so far.

Research

Research in psychiatry is located primarily in the major universities and teaching hospitals. The National Institute of Mental Health and Neurosciences, located in Bangalore, is a premier center for psychiatric research. Research is funded partly by the government and/or through collaborative research projects with other countries. Research on pediatric psychosomatic issues is still in the developmental stage in India due to the difficulties associated with funding and infrastructure and to the shortage of qualified pediatric psychiatrists.

China

China is a large and rapidly developing country with a population of over 1.3 billion people. An estimated 30 million children and adolescents have mental health problems in China. The first inpatient child psychiatry unit was established in the late 1950s, but the specialty of pediatric psychosomatic medicine (referred to in China as psychological medicine, medical psychology, or consultation-liaison psychiatry) was not established until the late 1980s. The first child medical psychology department in a general children's hospital on the Chinese mainland was set up at Tianjin Children's Hospital in 1988. Now, approximately 30 major children's hospitals have departments of psychological medicine; most of these hospitals are located in large or mid-sized cities. Most children's hospitals have outpatient mental health clinics, although some children still receive services in adult clinics.

Organization of Services

The professionals working in the specialty of pediatric psychosomatic medicine mainly include child psychiatrists and pediatricians trained in child psychiatry (both referred to as "psychological doctors") and developmental pediatricians. There are only a few practicing child psychologists and social workers, and these professionals work in China's major psychiatric hospitals. As of 2006 (according to data from the Chinese Center for Disease Control and Prevention [He 2006]), about 150 child psychiatrists were working in psychiatric hospitals or child mental health centers in China; most of these professionals were practicing in psychiatric hospitals in major cities. Most general psychiatrists (about 26,000 in number) provide both adult and child mental health services. An increasing number of developmental pediatricians practice in general hospi-

tals, children's hospitals, and community health care centers throughout China.

No reliable national statistical data are available regarding pediatric consultation-liaison services. Some recently published data indicated that the rates of inpatient psychiatry consultation in general hospitals were 0.27%–1.78% for adult inpatients of all ages (Yu 2003). Referrals generated in pediatric settings were only about 0.93%–3.2% of total psychiatric referrals (Lin 2006; Xiao 2001), with higher rates in hospitals with existing departments of psychological medicine. At the Children's Hospital of Fudan University, in Shanghai, which has had an established department of psychological medicine since 1998, data show a mean rate of psychiatric referrals of approximately 0.5% of all hospital admissions.

Funding of Services

The funding of consultation-liaison services, both outpatient and inpatient, is identical to the funding of other routine medical care. For example, in many urban areas, patients are eligible for reimbursement of at least 50% of consultation-liaison service costs from local children's health insurance or from parents' employee benefits. Other funding sources include rural cooperative medical insurance and commercial medical care insurance. In some cases, families self-pay for their children's consultation-liaison services.

Training

All Chinese medical schools have courses in medical psychology, and medical students are required to complete a 4-week rotation in psychiatry prior to graduation. In some medical schools, a number of hours are dedicated to specific topics in pediatric psychosomatic medicine. Psychiatry residents must complete a 3-year rotation in one of the psychiatry training institutes certified by the National Ministry of Health and may transfer to subspecialty training after passing an examination offered at the institute. Graduates of these programs are eligible for the national board certification in psychiatry. No subspecialty board certification is available in either child psychiatry or psychosomatic medicine. Only five universities offer masters or doctoral degrees in child psychiatry. Several annual national continuing medical education courses on child mental health are offered to pediatricians. In addition, some pediatricians may opt to complete a 6- to 12-month training program offered in some of the psychiatric hospitals.

Professional Organizations and Journals

The two major professional organizations for child psychiatrists or pediatric mental health professionals are the Chinese Society of Child and Adolescent Psychiatry, and the Children's Mental Health Committee of the Chinese Association for Mental Health. Other important national organizations include the Chinese Psychosomatic Medicine Society and the Chinese Behavioral Medicine Society. Each of these associations usually organizes annual national conferences. The major Chinese journals include the *Chinese Journal of Nervous and Mental Diseases, Chinese Journal of Psychiatry, Chinese Mental Health Journal, Shanghai Archives of Psychiatry,* and *Chinese Journal of Child Health Care,* The most widely used textbooks of child psychiatry in Chinese are by Tao Guotai (1999) and Li Xuerong (1994).

Research

Research on pediatric psychosomatic medicine in China includes the study of behavior problems and quality of life in children with epilepsy, asthma, obesity, diabetes, leukemia, and congenital malformations. Another important research focus is that of unexplained pediatric somatic symptoms. Research is usually funded by grants from organizations such as the National Natural Science Foundation of China, from local or regional foundations such as the Sichuan Science and Technology Department, or more rarely from commercial companies. Although the number of publications has increased in recent years, there is still a marked lack of multicenter clinical research and nationwide epidemiological studies.

Brazil

Brazil is a South American country with 186 million people. Of the entire population, 12% are classified as indigent and 30% as poor. Approximately 66 million Brazilians are younger than 18 years of age. The Brazilian Association of Psychiatry (Associação Brasileira de Psiquiatria 2009), in partnership with the Institute IBOPE (Instituto Brasileiro de Opinião Pública e Estatística [Brazilian Institute of Public Opinion and Statistics]), conducted a national survey to assess the mental health of Brazilian children. The study estimated the prevalence of symptoms of mental disorders commonly occurring during childhood and adolescence (ages 6–17 years) and the forms of care most often used. In August 2008, 2,002 interviews were conducted in 142 municipalities in all regions of Brazil. According to the survey,

12.6% of mothers reported having a child with mental health problems severe enough to require treatment or specialist help. (This number equates to about 5 million children throughout Brazil.) Of these, 28.9% could not or did not have access to public assistance, 46.7% were treated through the Sistema Unico de Saúde (the Brazilian National Health System), and 24.2% were treated through a private health plan or paid for care out of pocket.

Brazil has one child and adolescent psychiatrist for every 33,561 individuals with severe symptoms of psychiatric illness (Moraes et al. 2008), which is equivalent to fewer than 3 psychiatrists for every 100,000 individuals younger than 20 years with a severe mental disorder. In contrast, the United States has 160 psychiatrists for every 100,000 potential patients (Thomas and Holzer 2006).

Brazil has numerous university medical centers, located primarily in the larger cities. Brazil also has 140 publicly financed federal medical schools, although only 15 of these have child psychiatry programs. Psychiatric hospitals cater predominantly to adult patients, although a small portion of them also treat children and adolescents. A small number of child and adolescent psychiatrists participate in Centers for Psychosocial Care for children and youth (known as CAPSi), which are multidisciplinary team day treatment programs distributed throughout the country. Data from the Brazilian Ministry of Health indicate that only 264 CAPSi centers specialize in mental health care for children and adolescents (Associação Brasileira de Psiquiatria 2009).

Organization of Services

In Brazil during the 1990s, psychosomatic medicine or consultation-liaison services were available in 86% of 63 general hospitals offering adult psychiatric services (Martins and Botega 1998). Although an estimated two-thirds of patients admitted under pediatric services would benefit from psychiatric consultation, only 11% of the pediatric resources request such consultations (Reckziegel et al. 1999). Few medical centers that treat children and adolescents have a psychiatric consultation department. The most comprehensive services are offered in the university medical centers. When available, consultation is usually provided by child psychiatrists or psychologists, not using a multidisciplinary model of care. However, alternate systems of service do exist. For example, the child and adolescent psychiatry division at Hospital de Clínicas de Porto Alegre (HCPA) provides a more integrated model, offering multidisciplinary care that covers the child, family, community, and hospital staff. The multidisciplinary consultation-liaison team includes part-time psychiatrists and residents, pediatric neurologists, nurses, psychologists, social workers, occupational therapists, and educators, including teachers. Outpatients are primarily assessed and treated by the child psychiatrists and residents in training. The child and adolescent psychiatry division, which provides consultation-liaison services for HCPA's center for primary care, was established in 2005 with the objective of advising teams on the diagnosis and treatment of pediatric mental health issues within the context of outpatient primary care. At HCPA child psychiatrists are on duty to provide consultation-liaison services for hospitalized and emergency pediatric patients as needed.

Funding of Services

In Brazil, the Sistema Unico de Saúde, the Brazilian National Health System, covers all hospital services, including psychiatric assessment and treatment, regardless of the necessity of consultation-liaison (Conselho Nacional de Secretários de Saúde 2003).

Training

Medical students do not receive training in psychosomatic medicine. Residents in child and adolescent psychiatry have had a 1-year training course in psychosomatic medicine issues and see cases under the direct supervision of a senior child and adolescent psychiatrist. Although Brazil has no board certification in psychosomatic medicine, there has been a specific 2-year training course for board certification in child and adolescent psychiatry dating from the late 1980s. However, psychiatrists who had completed a fellowship in child and adolescent psychiatry recognized by the Associação Brasileira de Psiquiatria, the Brazilian Psychiatric Association, numbered only 300 in 2009 (Associação Brasileira de Psiquiatria 2009).

Professional Organizations

The Associação Brasileira de Psiquiatria, which has 5,500 members, has several departments; the two most important in this context are the department of child and adolescent psychiatry and the department of adult consultation-liaison psychiatry. The association holds one scientific meeting each year

and publishes a scientific journal on general psychiatry topics. Brazil has no official study group in pediatric psychosomatic medicine.

Journals and Publications

The main national journal is the *Revista Brasileira de Psiquiatria*, a quarterly publication of the Associação Brasileira de Psiquiatria, which publishes original articles in all areas of psychiatry, including psychosomatic medicine. The major Brazilian psychiatric consultation-liaison textbook is Botega's (2006) *Prática Psiquiátrica no Hospital Geral: Interconsulta e Emergência,* Second Edition.

Research

Recent papers on pediatric psychosomatic medicine are limited to epidemiological data, case studies, and descriptions of models of care (Bassols et al. 2007). The Conselho Nacional de Desenvolvimento Científico e Tecnológico (National Council for Scientific and Technological Development) is an agency of the Ministério da Ciência e Tecnologia (Ministry of Science and Technology) that is dedicated to the promotion of scientific and technological research and the training of human resources for research in Brazil. Its major objective is to promote scientific research, technology, and innovation through financial support to projects in all areas of knowledge.

Nigeria

Nigeria is Africa's most populous country, with an estimated 150 million people who speak over 260 different languages. Approximately 45% of the country's population is age 15 years or younger. Nigeria has suffered much instability in governance, and as a result, health and associated social services have suffered greatly. Nigeria operates a federal system with three tiers of government: a central administration, 36 states with their administrative headquarters, and 774 local government areas (districts). The health care system is organized according to the three tiers of government: tertiary health care is provided principally by the federal government, consisting of specialized services in teaching and other specialist hospitals; secondary health care is provided in general hospitals run primarily by state governments; and primary health care is constitutionally the responsibility of local governments.

For every 1,000 children born in Nigeria, 110 will die before their first birthday, and 200 will die before their fifth birthday (Federal Ministry of Health 1996; World Health Organization 2004). The World Health Organization rates Nigeria 180th out of 191 member states for fairness of financial contribution to the health system and 188th out of 191 member states for equality of access to health care (Gureje 2005). The government of Nigeria spends only 3% of the total general government expenditure on health. At present, the apparent focus on identifiable immediate causes of childhood mortality has led to an almost total neglect of child mental health care.

Nigeria has 11 psychiatric hospitals, 26 psychiatric units or departments in teaching hospitals, 8 psychiatric units in state general hospitals, and 5 units in the Armed Forces hospitals. Serving the population of Nigeria are only about 150 psychiatrists, a ratio of 1 psychiatrist to 1 million people. Most children in Nigeria do not have access to formal mental health services. In 1999, the first separate child psychiatric outpatient clinic, the Harvey Road Children's Centre, was opened at the Yaba Psychiatric Hospital. A few months later, in 2000, services commenced in a separate child and adolescent psychiatry clinic at the University College Hospital, Ibadan (Omigbodun 2004). Currently, 10 facilities have varying degrees of child and adolescent facilities, ranging from simple outpatient clinics to inpatient admission facilities. Virtually all the mental health expertise is at the tertiary level, and even though there is a mental health policy stating that mental health should be integrated into primary health care, this is yet to be actualized.

Organization of Pediatric Psychiatry Consultation

Organized pediatric psychosomatic services are nonexistent in Nigeria. No routine, structured relationship exists between pediatrics and child psychiatry, and pediatricians and child mental health professionals have no organized meetings for clinical reviews or to discuss patients. The relationship with pediatrics depends largely on the individual pediatrician's disposition toward psychiatry. Commonly, most pediatricians, pediatric neurosurgeons, and other child health professionals may not see a need to or may prefer not to work with psychiatrists due to stigma. Some have been known to protest the admission of children with mental health symptoms onto pediatric wards.

Funding of Services

Because Nigeria has no organized consultation-liaison services, the amount of funding that goes toward these services is unknown. However, most of the funds for mental health services go toward the maintenance of psychiatric hospitals at the tertiary level of care.

Training

In a few training centers, medical students have formal lectures in pediatric psychosomatic medicine and are introduced to the psychiatric aspects of pediatric disorders, but they have no formal clinical exposure. Subspecialty training in child and adolescent psychiatry has yet to be developed. About 10 psychiatrists have received varying degrees of training in child and adolescent psychiatry and are developing services for children within their centers. However, residents in psychiatry do a rotation in child psychiatry for a minimum of 6 months. Some residents who are based in teaching and general hospitals have exposure to a small amount of pediatric consultation-liaison psychiatry depending on the number of referrals that are received during this 6-month period. Adult consultation-liaison psychiatry is a part of training for residents in psychiatry, and those residents in teaching and general hospitals have some exposure.

The faculty of psychiatry in the National Postgraduate Medical College of Nigeria, the monitoring and examining body for postgraduate professional training in Nigeria, is currently reviewing a proposal for the commencement, hopefully in 2010, of postgraduate training in child and adolescent psychiatry. Within this proposal is a period of at least 6 months for pediatric consultation-liaison psychiatry training.

Professional Organizations

Nigeria has no professional organizations for pediatric psychosomatic medicine. The professional body for psychiatrists is the Association of Psychiatrists in Nigeria, and the professional organization for pediatricians is the Paediatric Association of Nigeria.

Journals and Publications

Medical professionals in Nigeria rely largely on foreign journals for information on psychosomatic medicine. Journals such as the *African Journal of Medicine and Medical Sciences,* published by the College of Medicine, University of Ibadan, and the *West African Journal of Medicine* include some articles on psychosomatic medicine. Other useful journals include the *Nigerian Journal of Psychiatry,* the official journal of the Association of Psychiatrists in Nigeria, and the *Nigerian Journal of Paediatrics,* published by the Paediatric Association of Nigeria.

Research

Very little Nigerian research has been done in the area of pediatric psychosomatic medicine. A small number of case reports (Oladokun et al. 2008; Omigbodun et al. 2008) and epidemiological studies have demonstrated a strong need to establish more comprehensive mental health services within pediatric medicine (Bakare et al. 2008; Gureje et al. 1994; Omigbodun et al. 1999).

Australia

Australia is a geographically large country (similar in size to the United States) with a relatively small population of approximately 21 million. Children and adolescents ages 0–18 years make up approximately 25% of the population (Australian Bureau of Statistics 2006). Australia is a multicultural country with a high standard of health care, with total spending on health of 9.8% of the gross domestic product. Mental health spending accounts for 7.3% of the total health budget, or A$3.9 billion (US$2.75 billion) annually. Government sources provide 96% of mental health funding, with the remainder coming from private health insurance funds. Approximately two-thirds of the total mental health budget is spent on adults ages 18–64 years, with the remainder being divided among children and adolescents, older persons, forensic services, and nongovernmental organizations. The country has 9.3 psychiatrists per 100,000 population (Australian Government 2007). A total of approximately 360 child and adolescent psychiatrists (personal communication, Royal Australian and New Zealand College of Psychiatrists [RANZCP], 2008) work in private practice, pediatric hospitals, child psychiatric units, and community mental health centers.

Organization of Services

Pediatric psychiatric consultation in Australia is provided by multidisciplinary teams within children's hospitals under the leadership of a child and adolescent psychiatrist. The multidisciplinary teams, often referred to as consultation-liaison teams, are situated within departments of psychological medicine

and consist of medical practitioners, including the consulting psychiatrist, psychiatry registrar (psychiatrist in training), and, increasingly, a pediatrics registrar (pediatrician in training). In addition, teams may include clinical psychologists, social workers, specialist psychiatric nurses, and transcultural mental health workers.

Although the prevalence of mental disorders among children and adolescents in Australia is around 14%, only 25% of those with clinical problems access any mental health service, including consultation with pediatricians (Sawyer et al. 2001). In fact, pediatricians see 11% of children with a mental health disorder, making them an important part of the assessment, treatment, and referral process for such children.

Consultation-liaison services in pediatric hospitals generally provide a range of services, including consultation on clinical issues and liaison with medical teams through attendance at medical team meetings. For disorders with a strong comorbidity between physical and mental health, such as eating disorders, specialized medical-psychiatric units operate in the hospital. Psychiatrists may also directly admit patients to medical wards for investigation or management, for example, to rule out diagnoses of conversion or factitious disorder. In addition, the consultation-liaison team often provides outpatient services, which may include services provided to hospital patients, services for those in the local community, tertiary-level consultation for patients outside of the hospital catchment area, or specialized clinics for children with specific mental health disorders, especially those with physical health implications or comorbidity.

All children's hospitals in Australia have direct links with specific universities, often offering conjoint clinical academic positions to university staff who have responsibilities for teaching, research, and clinical care. In addition, clinical academic appointments are common wherein hospital-employed clinicians are recognized by the university with an academic title and are expected to contribute to university teaching and supervision. University treatment clinics are often located within the hospital.

Mental health services within hospitals are dependent on local conditions in each hospital. In practice, trust has been built up over many years as a result of active attempts on the part of departments of psychological medicine to provide a useful service to hospital patients. This is often individualized and depends on local professional relationships. Services are coordinated on a local basis in each hospital. Larger departments may have individual consultation-liaison teams that provide services to particular medical and surgical teams to facilitate referral and professional relationships.

Funding of Services

Hospital services are funded through a mix of federal and state governments, although the day-to-day operations of the hospital system are run entirely by state governments. Access to these public services is unrestricted and free of charge to Australian residents. Departments of psychological medicine within hospitals receive their funding from the hospital administration, according to annual local resource allocations.

Training

The RANZCP determines the bylaws for training in psychiatry, including in the subspecialty area of child and adolescent psychiatry. In the past, consultation-liaison psychiatry was a mandatory 6-month rotation for trainees in child psychiatry. This expectation has been changed in recent years to a requirement that trainees see an unspecified number of such cases and select five cases that illustrate the trainee's breadth of experience. Trainees document the selected cases in their training logbooks. Under these training bylaws, consultation-liaison psychiatry is broadly defined and can include significant co-management between psychiatrists and general practitioners, pediatricians, or other nonpsychiatric health care workers.

Trainees wishing to commence training in child and adolescent psychiatry must have already completed at least 3 years of basic training in psychiatry with the RANZCP, including passing the college's written and clinical examinations. Although they take no further examinations, trainees must work in supervised practice for a period of 2 years, attend a formal education course throughout training, and complete detailed logbooks of their experience. Also, their supervisors must provide reports about the trainees to the college every 6 months. On the completion of this accredited training, trainees are eligible to receive a certificate of advanced training in child and adolescent psychiatry. Such training is also open to pediatric medicine trainees under the dual fellowships training program. This training takes a minimum of 7 years to complete, but results in certification as both a pediatrician and a child

psychiatrist. Such dual fellows are in a unique position to practice psychosomatic medicine, but their practice is not limited to this specialty.

Journals and Publications

The two psychiatric journals that are published in Australia and New Zealand are the *Australian and New Zealand Journal of Psychiatry* and *Australasian Psychiatry.* Practice parameters and consensus reports on clinical practice in child psychiatry have been produced by the RANZCP and are available on its Web site. In addition, federal and state governments have also produced guidelines such as treatment guidelines for attention-deficit/hyperactivity disorder, suicide risk assessment, and early intervention in autism. Health organizations have produced their own guidelines, such as for early intervention in psychosis.

Research

Clinical research occurs throughout the hospital system. The main funding body is the National Health and Medical Research Council. Postgraduate students also engage in clinical research, which may be funded by scholarships from the universities or by their employing institutions. Psychiatrists working in the public health system may receive generous annual training as well as education funding and leave, depending on their state of residence. This funding is often used to support research by providing time, although it is intended to support education initiatives, such as conference attendance, rather than the costs associated with research per se. Some hospital departments expect psychiatrists to engage in research and provide protected time to pursue this work.

Concluding Comments

The foregoing review suggests that there are widely differing models for the practice of pediatric psychosomatic medicine. Support for psychiatric consultation varies not only from country to country but also within individual health care systems, which offer varied degrees of acceptance and support for psychosomatic medicine services. Attitudes and knowledge about the benefits of mental health consultation vary, both internationally and within the United States (Alhamad et al. 2006).

The lack of strong empirically based data to support the financial and psychological benefits of such consultation has historically made it difficult for departments of psychiatry and psychology to confidently advocate for support for their services despite the strong clinical experience of the value of such services (Gündel et al. 2000). With the exception of a small number of studies with adult patients, limited data are available to demonstrate cost savings or reductions in length of stay as a result of mental health consultation within the medical setting (Andreoli et al. 2003; Levitan and Kornfeld 1981; Strain et al. 1994). In this textbook, contributors summarize much of the available evidence that does support the benefits and efficacy of interventions within pediatric psychosomatic medicine, with the goal of promoting the expansion and integration of this important specialty within the broader health care system.

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2

Adaptation and Coping in Chronic Childhood Physical Illness

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Between 10 and 20 million U.S. children have chronic health conditions (J.M. Perrin 1985). Most of these conditions are relatively mild and interfere little with normal activities, but approximately 1%–2% of children have conditions that have an impact on their daily lives (J.M. Perrin 1985). Chronic illnesses are illnesses of long duration or illnesses whose consequences are of long duration (J.M. Perrin 1985). More specifically, they are conditions that interfere with daily functioning for more than 3 months in a year, lead to hospitalization for more than 1 month in a year, or are expected to do either of these (J.M. Perrin 1985). Unlike adult illnesses, which are few in number and relatively common (e.g., arthritis, hypertension, and diabetes), there are many childhood chronic illnesses, and each of these is relatively rare.

Pediatric physical illnesses have become more prevalent in recent years. This rise is a result of increased life expectancy among children with chronic illnesses such as cystic fibrosis; improved survival rates among infants who are premature or of very low birth weight; and the emergence of new illnesses, such as AIDS, that can affect children (R.J. Thompson and Gustafson 1996). Contributors to improved health and prognosis for these children include advances in the behavioral sciences surrounding the understanding and treatment of disruptive behavior, anxiety, and depressive disorders, as well as availability of manual-based treatments and medications such as the selective serotonin reuptake inhibitors (SSRIs). More than 90% of children with significant physical disorders are likely to survive into adulthood (R.J. Thompson and Gustafson 1996). This improved prognosis has fostered increasing interest in understanding the factors affecting adaptation and resiliency.

Childhood illnesses affect daily functioning via the direct medical effects of the illness, such as restrictions on a child's physical development and on abilities to engage in accustomed and expected activities. In addition, children may develop emotional and behavioral responses to the illness, including maladaptive coping strategies, which may last hours, days, months, or years. In addition, most chronic illnesses require intermittent pediatric services, such as for diagnosis, routine checkups, and medical crises. Physical illnesses can impinge on a

child's health-related quality of life as a direct result of the disease state or as a result of a change in functional status or psychosocial functioning. These illnesses and their treatments may also cause physical pain and discomfort.

Much of the existing literature on the ways in which children and families respond to the demands of a chronic childhood illness has focused on evaluating coping responses. A *coping response* has been defined as an intentional physical or mental action, initiated in response to a perceived stressor, that is directed toward external circumstances or an internal state (Lazarus and Folkman 1984). In contrast, a *stress response* is a spontaneous emotional or behavioral reaction, and not a deliberate attempt to manage a situation. A *coping goal* is the objective or intent of a coping response, usually stress reduction or reduction of the negative impacts of a stressor (Lazarus and Folkman 1984).

In this chapter, we address the many factors that influence children's abilities to adapt to general medical conditions. The emphasis is on understanding how children's coping styles and developmental levels shape their emotional and behavioral responses to physical illness. Additional risk factors that have been linked to distress include history of medical procedures, child anxiety, parent anxiety, and parent interaction style. A thorough understanding of these factors can enable consultants to anticipate children's adjustment difficulties and to intervene effectively.

Conceptualizations of Chronic Illness

One of the controversies within the medical coping literature focuses on the use of a categorical versus a noncategorical approach to conceptualizing the childhood illness experience (R.J. Thompson and Gustafson 1996). In categorical approaches, illnesses are grouped in terms of specific diseases, such as inflammatory bowel disease or asthma. These approaches consider the different rates and presentations of psychological problems in childhood within each category of illness (e.g., cancer, heart disease). This method has the advantage of being able to identify important differences between conditions and to identify specific targets for intervention. However, as pediatric psychosomatic medicine has evolved, an increasing focus has been placed on the characteristics that pediatric illnesses have in common, and efforts have been made to categorize these conditions along a variety of dimensions.

In noncategorical approaches, pediatric medical conditions are classified based on general dimensions that are considered common to the illness experience regardless of the specific condition a child has, such as visible/invisible, fatal/nonfatal, and stable/unpredictable. These noncategorical approaches take into account a child's premorbid emotional functioning and developmental stage, as well as the degree of psychosocial stress in his or her environment. Noncategorical approaches view the stressors that physically ill children and families experience as being due to a variety of environmental factors that are not related to the child's condition or to the experience of the illness.

Models of Adaptation and Coping

The trend in the coping literature has been toward developing integrative models of adaptation to pediatric illnesses that are inclusive rather than reductionistic (R.J. Thompson and Gustafson 1996). Both Wallander and Varni (1992) and R.J. Thompson (1985) have developed such models, which display the interconnectedness of child and parent adaptation and child and parent adjustment.

The model of Wallander and Varni (1992) builds on simpler models of factors influencing children's coping with chronic illnesses (Pless and Pinkerton 1975) and on a more general understanding of adjustment (Masten and Garmezy 1985) (see Figure 2–1). This model presents a risk and resilience framework of responses to stress. In this model, children with chronic illnesses display adjustment problems because they are exposed to negative life events. These negative events stem from both their physical illness and from other general stressors in their lives that may or may not be related to the illness (Wallander and Thompson 1995). This model has guided a number of research studies (e.g., Varni et al. 1989), but, because of its complexity, some aspects of it have yet to be evaluated.

R.J. Thompson (1985) used an ecological-systems theory perspective to develop a transactional model of stress and coping (see Figure 2–2). Childhood chronic illness is seen as a stressor to which the child and family must adapt, and the relationship between illness and adjustment depends on biomedical, developmental, and psychosocial processes

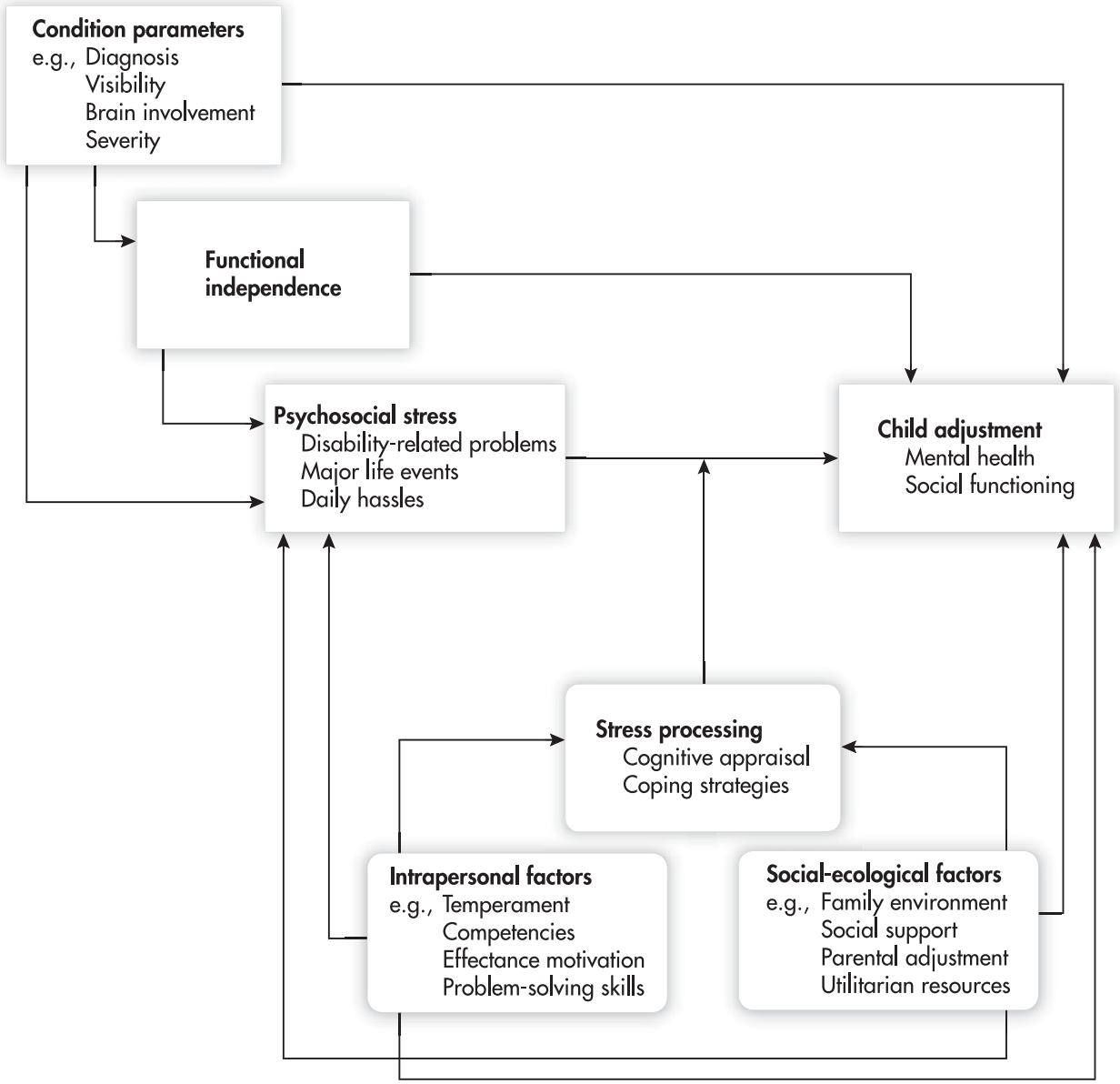

FIGURE 2–1. Wallander and Varni's (1992) disability-stress-coping model of adjustment.
Source. Reprinted from Wallander JL, Thompson RJ, Alriksson-Schmidt A: "Psychosocial Adjustment of Children With Chronic Physical Conditions," in *Handbook of Pediatric Psychology,* 3rd Edition. Edited by Roberts MC. New York, Guilford, 2003, p. 152. Copyright 2003, Guilford Press. Used with permission.

(Wallander and Thompson 1995). The model focuses on child and parental adaptational processes rather than on biomedical or demographic factors, due in part to the importance of the former in intervention efforts. Several studies have been conducted to test relationships within this model, particularly with regard to child health locus of control and self-esteem (e.g., Gil et al. 1991).

CORRELATES OF PSYCHOSOCIAL ADJUSTMENT

Condition Parameters

Among health conditions that do not involve the brain, such as heart disease and asthma, few differences have been found with regard to child psychosocial adjustment (E.C. Perrin et al. 1993). Findings

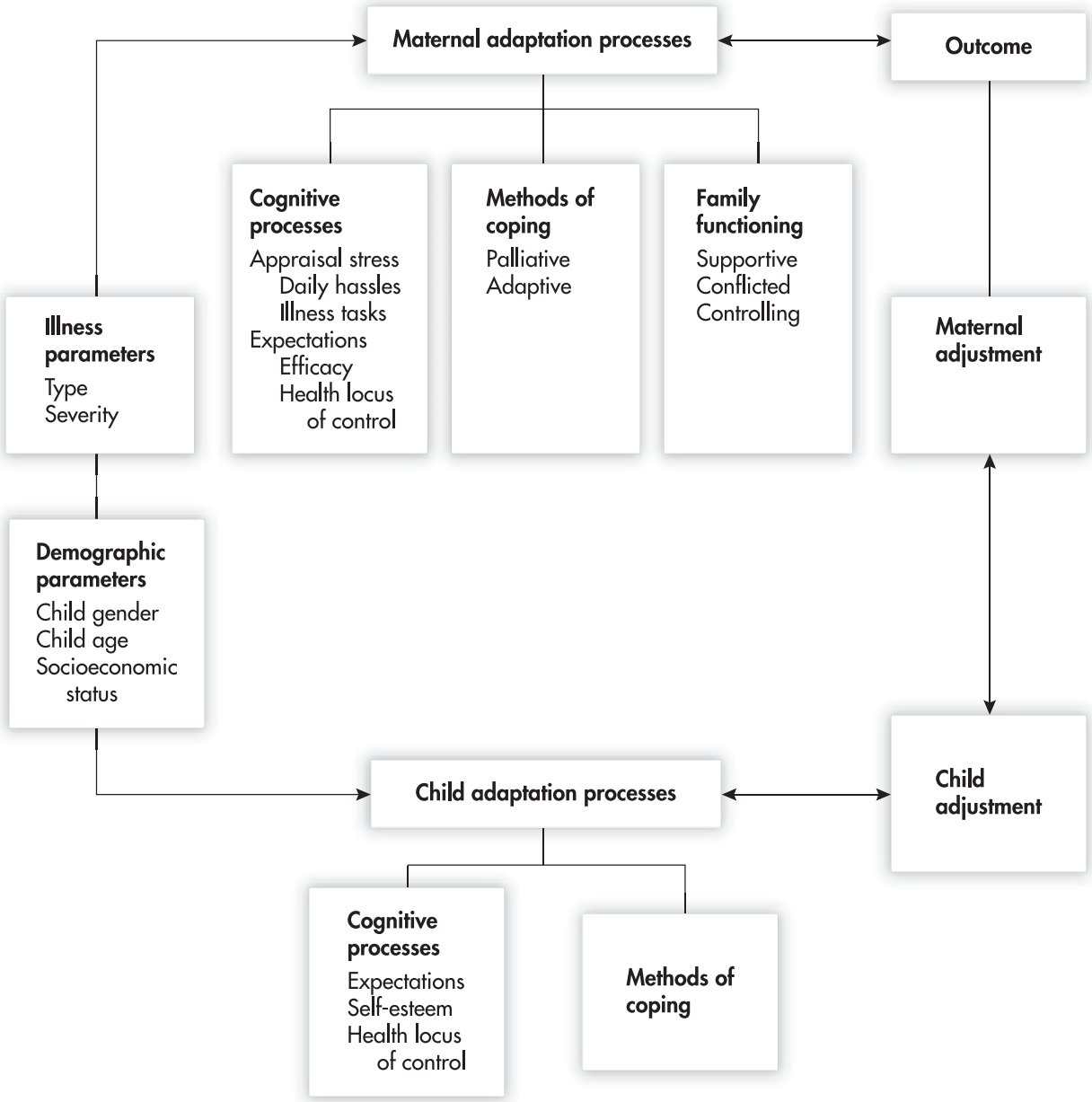

FIGURE 2–2. R. J. Thompson's (1985) stress and coping model of adjustment.

Source. Reprinted from Wallander JL, Thompson RJ, Alriksson-Schmidt A: "Psychosocial Adjustment of Children With Chronic Physical Conditions," in *Handbook of Pediatric Psychology,* 3rd Edition. Edited by Roberts MC. New York, Guilford, 2003, p. 153. Copyright 2003, Guilford Press. Used with permission.

from research on the impact of condition severity and functional status also have found few differences (Wallander et al. 2003). However, if a child's condition involves the brain (e.g., epilepsy) or sensory systems (e.g., deafness or blindness), the risk of behavior problems and social adjustment difficulties is significantly greater (Mitchell and Quittner 1996; Walker et al. 1989). In addition, the level of intellectual functioning is an independent predictor of psychological adjustment across a variety of physical illnesses (DeMaso et al. 1990).

Longer condition duration appears to be associated with more psychological adjustment problems. In longitudinal studies of youth with juvenile rheumatoid arthritis and diabetes (Daniels et al. 1987; Kovacs et al. 1990), longer disease duration was as-

sociated with more internalizing problems and the perception of one's illness as more unmanageable and stressful.

Child Parameters

Studies of demographic parameters, such as gender, age, and age at illness onset, have yielded mixed findings with regard to child adjustment (Wallander et al. 2003); however, studies that focus on temperamental and cognitive factors have yielded more consistent results. Difficult child temperament, such as very high child activity level or reactivity, is associated with more behavior problems in children with cerebral palsy and spina bifida (Wallander et al. 1988). In terms of cognitive factors, perceived stress (Kovacs et al. 1990), negative perception of physical appearance (Westbrook et al. 1992), and depressive attributional style (Mullins et al. 1997) are related to poorer adjustment. By contrast, the many studies conducted on health locus of control—that is, to what a person attributes the power to influence his or her health—have yielded mixed findings (R.J. Thompson et al. 1992, 1993).

Family Factors

Family functioning is perhaps the most commonly investigated social influence on child adjustment to a chronic physical condition (Wallander et al. 2003). Studies on this topic provide strong, consistent support for the role of a variety of family characteristics in shaping child adaptation. Two models of family variables have been most commonly used: 1) Moos and Moos's (1981) dimensions of cohesion, expressiveness, organization, independence, and control, and 2) Olson et al.'s (1979) circumplex model of adaptability and cohesion. Studies looking at groups of these dimensions in combination have found strong support for their role (e.g., Wallander et al. 1989). In addition, studies examining these characteristics independent of one another have often found that family cohesion plays a particularly important role in child social functioning (Lavigne et al. 1988) and that family conflict influences child adjustment problems (Manne and Miller 1998). In addition to having direct effects, family factors may interact with aspects of a child's illness experience to affect child adaptation. For instance, in a study of families of children with spina bifida, Murch and Cohen (1989) found that low conflict, high control, and high cohesion buffered depression in children with uncontrollable life stress, whereas high independence exacerbated depression in the context of controllable life stress.

Peer Relationships

Few studies examined peer relationships of children with chronic health conditions until the 1990s (Lavigne and Faier-Routman 1993). Today, although more studies exist on peer relationships, the role of these relationships in child adjustment has rarely been examined in the context of these conditions. One study, however, found that chronically ill children with high levels of social support from both family and peers had significantly better adjustment than those with social support from only one of these sources (Wallander and Varni 1989). Further research is needed to determine the causal relationships involved in these types of associations.

Stresses of Physical Illness and Hospitalization

Medical distress is a common problem among youngsters that has been associated with behavior management and adherence problems. In the pediatric patient population, prevalence estimates for medical anxiety are as high as 7%, and estimates of behavior management problems range from 9% to 11% (Van Horn et al. 2001). Overt emotional and behavioral distress often reflects children's efforts to avoid frightening and unpleasant situations and serves as a protective response to an external threat (Van Horn et al. 2001). Such reactions can range from verbal expressions of discomfort to resistance, physical protest, and refusal to cooperate. Fear and behavioral distress can interfere with the delivery of safe, efficient care for these children (Van Horn et al. 2001). Negative medical experiences also increase the likelihood of behavioral distress during subsequent health care encounters (Siegel and Smith 1989).

Assessing coping is complicated by the fact that different people involved in a health care encounter may have different perspectives on what is the most desired outcome. Parents may focus on minimizing observed distress in a child, whereas health care providers may focus on maximizing compliance (Rudolph et al. 1995). Notably, anxiety may not always emerge as overt behavior problems in the clinical setting. Only 60% of children who reported significant medical fear displayed uncooperative behaviors during treatment (Rudolph et al. 1995). Many youngsters may become withdrawn and uncommu-

nicative when faced with anxiety-provoking situations; thus, the seemingly cooperative patient actually may be overwhelmed with anxiety. As a result of these factors, having multiple sources of information on whether a coping response is adaptive is often the best method.

Medical hospitalization is associated with a diverse group of stressors. In addition to any distress associated with particular procedures and the discomfort they may cause, hospitalization is a uniquely challenging experience for children and adolescents because it involves loss of privacy and independence, separation from caregivers, and disruption of important daily routines (R.H. Thompson 1986). Considerable evidence indicates that hospitalization is associated with changes in patients' behavior, subjective assessments, and physiological indicators, as well as their perceptions of fear or pain, psychometric indices, and in some cases cognitive functioning (e.g., R.H. Thompson 1986). Classic studies in this area have found that hospitalization results in increases in separation anxiety, sleep anxiety, and aggression toward authority (Vernon et al. 1966). Of these, separation anxiety has been the most effectively addressed over the past several decades (R.H. Thompson 1986). Rooming-in and unlimited visitation, now the norm, are associated with better in-hospital child adjustment and more developmentally appropriate behavior while hospitalized (Brain and Maclay 1968; Shanley 1981). However, disruption of daily routines and sleep patterns caused by hospital procedures is common and may have important consequences for adjustment and behavior.

Coping Styles and Defense Mechanisms

Children and Adolescents

A child's coping style is defined as the set of cognitive, emotional, and behavioral responses to stressors (Van Horn et al. 2001). Coping involves a child's consistent use of particular strategies for managing stressors across contexts. The style a child adopts depends on the coping resources available, including problem-solving skills, social skills, social support, health and energy level, positive beliefs, and material resources (Rudolph et al. 1995). It is also dependent on temperament, developmental level, and family coping patterns.

Children's coping styles have been categorized in a number of ways. Inconsistent data are available as to the frequency of coping efforts. Some investigators have suggested that only a small proportion of children use self-initiated coping strategies when confronted with pain, and that those who use such strategies most frequently try to distract themselves or use physical procedures such as clenching their fists (Ross and Ross 1984). Others have noted that many children are able to identify techniques to cope with pain (Band and Weisz 1988).

One coping strategy classification distinguishes between approach-oriented and avoidance-oriented children (e.g., Hubert et al. 1988). The children in these two groups can also be described as information seeking versus information avoiding, ruminative or attentive versus distracted, and active versus passive. Approach-oriented coping refers to behaviors and thoughts directed at addressing or managing the stressor and/or the feelings it elicits. This style includes asking questions, displaying interest in medical play and equipment, and seeking emotional and social support prior to procedures. Avoidance-oriented coping refers to thoughts and behaviors designed to avoid experiencing the stressor at the physical, cognitive, and/or emotional level. Examples of this coping style include going to sleep, daydreaming, and refusing to ask or answer questions (Rudolph et al. 1995). Some investigators have conceived of the child's approach or avoidance as traitlike, and the styles have been associated with physiological arousal, such that children who have an approaching coping style display higher physiological activation (Melamed 1982).

Another method of categorizing coping responses identifies children's strategies as problem focused versus emotion focused (e.g., Folkman and Lazarus 1988). Problem-focused strategies are directed at altering the stressor or associated external circumstances. Emotion-focused strategies are aimed at regulating emotional responses to the stressor. This is similar to another method of categorization: that of primary control (coping designed to influence objective events) versus secondary control (coping designed to maximize one's fit to current conditions). For acute medical stressors, emotion-focused coping strategies tend to be more adaptive, primarily because the stressor (i.e., medical treatment) is unavoidable (Brown et al. 1986).

Parents

Some researchers have shown interest in the effects of interactions between children's and parents' behavioral characteristics in medical contexts. If a

child has an approaching coping style, parental employment of distraction and low informing may lead to increased distress, whereas if a child has an avoidant coping style, parental provision of information is associated with increased child anxiety (Lumley et al. 1990).

Some evidence suggests that a match between the intervention employed and a child's coping style is important. Children characterized as distractors who were provided with guided imagery tolerated more pain than did either distractors or attenders who were provided with mismatched interventions (i.e., sensory focusing for distractors and imagery for attenders) (Fanurik et al. 1993). Many parental challenges, such as providing children with helpful and appropriate information to facilitate adaptive coping, continue to be important during the recovery period and following the child's discharge from the hospital.

Typical Responses to Illness and Hospitalization

Regardless of individual characteristics, illness characteristics, or coping style, some responses to physical illness and hospitalization are common. During the preschool years, children may react to the concept of illness as punishment for bad behavior and may believe that adults could cure them if they wished to (Magrab 1985). Hospitalization may be similarly viewed as punishment and can also be seen as rejection by caregivers if they are not present. During the school-age years, children view hospitalization as a threat to bodily control and mastery. As a result of these feelings of inadequacy, a child may become rebellious, angry, or difficult to control. However, increased understanding of the illness and reasons for hospitalization lead to decreased anxiety and guilt.

For adolescents, denial is a primary coping strategy because the illness may be seen as a threat to independence. In addition, conflicts with caregivers over control while in the hospital or during treatments are common, as are concerns about peers' perceptions. Nonadherence is particularly common in adolescence, with estimates indicating that the overall treatment adherence rate for adolescent populations is approximately 50% (Litt and Cuskey 1980). In more extreme cases, the developmental challenges of chronic illnesses may be met with regressed behavior, depression, or hospital discharges against medical advice.

Long-Term Adaptation to Childhood Illness

J.M. Perrin (1985) defined *psychosocial adjustment* as encompassing psychological adjustment, social adjustment, and school performance. Studies have shown that children and their families are remarkably resilient in adapting to the challenges presented by a physical illness. The majority of chronically ill children and their parents do not have identifiable mental health, behavioral, or educational difficulties (Wallander and Thompson 1995). However, research has shown that children with chronic physical illnesses have an increased risk of subthreshold or subclinical mental health problems (Wallander and Thompson 1995). The rate of emotional disorders in children under age 18 with physical illnesses has been found to be approximately 25%, compared with 18%–20% in medically healthy children (Wallander and Thompson 1995).

Currently, information is limited regarding the types of adjustment and psychiatric problems that are experienced by chronically ill children, but available research suggests that these children primarily have internalizing syndromes (R.J. Thompson et al. 1990). In a population of children with cystic fibrosis, 37% of those who received psychiatric diagnoses were diagnosed with an anxiety disorder, 23% with oppositional defiant disorder, 14% with enuresis, 12% with conduct disorder, and 2% with a depressive disorder (R.J. Thompson et al. 1990). The issue of whether these indicators of psychosocial functioning change over time is complicated. Although there is reason to suspect that changes in illness severity and illness status over time might influence adjustment, research suggests that psychiatric problems, when they are present in chronically ill children, persist over time. One study found that nearly two-thirds of children with chronic physical illnesses who had been classified as "severely psychiatrically impaired" were still impaired 5 years later (Breslau and Marshall 1985).

Contributors to Medical Distress

Coping Style

Problem-focused coping is not usually adaptive in the context of acute medical stressors, because in these situations the stressor itself is largely uncontrollable. However, the opposite may be true about

long-term adaptation to chronic illness. Studies have found that in patients with juvenile diabetes, primary control (or problem-focused coping) predicted better adjustment than secondary control (or emotion-focused coping) (Band 1990). The relative adaptiveness of problem-focused coping versus emotion-focused coping over the course of an illness characterized by relapses and remissions is an area for further research, because different coping strategies may be found to be effective during relapses and during remissions.

Another approach to examining coping style is to assess the child's health locus of control. Chronic illnesses often involve a loss of control for children, and beliefs about personal influences on outcome in medical contexts vary widely (Williams and Koocher 1998). Patients and families may have an internal locus of control (i.e., believe they can influence outcomes) or an external locus of control (i.e., believe the outcome is determined by fate or by powerful others, such as health care personnel). Patients with an internal locus of control often have the best adjustment; those who believe outcomes are determined by powerful others often do well during a hospitalization but have difficulty following through afterward; and those who believe the outcome is influenced by fate may be more nonadherent or experience depressed mood (Williams and Koocher 1998).

An individual's or a family's health locus of control may change over time. Often, a chronically ill child will develop an increasingly external health locus of control as time passes. This may be because the child experiences a loss of control due to living with a physical condition characterized by hospitalizations and an unpredictable course (Williams and Koocher 1998). Health locus of control interacts with other dimensions discussed in this chapter, such as a child's developmental level (e.g., younger children rely heavily on caregivers), a family's background and cultural beliefs, and a child's anxious temperament (Williams and Koocher 1998).

Developmental Level

In contrast to the acute illness literature, studies have consistently failed to show that age affects behavior problems or self-esteem in chronically ill pediatric populations (Wallander and Thompson 1995). However, studies are needed to assess the influences of child age on developmental adjustment, particularly in terms of the effects of developmental transitions such as school entry and high school graduation.

Preschool Children (Ages 1–4 Years)

Although preschoolers with chronic illnesses experience their parents' anxiety and watchfulness, they simultaneously make efforts to explore the environment and separate from their parents (Donovan 1989). Problems may occur with these children's development of motor skills as a result of their illnesses, and they may also have difficulty controlling their anger. Parents of chronically ill preschoolers may experience shock, mourning, and anger following the diagnosis of a medical condition, and may experience denial related to their child's symptoms. These parental feelings and behaviors can affect the young child's development.

School-Age Children (Ages 5–12 Years)

School-age children often feel anxiety and dread as they learn more about their chronic illness, and these reactions may mimic those of their parents earlier on in development (Donovan 1989). Potential difficulties with motor skills, separation from the primary caregiver, fear, and anger continue in this age group, and the introduction of significant peer relationships during this developmental period can be problematic and difficult. Parents of school-age children often become aware of their children's fears and concerns related to symptoms, as well as their children's suffering related to illness.

Adolescents (Ages 13–18 Years)

Adolescents also experience feelings of sadness, anger, and loss as a result of their conditions (Donovan 1989). Chronic medical problems may affect an adolescent's functioning in new normative roles, impacting areas of his or her life such as dating. As a result, some adolescents may begin to be seen by their peers as loners. These adolescents may fear death and may withdraw from their environment, leading to further isolation. Parents may become increasingly concerned about an adolescent's psychosocial adjustment but may be fatigued by their challenging parenting role. Separation issues can be as complex and confusing for parents as they are for adolescents, and some parents may feel torn and ambivalent about letting go. This ambivalence can impact the extent to which the adolescent separates and engages with his or her peer group.

History of Illness and Medical Experiences

Few studies have examined the relationship between illness duration and adjustment in children with chronic illnesses. Some investigators have reported that children with chronic illnesses that require strict disease management, such as juvenile diabetes, perceive their illness as increasingly difficult to manage over time (Kovacs et al. 1990). Additionally, age at illness onset may play a role; one study found that boys with early-onset diabetes had more behavior problems than either girls with early-onset diabetes or youngsters of either gender with late-onset diabetes (Rovet et al. 1987). Age at onset may not be related to self-reported distress, suggesting a complex relationship between illness experience and adaptation (Kovacs et al. 1990).

Temperament

Temperamental difficulties have been found to predict poor behavioral and emotional adjustment in children with chronic medical illnesses. Two studies have found a relationship between dimensions such as activity level, reactivity, behavioral difficulty, and distractibility on the one hand and mother-reported behavior problems on the other (Lavigne et al. 1988; Wallander et al. 1988). Notably, both populations included in these studies had illnesses characterized by central nervous system impairment (i.e., spina bifida and cerebral palsy), which may affect findings regarding psychological functioning, given the apparent importance of whether or not the brain is involved in a child's chronic condition.

Interactions With Parents, Family Environment, and Parental Mental Health

Maternal depression and anxiety play important roles in child adjustment to chronic illnesses and child behavior during procedures (Wallander and Thompson 1995). One reason for the interest in assessing parental distress is that it has potential effects not only on the child's adjustment but also on the accuracy of the parent's reporting of the child's adjustment (R.J. Thompson et al. 1993). In studies of depressed mothers of children with a range of chronic conditions (e.g., diabetes, mental retardation, cystic fibrosis), mothers with depression reported more behavior problems in their children than did nondepressed mothers (Walker et al. 1989). However, the depressed mothers' reports still bore a significant relationship to the level of child adjustment, suggesting that the reports were influenced both by the mother's emotional state and by the child's behavior.

Maternal anxiety plays an important role in mother-reported behavior problems and in child-reported psychiatric symptoms. One longitudinal study of children with cystic fibrosis found this to be the case even after controlling for demographic parameters (R.J. Thompson et al. 1992). The same study also found that at follow-up, maternal anxiety played a role in increases in child self-reported psychiatric symptoms when baseline child psychological functioning was controlled for (R.J. Thompson et al. 1994). A parallel study of children with sickle cell anemia yielded some but not all of the same findings (R.J. Thompson et al. 1993).

Concluding Comments

Children and adolescents face a wide variety of chronic physical conditions that may impinge on their development and their emotional, cognitive, behavioral, and social functioning (American Academy of Child and Adolescent Psychiatry 2009). Because improvements in medical and surgical care have led to increased rates of survival of children and adolescents with these illnesses, more attention is being paid to the factors that influence coping and adaptation. Noncategorical approaches to the study of this topic suggest that children with different illness types, with the exception of those illnesses affecting the central nervous system, do respond in a predictable and uniform way to the stress of their diseases. Particularly relevant factors to consider include coping style, developmental level, previous illness or medical experiences, and temperament, as well as interactions with their families. The development of models to explain adaptation and coping have helped to inform research efforts and to provide a framework for further investigations to explore both risk factors and resilience in the physically ill child.

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3

The Pediatric Psychosomatic Medicine Assessment

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The successful pediatric psychosomatic medicine assessment results in a developmentally informed biopsychosocial understanding and plan for children and their families. The assessment should determine where the child falls along a mental health continuum ranging from *normal* to *developmental variation* to *problem* to *disorder* (Wolraich et al. 1996). The assessment must take into account physical symptoms that may occur with emotional distress and consider the physical conditions that may mimic psychiatric dysfunction. Also, the assessment should identify patient and family strengths that promote resiliency as well as maladaptive coping strategies that impair functioning and adherence.

The biopsychosocial formulation describes the "why" of the child or adolescent on all levels. It serves both as a guide to the comprehensive care of the patient and family and as the foundation for the working alliance with patients, families, and health care providers. This chapter outlines the critical steps in the pediatric psychosomatic medicine consultation process to guide the mental health consultant in the assessment, diagnosis, and care of patients and their families in the pediatric setting (see Table 3–1).

The psychosomatic medicine assessment of children and adolescents in pediatric settings should cover all the components contained in the "Practice Parameters for the Psychiatric Assessment of Children and Adolescents" (American Academy of Child and Adolescent Psychiatry 1997) as well as the "Practice Parameter for the Psychiatric Assessment and Management of Physically Ill Children and Adolescents" (see Table 3–2) (American Academy of Child and Adolescent Psychiatry 2009). The formulation can be framed in a series of concentric, nesting, interrelated domains of functioning, with biology at the core, followed by the child's experiences, then those most proximally involved with the child (parents, siblings), then the child's health care system, and finally the child's "outside world" of school and peers (see Figure 3–1). The concentric model emphasizes the interrelated elements of each domain and the critical task of the consultant to integrate them into the formulation.

Assessment Protocol

The development of an accurate biopsychosocial formulation requires the mental health consultant to elicit the chief complaint, the history of the pre-

TABLE 3–1. The consultation assessment process: critical steps in the pediatric psychosomatic medicine assessment

Develop an appropriate intake system
Determine the reason for referral
Obtain multiple sources of information
Review with clinical team
Prepare the patient and the family for the psychiatric assessment
Meet initially with the parent(s) or caretaker(s)
Interview the child or adolescent
Observe behavior and play
Consider standardized assessment instruments
Frame clinical findings in a developmental context
Develop a biopsychosocial, developmentally informed formulation
Communicate findings and recommendations to the medical team and family
Implement plan
Monitor and revise intervention

Source. Adapted from Shaw RJ, DeMaso DR: "The Pediatric Consultation Psychiatry Assessment," in *Clinical Manual of Pediatric Psychosomatic Medicine: Mental Health Consultation With Physically Ill Children and Adolescents.* Washington, DC, American Psychiatric Publishing, 2006, pp. 43–45. Copyright 2006, American Psychiatric Publishing. Used with permission.

senting illness, any current medications, a pertinent review of systems, and any psychosocial stressors, as well as medical, psychiatric, developmental, family, social, and substance abuse histories (Fritz and Spirito 1993). As discussed in the following subsections, the assessment in physically ill youngsters should specifically consider the following interrelated areas related to the physical illness: illness factors; understanding of the illness; emotional impact on child; impact on family, siblings, and peer relationships; academic functioning; coping mechanisms; role of spirituality; and relationship of family to medical team (see Table 3–3) (Shaw and DeMaso 2006).

Illness Factors

The assessment begins with a review of the illness, including the patient's history and physical examination, as well as any laboratory tests, procedures, and medical or surgical treatments. Basic laboratory tests in an acute assessment include complete blood cell count, electrolytes, glucose, blood urea nitrogen, creatinine, total protein, liver function tests, calcium, magnesium, phosphorus, thyroid function tests, pregnancy test, and urinalysis. Additional tests to consider include arterial blood gases, heavy metals screening, serum B_{12}, folate, lupus erythematosus preparation, antinuclear antibody, urinary porphyrins, ammonia levels, erythrocyte sedimentation rate, and HIV. Medication drug screens might include serum drug levels (lithium, anticonvulsants, tricyclic antidepressants, digoxin, and cyclosporine) and urine toxicology. Common procedures in the acute assessment include the chest X ray, lumbar puncture, computed tomography scan, magnetic resonance imaging, electroencephalogram, electrocardiogram, echocardiogram, and endoscopy.

The assessment should always be considered in the context of understanding the physiology, course, treatment, and prognosis of the physical illness. Mood, anxiety, behavioral, somatic, and cognitive symptoms can be either primary or secondary to a general medical illness and/or its treatment. The impact of a physical illness can vary dramatically based on the stage, course, treatment, recovery, and prognosis, all set in the context of a particular child and family. As described by Newby (1996), early-phase new illnesses, single-episode illnesses, chronic relapsing, and deteriorating disease, as well as recovery, all present different challenges as the illness progresses through initial onset, course, degree of incapacitation, and eventual outcome.

Prognosis must be considered because illnesses range from recovery, to chronic with preserved functioning, to deteriorating or terminal courses. The patient's and family's experiences with treatment both for the current illness and for prior significant illnesses must be considered in the assessment. Attention should be given to outpatient and hospital-based care, the nature of the interventions, successes, failures, and side effects, as well as adherence. Particular challenges may arise when patients and families have endured painful or traumatic experiences or when the medical system has failed, all leaving the patient or family feeling "hurt by their doctors."

Understanding of the Illness

People of all ages develop frameworks to try to understand and give meaning to the challenges they face. Their "theories" are dependent, to differing de-

TABLE 3–2. Practice Parameter for the Psychiatric Assessment and Management of Physically Ill Children and Adolescents

1. Mental health clinicians should understand how to collaborate effectively with medical professionals to facilitate the health care of physically ill children.
2. The reason for and purpose of the mental health referral should be understood.
3. The assessment should integrate the impact of a child's physical illness into a developmentally informed biopsychosocial formulation.
4. General medical conditions and/or their treatments should be considered in the etiology of a child's psychological and behavioral symptoms.
5. Psychopharmacological management should consider a child's physical illness and its treatment.
6. Psychotherapeutic management should consider multiple treatment modalities.
7. The family context should be understood and addressed.
8. Adherence to the medical treatment regimen should be evaluated and optimized.
9. The use of complementary and alternative medicine should be explored.
10. Religious and cultural influences should be understood and considered.
11. Family contact with community-based agencies should be considered and facilitated where indicated.
12. Legal issues specific to physically ill children should be understood and considered.
13. The influence of the health care system on the care of a physically ill child should be considered.

Source. Reprinted from American Academy of Child and Adolescent Psychiatry: "Practice Parameter for the Psychiatric Assessment and Management of Physically Ill Children and Adolescents." *Journal of the American Academy of Child and Adolescent Psychiatry* 48:213–233, 2009. Used with permission.

grees, on their factual knowledge, prior experience, stage of development, cognitive level, cultural background, and spirituality. Consultants should ask children and parents about their understanding of the illness, its treatment, and the prognosis. Children and their parents may initially be reluctant to offer their "explanatory model" but they almost universally have one. The use of the patient's or family's explanatory model by the consultant can be helpful in guiding patients, families, and the medical team to an appropriate level of mutual understanding and for addressing any misperceptions. After considering the factors specifically associated with the illness, the consultant moves to assess the patient in each of the previously outlined concentric functioning domains (see Figure 3–1).

Emotional Impact on the Child

Assessing the emotional impact of and the adjustment to a physical illness extends the general assessment of emotional functioning of children and adolescents (Wallander et al. 2003). Temperament, premorbid functioning, and previous experiences with stress and coping (particularly with physical illness) often help explain the current impact of an illness. Reviewing the onset of the illness as well as the child's initial responses can also provide additional insight into the current presentation.

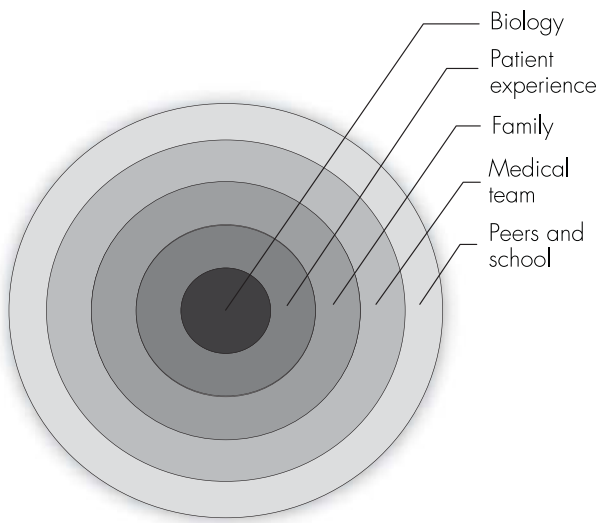

FIGURE 3–1. Concentric spheres of biopsychosocial functioning in children and adolescents with physical illnesses.

TABLE 3–3. Protocol for the psychiatric assessment of the physically ill child

What are the illness factors?
Stage—new, relapse, chronic
Course—relapsing, single event, interinterval recovery, chronic deteriorating
Prognosis—preservation of function with treatment, decline, terminal
Treatment—hospitalizations, clinic visits, medications, adherence, traumatic procedures
What is the understanding of the illness by the child and parent?
How explained, realistic comprehension, adequate understanding, cognitive factors, cultural issues
What is the emotional impact of the illness on the child?
Premorbid, current, degree of acceptance
What is the impact of the illness on family functioning?
Family, marital, occupational, financial issues
What is the impact of the illness on the healthy siblings?
Decreased parental availability and/or resources, emotional reactions
What is the impact of the illness on social and peer relationships?
Stigma, decreased contact, impact on dating and sexuality
What is the impact of the illness on academic functioning?
Premorbid, current, problems with school reintegration, special education needs
What are the child's habitual coping mechanisms?
Family, friends, religious, social withdrawal, denial, avoidance, maladaptive coping
What is the role of religion and spirituality?
Affiliation, beliefs, role as social support in family
What is the relationship of the family with the medical team?
Level of trust, quality of communication, family's involvement in decision making

Source. Adapted from Shaw RJ, DeMaso DR: "The Pediatric Consultation Psychiatry Assessment," in *Clinical Manual of Pediatric Psychosomatic Medicine: Mental Health Consultation with Physically Ill Children and Adolescents.* Washington, DC, American Psychiatric Publishing, 2006, pp. 43–45. Copyright 2006, American Psychiatric Publishing. Used with permission.

Children's responses to illnesses may vary from resolved acceptance and collaboration to disabling problems marked by anger, depression, and anxiety. These latter feelings, although often considered expected or normal responses to illness, may insidiously move into clinically significant problems or even frank psychiatric illness. The assessment should include a review for the presence of the signs and symptoms of suspected psychiatric difficulties, with particular attention to the interplay between emotions, physical complaints, and adherence to care. Notably, although mood and anxiety disorders are common, they typically respond to treatment (see Chapter 6, "Mood Disorders," and Chapter 7, "Anxiety Symptoms and Disorders").

Deliberation about the emotional impact should extend beyond diagnostic considerations from the *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition, Text Revision (American Psychiatric Association 2000), and the care received in the hospital. For many youngsters, physical illness erodes self-esteem. Defining the extent of the emotional impact is aided by exploring the ways in which their illness limits their activities (e.g., driving or dating) or hinders their achieving important developmental milestones (e.g., progressing through school), as well as ways they might have to cope with side effects, including the cosmetic effects of medications on their body, and body image. Subthreshold anxiety about their illness or prognosis

should also be explored. The consultant should ask specifically about strategies that have "worked" in helping the child cope. Finally, consultants should be aware that adolescents are particularly prone to angry responses to the narcissistic injury that illnesses present and sometimes respond with concomitant acting out and/or nonadherence.

Family Functioning

Physical illnesses can have a significant effect on family functioning, including dramatically changing family dynamics (Kazak et al. 2003). The demands of treatment alter normal family routines and diminish the time available for routine activities. Children and adolescents commonly become more dependent on parents for both physical and emotional support. The demands of care can lead to conflicts in the division of family labor and interfere with parental work and child care routines. Resultant financial pressures from lost employment coupled with the costs of care can present formidable economic challenges.

Additional stress may emerge as families struggle with the demands of work, particularly if their health insurance is dependent on their employment. The combination of stress and competing demands may dramatically impact the parental relationship and intimacy. All of these factors can make some parents resentful of their child's illness and place them in an uncomfortably conflicted position. The consultant should not become too narrowly focused on problem areas and fail to inquire about the successful coping in the family. Asking families about coping strategies and their "successes" in the face of real challenge can significantly empower families.

Siblings

Siblings are significantly impacted by a brother's or sister's physical illness and the accompanying changes in family functioning (Sharpe and Rossiter 2002). Frequently, early in the illness, the siblings feel overlooked (Sharpe and Rossiter 2002). Symptoms of anxiety, sadness, and anger are common. Siblings may resent the redistribution of parental attention and time, as well as the disruption of their own daily routines. Parents may need to miss important school or social events and alter their daily lifestyle. Healthy siblings may feel embarrassment about the illness and may be reluctant to have friends over to their home. Siblings also may experience guilt regarding their anger or resentment. In the assessment, the consultant can help uncover siblings' unspoken difficult feelings by framing inquiries in ways that make the siblings feel that other young people have strong feelings about similar situations (e.g., "A lot of kids I know sometimes feel resentful or even really angry about…").

Social Relationships

Physical illness can significantly impact peer relationships (Reiter-Purtill and Noll 2003). Effects of illnesses may range from strengthening relationships, to creating mild interference with a child's ability to participate in desired social functions and activities, to causing isolation from peers. Although in some cases, a constructive reworking of friendships may lead to deepened relationships, many illnesses and/or their treatments can cause disfigurement, disrupt growth, and/or delay puberty, thereby adversely impacting adolescents' peer relationships. Youngsters may be stigmatized by their illness, teased at school, and distanced from their peers. Although many children minimize the impact of their illness on peers, the following assessment query may elicit their perspective: "Many kids I know feel like their being sick gets in the way of their friendships or changes things with their friends. How have things gone for you?"

Academic Functioning

Physical illnesses can have effects on academic functioning. Missing school may result in difficulty keeping on top of academic work. At the same time, some physical illnesses and/or their treatments may compromise academic performance through direct effects on cognitive functioning. These changes in academic functioning may be experienced as another significant loss that must be dealt with. The initial assessment may identify a critical need for further psychological or neuropsychological assessment (see Table 3–4). The assessment may identify an important need for advocacy and guidance on behalf of children to ensure that they have adequate support in their school setting.

Coping Mechanisms

One of the consultant's most important actions is to enhance patient coping (Harbeck-Weber et al. 2003). The consultant should review the characteristic coping mechanisms used by the child in dealing with his or her illness as well as ones that the child has successfully used earlier and in other contexts.

TABLE 3–4. Selected intelligence, neuropsychological, and achievement tests for children and adolescents

Function	Test	Age range
Intelligence	Kaufman Assessment Battery for Children, 2nd Edition (Kaufman and Kaufman 2004)	3–18
	Stanford-Binet Intelligence Scales—5th Edition (Roid 2003)	2–85+
	Wechsler Preschool and Primary Scale of Intelligence, 3rd Edition (Wechsler 2002)	2.6–7.3
	Wechsler Intelligence Scale for Children, 4th Edition (Wechsler 2003)	6–16
	Wechsler Adult Intelligence Scale, 3rd Edition (Wechsler 1997)	16–89
Neuropsychological	Delis-Kaplan Executive Function System (Delis et al. 2001)	8–89
	Luria-Nebraska Neuropsychological Battery: Children's Revision (Golden 1987)	8–12
	NEPSY, 2nd Edition (Korkman et al. 2007)	3–12
Achievement	Wechsler Individual Achievement Test, 2nd Edition (Wechsler 2001)	4–85
	Wide Range Achievement Test, 4th Edition (Wilkinson and Robertson 2006)	5–94
	Woodcock-Johnson III Tests of Achievement (Woodcock et al. 2001)	2–90

These mechanisms often provide a vital starting point in formulating the treatment plan. Children who identify relationship-based (family, friends, professional) coping strategies are more likely to benefit from a referral for psychotherapy. Generally speaking, when coping strategies work without collateral "costs," they should remain undisturbed; this even extends to children who may have periods of minimization or denial (sometimes described as "healthy denial"), especially during periods of remission from their illness, when they may be quite reluctant to engage in any active discussions, particularly about potential future implications. In contrast, maladaptive coping mechanisms, including alcohol and substance abuse, risk-taking behaviors, and nonadherence, should all be appropriately and actively addressed.

Religion and Spirituality

Assessment of religious and spiritual traditions may identify potential sources of support. At other times, the traditions may interfere with and/or be at odds with the treatment. The consultant should specifically inquire about affiliation, involvement, specific practices, and perceived support to both children and families, remembering that children (particularly adolescents) and parents not infrequently differ (Moncher and Josephson 2004; Sexton 2004). The assessment should also question the meaning or purpose of life, causality of misfortunes, fairness, and blame, as well as beliefs about the afterlife, which are particularly important in the context of life-threatening illness (Barnes et al. 2000).

Relationship With the Medical Team

The assessment should explore the nature of the patient's and family's relationships with and feelings about the medical team. Such an examination may identify communication problems with or a lack of trust in the medical team. To help clarify the nature of the working relationship between the medical team and the family, the consultant can ask questions such as these: "Do you feel the team has been helpful and is on your side? Do they seem to understand how you feel and what you need? Are there things that you wish you could change?" Patients and families who have had previous or ongoing medical failures and who have felt "hurt" or "let down" by their physicians are prone to have more problematic relationships. Reviewing past and current experiences can identify critical issues that have the potential to interfere with the child's treatment and well-being.

Furthermore, the health care system can interact in complex ways with the family's emotional state, behaviors, lifestyle, and illness treatment to impact the medical team and ultimately health outcome. Families may be confronted with limitations in ob-

taining necessary or optimal medical care. Many medical expenses are not covered by health insurance. Finding an accessible physician may be hindered by limitations in health insurance provider networks.

Behavior Observation

A balanced and comprehensive view of a child's and family's functioning often requires follow-up behavior observations of children and their families subsequent to the initial contact. Direct observation of behavior can provide a fuller understanding of children's strengths and vulnerabilities. For younger children, play is generally included in the observation.

Hospital Behavior

Children's behavioral changes should be evaluated in different hospital situations and contexts. For example, behavioral difficulties in a child 2 days after surgery may have a completely different meaning from that of the same behaviors in a child 1 week following surgery. Also, different interpretations may be made for a child whose parents are not visiting than for a child whose family is staying in the hospital.

In some cases, the consultant may observe symptom changes that reflect aspects of a child's relationships with his or her parents or caretakers. Reinforcement of behavior and symptoms may be observed in both family members and the medical team. The family or medical team can assist in understanding a child's behavior by keeping a logbook of any noteworthy behaviors (Shapiro et al. 2006). One useful model that can be rapidly taught and used in most hospital contexts is the ABC (**A**ntecedent-**B**ehavior-**C**onsequence) format, in which the following questions are considered: What happened just before the episode? What was the episode? What happened next?

Medical Play Observation

Medical play observation provides an invaluable window into the world of preverbal, young, or otherwise reluctant patients and their families. These observations can reveal a child's underlying feelings or concerns and be helpful in assessing interactions with family members, especially when professionals have questions about parenting, feeding, and/or attachment. The consultant should make observations about the patient's ability to engage in symbolic and age-appropriate play and about play themes that emerge.

To assess the parent-child relationship, the consultant should ask to observe parents interacting as they usually would at home for approximately 15–20 minutes of unstructured parent-child or family play. The consultant might introduce this request by saying, "It can be a real challenge to parent a child who's not feeling well. I would like to see how it goes for you, and then we can brainstorm together about any suggestions I might have." Specific issues to observe during the session include the parents' ability to engage their child and read their child's cues, both verbally and nonverbally; their level of affection expressed toward their child; and their ability to address their child from a developmentally appropriate perspective. The parents' abilities to regulate their child's emotional responses, to set appropriate limits, and to handle separations are important to observe. Observation of the child should include capacity to relate, amount and extent of physical and eye contact, degree to which the child engages in or initiates play or speaks with the parents, and the child's affective involvement. The capacity for imaginative play and the thematic content of the play should also be noted.

Standardized Assessment Measures

A small number of standardized assessment tools and semistructured interviews are used in the specialty of adult psychosomatic medicine and can serve as a template for use in selected pediatric populations. These include the Primary Care Evaluation of Mental Disorders (PRIME-MD), a 26-item, self-administered questionnaire that screens for five of the most common groups of disorders in primary care: depression, anxiety, alcohol use, somatoform disorders, and eating disorders (Spitzer et al. 1994). The PRIME-MD has been adapted as a self-report measure called the PRIME-MD Patient Health Questionnaire (Spitzer et al. 1999). In addition, the *Diagnostic and Statistical Manual of Mental Disorders,* Fourth Edition, Primary Care Version (DSM-IV-PC; American Psychiatric Association 1995), contains diagnostic algorithms to evaluate eight common categories of psychiatric disorders, including depression, anxiety, cognitive abnormalities, substance use, unexplained physical symptoms, sleep and sexual disorders, weight and eating disorders, and psychosis.

For pediatric patients, a number of general measures of psychiatric functioning have been developed (see Table 3–5). In addition to the Child Behavior Checklist (Achenbach 1991), a number of well-validated semistructured interviews and self-report measures, such as the Semi-Structured Clinical Interview for Children and Adolescents (McConaughy and Achenbach 1994), can be used to assess the general areas of school, friends, family, relatives, fantasies, and self-perceptions, as well as academic achievement, fine motor skills, and gross motor skills. Also, a number of general psychiatric screening measures are available, including the widely used Pediatric Symptom Checklist (Jellinek et al. 1988).

Although no empirically based general psychosocial assessment interviews or measures are applicable in the field of pediatric psychosomatic medicine, some specialty-specific assessment instruments have been developed. For example, the Psychosocial Assessment Tool (Pai et al. 2008) is used to assess psychosocial stress in family members of children newly diagnosed with cancer. Similarly, a number of measures of parental stress have been adapted for parents of medically ill infants or for parents of infants hospitalized in the neonatal intensive care unit (Carter and Miles 1989; Miles and Brunssen 2003; Miles et al. 1993). Also, numerous instruments are available for use in the assessment of specific clinical symptom pictures, such as the assessment of delirium (Trzepacz et al. 2001) and of psychosocial risk factors in pediatric organ transplant recipients (Fung and Shaw 2008). Measures used in the assessment of pain and eating disorders are reviewed in Chapters 9 and 10, respectively.

Health-Related Quality of Life

Quality-of-Life Issues in Physical Illness

Over the past two decades, the emphasis on individual differences in adaptation and coping that characterize much of medical coping research, including its most comprehensive integrative models, has broadened to include an increased interest in quality of life. Quality-of-life perspectives adopt the World Health Organization's (1947) definition of health as "a state of complete physical, mental, and social well-being." As such, health-related quality of life (HRQOL) encompasses 1) disease state and physical symptoms, 2) functional status, 3) psychological/emotional functioning, and 4) social functioning (Aaronson 1989). HRQOL assessment relies on an individual's subjective evaluation of his or her well-being, with the goal of being able to track progress in this area in response to medical or psychosocial interventions (Quittner et al. 2003).

Standardized Assessment Measures in Health-Related Quality of Life

Several approaches to HRQOL measurement are currently available. Several of these are classified as generic measures, in that they assess the construct in general terms applicable to many medical populations. Two popular generic measures for pediatric populations are the Pediatric Quality of Life Inventory (Varni et al. 2003) and the Child Health Questionnaire (Landgraf et al. 1996) (see Table 3–5). These have the advantages of painting a broad portrait of HRQOL and allowing researchers to compare HRQOL across different illnesses. However, generic measures may not provide the precision necessary to track change over time, which is of great importance in clinical settings. As a result, several illness-specific measures have been developed, such as the Pediatric Asthma Quality of Life Questionnaire (Juniper et al. 1996) and the Cystic Fibrosis Questionnaire (Modi and Quittner 2003). These provide more precise measurement of the health-related issues most relevant to a particular clinical population.

Developing the Biopsychosocial Formulation

The biopsychosocial formulation is important for prioritizing and integrating the information obtained into an explanatory hypothesis that is helpful for the patient, family, and medical team. It must succinctly describe the current problem, place it in context, explain why it has occurred, and offer direction for intervention. The formulation should foster increased understanding and empathy toward the patient and family. Biological, psychiatric, and social dimensions need to be evaluated both separately and in relation to each other (Richtsmeier and Aschkenasy 1988). These dimensions need to be placed in the context of a patient's developmental and life circumstances. The formulation should always include a careful weighing of those factors in the patient's life that promote development and allow for recovery.

The daunting task of organizing and selecting the appropriate biopsychosocial data to be used in a formulation begins with a review of the presenting problems and identification of the two or three ele-

TABLE 3–5. Selected assessment instruments to assess general psychiatric functioning and illness-specific symptoms in the physically ill child

Coping and defenses
Response Evaluation Measure (Steiner et al. 2001)
Weinberger Adjustment Inventory (Weinberger and Schwartz 1990)
Delirium
Delirium Rating Scale–Revised–98 (Trzepacz et al. 2001)
Mini-Mental State Examination (Folstein et al. 1975)
Family functioning
Family APGAR Questionnaire (Smilkstein 1978)
Parental Stressor Scale: Infant Hospitalization (Miles and Brunssen 2003)
Parental Stressor Scale: Neonatal Intensive Care Unit (Miles et al. 1993)
Parental Stressor Scale: Pediatric Intensive Care Unit (Carter and Miles 1989)
Psychosocial Assessment Tool (Pai et al. 2008)
General psychiatric functioning
Behavioral Assessment System for Children, 2nd Edition (W.M. Reynolds et al. 2004)
Child Behavior Checklist (Achenbach 1991)
Functional Disability Inventory (Walker and Greene 1991)
Mini-International Neuropsychiatric Interview–Kid for children and adolescents (Sheehan et al. 1998)
Pediatric Symptom Checklist (Jellinek et al. 1988)
Semi-Structured Clinical Interview for Children and Adolescents (McConaughy and Achenbach 1994)
Pretransplant psychosocial assessment
Pediatric Transplant Rating Instrument (Fung and Shaw 2008)
Quality of life
Child Health Questionnaire (Landgraf et al. 1996)
Cystic Fibrosis Questionnaire (Modi and Quittner 2003)
Pediatric Asthma Quality of Life Questionnaire (Juniper et al. 1996)
Pediatric Quality of Life Inventory (Varni et al. 2003)
Specific psychiatric symptoms
Children's Depression Inventory (Kovacs 1992)
Conners Rating Scales Revised (Conners 2000)
Revised Children's Manifest Anxiety Scale (C.R. Reynolds and Richmond 1985)
University of California at Los Angeles Post-Traumatic Stress Disorder Reaction Index (Steinberg et al. 2004)

ments that are most critical to explain. This review can place the events on a timeline based on the presence or absence of predisposing, precipitating, perpetuating, and protective factors (Kline and Cameron 1978). The biopsychosocial approach to the formulation has the advantage of being more accessible to patients, families, and the medical team, who often do not have a detailed understanding of psychodynamic theoretical concepts. The specific components of a biopsychosocial formulation are detailed in the following subsections. These factors are all woven into a clear explanatory model that substantiates the consultant's proposed plan. It should include specifics for the treatment plan, methods of implementation, and an explanation about how the situation will be followed and monitored.

Biological

Biological factors include family and genetic histories, temperament, developmental stage, physical descriptors and symptoms, stage of maturity, and intelligence. Intrauterine exposures and other pertinent patient illnesses are also relevant.

Psychological

Psychological factors include the child's and family's emotional development, personalities, and coping styles and weaknesses, as well as the history of emotional trauma. The child's developmental stage and relevant developmental issues should also be highlighted. Psychological factors should include habitual ways of managing (i.e., defenses) feelings of anger, loss, and anxiety; self-esteem; and functioning in the major areas of daily life. Significant strengths and problems should both be noted.

Social

Social factors include the child's functioning and past experiences within the larger social context. This section of the biopsychosocial formulation should integrate pertinent factors from peers, family, community, ethnic background, economic status, and spiritual and cultural traditions that impact the patient and the family. Patients and families without support systems are particularly vulnerable. Sophisticated consultants consider the family as a social system and consider the role of the child as the identified patient within the family system.

Communicating Findings to the Medical Team and Family

Communication problems with mental health consultations are often the root of dissatisfaction for pediatric nurses and doctors, and the consultant must make every effort to communicate promptly and clearly, and to present an action plan. The mental health consultant should present a biopsychosocial formulation that clearly specifies both what needs to be done about the problem and why, remaining mindful of the frustration engendered in physicians by patients with emotional and behavioral presentations (DeMaso and Beasley 1998). This frustration comes in part because in the familiar medical model framework, psychosocial factors have little role in patient care.

This dialogue usually occurs in a team meeting. Four types of team meetings are common in the pediatric setting (see Table 3–6): 1) the *traditional medical team meeting,* which focuses on gathering medical information to make a medical diagnosis and gen-

Table 3–6. Types of team meetings in the pediatric setting

Meeting type	Participants	Target areas	Goals
Traditional medical	Physicians, nurses, and medical/surgical consultants	Gathering medical information used to make a diagnosis, determine prognosis, and/or formulate a treatment plan	Develop a medical treatment plan
Psychosocial	Physicians, nurses, medical/surgical consultants, social worker, and mental health clinician	Gathering psychosocial information used to make a diagnosis and/or formulate a treatment plan	Develop a psychosocial plan
Family conference	Primary physician, nurse, staff crucial to treatment plan, and patient/family	Giving medical and/or psychosocial information, answering questions, listening to family concerns, and making decisions around interventions	Develop a cohesive, fully informed family care plan
Staff centered	Physicians, nurses, medical/surgical consultants, social worker, mental health clinician, clergy, ethicist, and/or lawyer	Focusing on questions regarding the treatment of a specific patient	Address ethical issues

Source. Adapted from Williams and DeMaso 2000.

erate the treatment plan, and generally convenes without the family; 2) the *psychosocial team meeting,* which focuses predominantly on psychosocial issues, such as treatment adherence or child abuse, and has the goal of reviewing psychosocial issues and formulating a treatment plan that addresses coping and emotional adjustment; 3) the *family conference,* which provides medical and psychosocial information to the family and works toward a consensus with the family about the treatment plan; and 4) the *staff-centered meeting,* which often addresses ethical issues or differences in approach that may arise in the context of the child's treatment (Williams and DeMaso 2000). The role of the psychiatric consultant in these meetings may involve providing advice to the medical team, advocating for the child or family, providing psychosocial support for team members, or educating the team about the child's developmental and mental health needs.

After the mental health consultant and pediatrician discuss the problem and reach consensus, there should be an "informing conference" that includes at least the physician, patient, and family (DeMaso and Beasley 1998; DeMaso and Meyer 1996). Depending on the context and the pediatrician, the mental health consultant may or may not attend this meeting. In a supportive and nonjudgmental manner, the pediatrician (and at times the mental health consultant) should present the patient and family with both the medical and psychosocial findings.

In the final step, the consultant, together with the patient, family, and referring physician, develop and implement an integrated medical and psychiatric treatment program that is based on the agreed-upon biopsychosocial formulation. The key components of most plans fall into five categories, which are summarized in Table 3–7 (Shaw and DeMaso 2006).

TABLE 3–7. Treatment recommendations

Category of recommendation	Examples
Clarification of diagnosis	Further review of medical records. Discussion with outside providers. Additional laboratory tests or diagnostic procedures. Additional subspecialty consultation. Neuropsychological testing.
Management by psychiatry team	Psychopharmacology interventions: Specific doses and timing of doses. Highlight potential drug interactions. Highlight common side effects. Individual psychotherapy. Family therapy. Behavior modification programs: Specific instructions on how to set limits or de-emphasize attention being paid to problematic behaviors. Clarification of roles of staff members and parents in implementation of the program. Outline specific approaches to behavior management. Medical hypnosis.
Legal issues	Referrals to child protective services or police department. Ascertain the need to obtain and document informed consent for specific treatments. Provide assistance with steps necessary for involuntary psychiatric hospitalization and transfer.
Involvement of other services	Child-life/recreation therapy for therapeutic play and recreation. Social work for assistance with resources. Chaplaincy for spiritual and religious support. Occupational therapy for activities of daily living including feeding issues. Physical therapy for rehabilitation and biofeedback. Speech and language for evaluation and assistance with communication needs.
Outpatient recommendations	Referral for outpatient mental health follow-up: Specify model, frequency, duration, and potential location of therapy. Specify the need for substance abuse treatment if relevant. Outline specific approaches to behavior management. Referral to school for testing or school-based resources.

Source. Adapted from Shaw RJ, DeMaso DR: "The Pediatric Consultation Psychiatry Assessment," in *Clinical Manual of Pediatric Psychosomatic Medicine: Mental Health Consultation with Physically Ill Children and Adolescents.* Washington, DC, American Psychiatric Publishing, 2006, pp. 43–45. Copyright 2006, American Psychiatric Publishing. Used with permission.

Concluding Comments

The goal of the pediatric psychosomatic medicine assessment is a developmentally informed, biopsychosocial formulation of the child or adolescent. The assessment should focus on the eight C's:

1. Consent from parents and patient to evaluate
2. Clarification of purpose of the consultation (e.g., diagnosis, management, disposition)
3. Collaboration with multidisciplinary team
4. Consideration of conditions (i.e., medical or treatment factors that may be etiological)
5. Contextualization with the multiple systems around the patient (e.g., medical, school, family)
6. Concise, clear, jargon-free notes and plan
7. Consensus with patient, family, and medical team around intervention
8. Continuity of care over time

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4

Legal and Forensic Issues

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Ideally, every clinician would have forensic experts and lawyers available for consultation on the challenging legal issues that arise in the pediatric setting. Although feasible in some larger teaching centers, this goal is not realizable for most practices. Mental health consultants are increasingly called on to assume this role. Therefore, consultants need to have a solid working understanding of these legal issues and, where possible, establish an ongoing working relationship with the legal or risk management services responsible for the pediatric setting in which they practice. Together, they can effectively advise and coach the medical team in its responses to the legal and forensic issues presented by patients and their families. State law varies by jurisdiction, and consultants must be knowledgeable about the specific statutes and judicial decisions in their particular jurisdictions. This chapter provides a general orientation to treatment consent and confidentiality in working with children and adolescents and an overview regarding the mental health clinician's role in the assessment of parental capacity and medical neglect in the pediatric setting.

Consent for Treatment

Consent and authorization are required for all medical treatments except in unusual circumstances, and any health care provider who provides treatment without proper consent would be open to a charge of battery and could be subject to a civil action for damages for performing a procedure or investigation without consent of the individual or legal guardian (Macbeth 2002). When a child is admitted to the hospital, obtaining a general consent for all treatments is appropriate; however, specific situations, such as surgical procedures or HIV testing, require special informed consent, and concepts of how to approach different situations change over time.

Informed consent requires that patients or legal guardians (if the patient is a minor) receive a full and reasonable explanation of the risks and benefits of

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treatment, including no treatment, and possible alternative treatments from their health care providers (Kuther 2003). Obtaining informed consent is a process that involves four distinct steps: 1) determining who has the authority to consent, 2) determining whether the person with the authority to consent is competent, 3) providing all the material information necessary for a reasonable person to make an informed decision, and 4) obtaining the agreement of the person with the authority to consent.

The consent must be voluntary and knowledgeable. The best practice is to obtain written consent and document the informed consent process in the medical record, particularly for complicated treatments. As a general rule, anyone who has reached the age of majority, usually 18 or 21 years, may consent to treatment and is legally presumed competent until demonstrated otherwise.

Issues regarding consent are more complicated with children and adolescents because the doctrine of informed consent has only a limited direct application in pediatrics (Kuther 2003). Minors under age 18 are often considered to be incompetent to make decisions regarding their medical treatment. Instead, consent is usually obtained from a parent or legal guardian, who is assumed to act in the best interest of the child. Consent issues with minors are complicated in part because the best interests of the child are hard to define and are often subjective (Kuther 2003).

Recognition that most adolescents have the capacity to participate in decisions about their health care is increasing, as is the willingness of parents and health care providers to include adolescents in decision making (Kuther 2003). The American Academy of Pediatrics Committee on Bioethics (1995) has taken a developmental perspective toward informed consent and recognizes that as minors approach and progress through adolescence, they need a more independent relationship with their health care providers. Pediatricians have been advised that they have an ethical duty to promote the autonomy of minor patients by involving them in the medical decision-making process to a degree commensurate with their abilities (American Academy of Pediatrics Committee on Bioethics 1995).

Assent is a means of involving minors in treatment decisions. It is an interactive process between a minor and a health care provider that involves developmentally appropriate disclosure about the illness and solicitation of the minor's willingness and preferences regarding treatment (American Academy of Pediatrics Committee on Bioethics 1995; Kunin 1997). This commonly accepted definition of assent as a minor's agreement to participate sets a lower standard of competence than informed consent because assent does not require the depth of understanding or the demonstration of reasoning ability required for informed consent. Assent is a means of empowering children and adolescents to their full abilities (Kuther 2003). Obtaining assent from children and adolescents with mental health issues is often more challenging because many psychiatric disorders are associated with poor insight and judgment along with a higher resistance to treatment.

Treatment Without Parental Consent

Important exceptions exist to the rule requiring parental consent prior to treatment. These include emergency treatment, treatment of emancipated or mature minors, reproductive health, and substance abuse or mental health treatment.

Emergency Treatment

The definition of an emergency may vary from state to state. A case is not definable as an emergency merely because the patient is in an emergency room. In Massachusetts, for example, an emergency is defined as "when delay in treatment will endanger the life, limb, or mental well-being of the patient." Consent is generally not required when the child needs emergency treatment, but the consultant should make every attempt to contact and inform the parent or legal guardian and document such efforts in the patient's medical record.

This exception is based on the assumption that the parent would agree to allow emergency treatment if sufficient time were available to obtain consent. Courts are especially willing to allow this exception if a delay in treatment caused by efforts to obtain legal consent would endanger the child's health. If necessary to ensure a patient's safety, physicians may perform diagnostic tests, including skeletal X rays, to diagnose child abuse or neglect without parental consent.

Treatment of a patient who is acutely agitated or having a panic attack may not be considered an emergency unless there is an associated threat of harm to self or others. Administering an antipsychotic medication or benzodiazepine to an acutely agitated patient in the emergency department or on medical

floors would generally be considered a medical necessity because of the significant risk of harm to self or others if the patient remains untreated. In a patient with an eating disorder and acute food refusal, administering intravenous fluids for dehydration might be considered emergent (depending on the clinical findings and duration of food refusal), whereas placement of a nasogastric tube as part of an eating disorder protocol would not. Table 4–1 outlines considerations in the assessment of children and adolescents for emergency medication treatment.

Emancipated Minors

Emancipated minors have the authority to make their own decisions regarding treatment, and parental consent is not required to treat these patients. Children become emancipated minors through marriage (including those who have been widowed or divorced), military service, and parenthood, or by demonstrating that they are independent and managing their own financial affairs. A 13-year-old girl who is living with her parents and becomes pregnant can be considered an emancipated minor for treatment of the pregnancy. Homeless minors, defined as children under age 18 years who are living apart from their parents in a supervised shelter or temporary accommodation, also have authority to give consent. Although financial independence is an important issue, a child may be an emancipated minor even if he or she is still obtaining financial support from parents, provided the child is independently managing his or her own financial affairs. Health care providers often rely in good faith on the minor's reasonable factual representation that he or she is emancipated. Children under age 18 may also receive a declaration of emancipation through the courts.

Mature Minors

Older children who do not meet the criteria for being emancipated minors may still have authority to give consent for treatment in limited situations. Mature minors are adolescents, generally ages 16–18 years, who are capable of appreciating the nature, extent, and consequences of a recommended medical treatment. This exception is designed to cover situations in which the parents are unable or unwilling to give consent for low-risk treatments that are clearly beneficial. This exception requires the pediatric team to assess the maturity and judgment of the child and the nature of the treatment in question. For example, treatments that involve psychiatric medications may be of higher risk than treatments with psychotherapy. It is important to document the rationale used to justify the belief that the child is competent to give his or her own consent.

Reproductive Health

Sexually Transmitted Diseases

Under the statutes of some jurisdictions, parental consent is not required for treatment of sexually transmitted diseases in minors. Similarly, minors may be able to give consent for HIV testing without notification of their parents or legal guardians.

TABLE 4–1. Considerations in assessment of children and adolescents for emergency medication treatment

1.	Benefits of treatment and risks of withholding treatment
2.	Benefits and potential risks of proposed medication
3.	Necessity of physical restraint to administer medication
4.	Route of medication administration: Is oral administration possible? If not, is alternative route already in place (e.g., intravenous access or gastric tube), or would medication have to be administered rectally or intramuscularly and potentially be more traumatic?
5.	Patient age: A mature minor may be able to consent to treatment. Efforts should be made to document that physician has communicated with patient before giving medication. The younger the child, the less input he or she would have regarding treatment.
6.	Level of anxiety: Mild panic attack episodes characterized by hyperventilation and tremors may not require any immediate intervention, whereas severe attacks associated with acute agitation (e.g., pulling out intravenous or nasogastric tubes or removal of oxygen mask) would constitute a higher level of urgency.
7.	Level of agitation: Mild episodes characterized by restlessness may not require immediate intervention, whereas severe agitation associated with significant threat of harm to self or others would constitute a higher level of urgency.

Pregnancy Prevention and Treatment

Minors can generally consent to medical care related to the prevention (contraceptives) or treatment of pregnancy, including prenatal care.

The ages of the patient and partner, and the nature of the activity and relationship, may trigger other clinical and legal obligations. In certain jurisdictions, minors ages 16 and older can legally consent to sex. Some contraceptives require surgical procedure (e.g., subdermal implants), in which case consent of the parent or guardian is generally recommended. Minors cannot consent to sterilization, nor can parents on their behalf, without involvement of the courts.

Pregnancy Termination

Consent issues regarding abortion are complex, with individual jurisdictions having different laws governing the authorization for an abortion without parental consent. Emancipated (married, widowed, or divorced) minors under age 18 may generally consent to an abortion. In some states, an unmarried minor younger than age 18 cannot have an abortion unless the physician first gets written consent of the pregnant woman and a parent or guardian or a court order authorizing the procedure. If the minor does not want to tell her parent or guardian that she is pregnant or if the parent or guardian does not consent to an abortion, the minor can apply to a court to ask permission for an abortion. Parents cannot provide consent for an abortion if the minor does not want to go through with the procedure.

Sexual Abuse

Victims of sexual assault can be evaluated and treated without parental consent, but local statutes may require the physician to inform the parent or legal guardian unless the parent or legal guardian is suspected of having committed the assault. The younger the age of the minor, the more caution clinicians should exercise before deciding not to notify the parent of a child who has been sexually molested.

Substance Abuse Treatment

Many jurisdictions allow emergency treatment, without parental consent, of intoxicated minors or minors at risk of complications from withdrawal from alcohol or substances. In Massachusetts, a child age 12 or older may give consent to hospital and medical care to treat drug dependency, but the age may differ depending on the state. Minors can often consent to medical care and counseling related to the diagnosis and treatment of problems related to alcohol and substance abuse; however, minors cannot receive replacement narcotic abuse treatment without parental consent. Federally funded substance abuse treatment programs are bound by federal confidentiality laws that prohibit disclosure of any information to parents unless the consultant believes 1) that the minor's situation poses a substantial threat to the life or physical well-being of the minor or another person and 2) that the threat may be reduced by communicating with the minor's parents. Some examples of dangerous behaviors as a result of substance use include motor vehicle accidents, suicidal or homicidal threats, self-injurious behaviors such as jumping or falling out of a window while intoxicated, or drug or alcohol overdose (accidental or intentional). In general, the parent or guardian should be notified if, as a result of substance use, a child or adolescent is incapacitated, in need of medical attention, likely to suffer or cause physical damage, disorderly, or likely to cause property damage (Pries and Rosenzweig 2001).

Mental Health Treatment

In some jurisdictions, minors can give consent for mental health treatment or for residential shelter services if a doctor or clinician decides that they are mature enough to participate in these treatment services and that there is potential risk of physical or mental harm without the treatment. If a minor who is admitted to the emergency room or to a medical or surgical floor requests a psychiatric consult but asks that parents not be informed, the minor may be granted the consult.

In general, there is a greater legal and clinical reluctance to override the request of a 16- or 17-year-old than that of a younger minor. The threshold to obtain consent for a consult should differ from that required for ongoing treatment. When performing the assessment, however, the mental health consultant should try to understand the motivation behind the child's request not to have parents involved in the consult, as well as the possible consequences. The treating therapist should try to open lines of communication between the child and the parents or to involve the parents in treatment unless the provider decides that such involvement is inappropriate.

In some states, a voluntary application for psychiatric hospitalization can be made by a child age 16 or older or by the parent or guardian of a child under age 18. If a minor is unwilling to be hospital-

ized, a voluntary application for hospitalization can be made by parents without a court hearing. In some jurisdictions, minors age 16 or older can sign themselves out after 72 hours' written notice unless they are involuntarily committed. Two standards must be met for such a commitment to occur: the child 1) must be determined to be mentally ill and 2) must be either a danger to self or to others or show an inability to care for self.

Limits of Parental Authority

In certain situations, a parent or legal guardian has limited authority. These limits are discussed in the following subsections.

Mental Retardation

In many states, parents of a child with mental retardation who has reached the age of majority (18 or 21) are not automatically their child's legal guardian and therefore have no legal authority to consent to their child's treatment until they have been appointed guardians by the court. This appointment depends on the degree of mental retardation, because an adult with mild mental retardation may not need a guardian. Even after being appointed as legal guardians, parents cannot provide consent for psychiatric hospitalization or treatment with antipsychotic medications without a court order. Parents or legal guardians can provide consent for hospitalization of a minor with mental retardation who is in need of psychiatric admission. A patient over age 16 with mild mental retardation who has the capacity to consent to psychiatric admission and treatment may do so even if his or her legal guardian objects. If the patient refuses the admission but is considered to be in need of such after evaluation by a clinician, then a court order must be obtained.

Sterilization

Because sterilization is an irrevocable procedure, parents and legal guardians are not permitted to give consent in many states without obtaining a court order. The court order is required to ensure protection of the patient's best interest.

Minors in State Custody

An important clarification is whether a state has legal custody of a child through a voluntary arrangement or by judicial order. In the former case, parents still retain legal rights and can authorize most treatments, including psychiatric hospitalization and administration of antipsychotic medications. In the latter case, the state needs to obtain a further court order to authorize such psychiatric treatments or to give or withhold life-prolonging treatment.

Refusal of Treatment by an Adolescent

Sometimes, a child wishes to refuse a treatment that the parent or legal guardian has requested. In most cases, depending on the child's age and maturity, courts do not allow a child to refuse medical treatment if it is necessary to save the child's life or preserve the child's health. Some jurisdictions have similar stipulations regarding alcohol or substance abuse treatment. The consultant must be aware of the relevant statutes in his or her jurisdiction. These issues may be pertinent when a child has religious beliefs that influence his or her opinions about medical treatment.

Coercive imposition of treatment on a minor should be resisted if possible. Interventions may be permitted legally if the minor is not mature or emancipated, the underlying condition is serious, the treatment is clinically necessary to preserve the child's health, and the parents consent to treatment. For example, the parents of an adolescent with anorexia nervosa can consent, against the adolescent's wishes, to the use of nasogastric tube feeding as part of an eating disorder protocol. If both the parents and the adolescent refuse a treatment that the clinician feels is important due to significant medical (or mental health) risks, then a court order should be obtained before proceeding. The consultant should consider involving state protective services if he or she feels that a parent or legal guardian is not acting in a child's best interest and is placing the child's health at risk.

Parents and legal guardians are usually limited in their ability to force an adolescent to participate in any outpatient treatment (e.g., day treatment mental health program, substance abuse counseling) unless not having treatment poses significant medical risks. When adolescents with eating disorders or chronic medical illnesses, such as diabetes or cystic fibrosis, are nonadherent with their home treatments and follow-up appointments, parents need to work closely with clinicians to develop treatment plans that facilitate the adolescents' participation. These plans may include developing treatment contracts between the patient, parents, and health care

providers. If the parents are resistant or nonadherent to clinical recommendations, the care providers may need to consider protective services intervention.

Consent for Children of Divorced or Separated Parents

If parents separate or divorce during their child's treatment, the physician may need to reassess parental rights before continuing treatment. If the physician becomes aware of questions regarding legal guardianship or if parents with equal legal rights differ on treatment options, the physician must take immediate steps to clarify the custody situation, including obtaining a copy of the custody decree. The physician may need to obtain legal informed consent from the authorized parent, or the parents may need to return to court for judicial clarification.

In general, communication with both parents is recommended when parents with joint legal custody disagree, even if the child is brought for treatment by the parent who has physical custody. When a clinician becomes aware of disagreement between parents with equal legal authority, he or she should attempt direct communication with the opposing parent to better understand that parent's position. Encouraging the opposing parent to obtain a second opinion may be helpful.

If disagreement continues, the clinician has two alternatives. The first is to advise the consenting parent to consult with an attorney to attempt resolution of differences either informally or formally (through a court). The second alternative comes into play if medication is immediately necessary and the benefits exceed the risks, in which case the clinician can obtain authorization for treatment from the consenting parent and notify the opposing parent that these steps are being taken based on the belief that medications are imminently necessary and appropriate. Attempts should be made to continue a dialogue with the opposing parent and encourage his or her involvement, but treatment may be initiated with the focus on the child's "best clinical interest."

Because this best interest standard is difficult to define, several factors should be considered: 1) severity of the underlying condition (i.e., the more severe, the lower the threshold to initiate treatment), 2) treatment options (i.e., whether the recommended treatment is the only one available or the clearly preferred option, and whether other safe and effective alternatives are available), and 3) potential risks versus benefits of treatment. A guardian ad litem (usually an attorney or clinician in a "neutral" position) may be appointed by the court to investigate the clinical situation and provide recommendations to the court prior to an order being entered.

Payment for Treatment

Complications may arise regarding payment for treatment of minors who can legally give their own consent for treatment. In emergency situations, the health care providers may look to the parent or legal guardian for payment, but in situations where the minor consents and confidentiality requires protection, the physician may look to the minor for payment. However, most jurisdictions do not allow health care providers to demand payment from the minor until he or she turns age 18, and minors cannot be held liable for payment until they do so. Minors without the financial means to pay for health care services may be eligible for free or low-cost programs that reimburse confidential health services provided to the young. Providers may have to be enrolled in these programs to be reimbursed.

Confidentiality and Privilege

The concepts of privilege and confidentiality are often confused. *Privilege* (more accurately called "testimonial privilege") is a legal term used to describe the protection afforded certain types of relationships (e.g., attorney-client, physician-patient, therapist-client) during legal and administrative proceedings. *Confidentiality* rules are broader and refer to a general standard of professional conduct that governs the disclosure of personal information to anyone not involved in the patient's care. Physicians and health care providers are legally and ethically mandated to protect the confidentiality of information they obtain through their clinical work.

Confidentiality

Elements of confidentiality that are taken for granted in work with adult patients are more complicated in work with children because the rights assured adults do not necessarily apply to children. Information is often shared with parents or legal guardians who authorize treatment, and they are generally also authorized to waive confidentiality and to give permission for release of information. In the hospital setting, issues are further complicated by the fact that the consultant has a professional relationship with the pediatric team and is expected

to share information and opinions with other individuals involved in the patient's care.

This team relationship should be explicitly defined from the beginning to clarify how information obtained in the psychiatric consultation will be used, including potential limits on confidentiality in the hospital setting. The clarification is an important first step when developing a treatment relationship to avoid potential misunderstandings and disruptions in alliance. The team relationship does not exempt the psychiatric consultant from protecting confidential information that does not need to be disclosed and that is not immediately relevant to the patient's medical care. Although a child's parents or legal guardians are entitled to the access of some personal information to help them make treatment decisions, the older child has some independent rights to confidentiality that must be considered (e.g., for birth control and contraception or for HIV testing and results).

Release of Information to Parents

Parents often expect full access to information regarding their child's treatment. This expectation is usually met with regard to medical treatment. Mature and emancipated minors, however, may consent to their own treatment; if they do so, any clinical information is confidential and may not be shared with the parent or guardian without the minor's authorization, absent a danger to the minor's life or limb. If this exception to confidentiality arises, and the medical care provider believes that sharing is essential, he or she should notify the minor of this decision and take reasonable steps to support the patient during and after disclosure. Without a danger to life or limb, all clinically relevant information documented in the emancipated or mature minor's chart should be withheld despite a parent's request for access.

Information obtained by a mental health consultant may be of a delicate nature, and disclosure to parents may complicate the therapist-child relationship and potentially jeopardize the child's treatment. Consultants should discuss these issues with both the child and the parents prior to treatment and stipulate which types of information may be released (e.g., evidence of dangerousness) and which will be protected. This type of conversation can clarify expectations and inform all parties about the terms of the treatment.

Further issues arise when a patient's parents are divorced or separated. Generally, the parent with legal custody retains the legal rights regarding access to information and authority to disclose this information. However, many jurisdictions have granted similar rights to the noncustodial parent. When the noncustodial parent has visitation rights, the physician should provide this parent with any information regarding the treatment necessary to ensure the child's safety. If a noncustodial parent lacks legal access to protected health information, a care provider may have to obtain consent for the release of this information from the parent who has legal custody.

Adolescents have greater authority regarding the release of information, particularly regarding issues of sexual behavior and substance abuse. Many jurisdictions link the ability to consent to treatment with the authority to release information, so that the adolescent who is competent to consent to treatment has the right to protect information that emerges in the course of that treatment. Other jurisdictions require the consent of both the parent and the adolescent to disclose confidential information once the adolescent has reached a certain age. If the adolescent cannot consent to treatment, the consultant should discuss the disclosure rules with both the patient and the parents.

The mental health consultant is also bound by legal and ethical codes. The consultant who fails to disclose information that would allow the parents to protect the child may be held liable if the child is harmed. The consultant's decision to maintain adolescent confidentiality or disclose risk-taking behaviors to a parent is often a difficult one. For example, if a teen is drinking or smoking marijuana without the parents' knowledge, he or she may accuse the care provider of a privacy violation if the parents are informed. Such sharing may also lessen the likelihood of honest communication between the patient and therapist, undermine the therapeutic relationship, or cause the patient to withdraw. If, however, the patient's life or limb is in danger, or the behavior and its consequences are serious and predictable, the parent needs to be informed and the patient notified. Jurisdictions generally permit disclosure if the child's safety is at risk. The consultant should always attempt to work therapeutically to encourage the child to disclose relevant information to parents.

Release of Information to Third Parties

In many jurisdictions, a person must be age 18 or older to authorize release of his or her medical record. Authority for release of information to schools, insurance companies, and researchers nor-

mally lies with the custodial parents or legal guardians of minors, except when the patient is emancipated or mature.

Oral consent may be adequate in the following situations:

- For potential emergencies when a delay of action until written consent is obtained would place the health or safety of a child in danger
- For disclosure of information to providers within the same institution (but institutional quality assurance proceedings should ensure that information is not carelessly shared with individuals within the hospital who are not involved in the patient's care, because access within a facility generally requires an administrative or clinical "need to know")
- Within academic institutions (but efforts should be made to protect a patient's identity during nonclinical case discussions)
- For disclosure of information to family members

As a general rule, written consent should be obtained before releasing information to third parties to clarify to all parties that voluntary and knowledgeable consent has indeed been given and to ensure that documentation exists in the chart. Consultants must ensure that the consent form qualifies the nature and extent of the information that may be released and that it complies with state statutes. Consultants should also be aware of the time frame during which a signed consent form remains valid, because the consent may need to be renewed after this time frame expires.

Specific sections of the consent form may describe how the information can be used and may allow the consenting party to examine any disclosed information. Before information is released, consultants should establish that the child and the parents have given fully informed consent by describing the nature of information that has been requested and what information will be released. If a consultant believes that the patient or parents would not have consented to the release of information to third parties (e.g., schools or insurance companies), it may be necessary for the consultant to obtain another consent or a new consent from the family. The consultant should review specific state statutes concerning access to information. For example, in certain jurisdictions, a school system paying for an independent educational assessment is entitled to access regardless of parental wishes. In many states, an insurance carrier has a legal right of access to clinical information that is relevant to coverage and reimbursement.

Many jurisdictions have statutes that govern the handling and protection of medical information and records. Violations of these rules place the treating clinician and institution at risk of a lawsuit or fine. The consultant should carefully monitor the information that is released to ensure that the disclosure does not harm the child.

Exceptions to Confidentiality

Emergencies. In an emergency situation, if parents are unavailable to provide consent, clinicians may disclose relevant and appropriate data in the best interests of the patient when the immediate welfare of the patient is clearly at stake. Care providers should document in the patient's chart all outreach efforts to contact the family.

Child abuse reporting. Medical professionals who identify or have reasonable cause to suspect child abuse are mandated to report this information to the appropriate child protection agencies. Each jurisdiction or state has a list of professionals (e.g., physicians, mental health practitioners, teachers) who must disclose child abuse. Child abuse reports from "mandated reporters" usually need to be made within 24–48 hours. All jurisdictions have statutes in place to provide immunity from civil liability for clinicians who are required to report concerns.

Before starting an assessment or treatment, mental health consultants should generally inform patients and families that they have a mandate to report child abuse. Consultants must be familiar with the definition of abuse or neglect in his or her jurisdiction. Clinical information regarding abuse or neglect may not be shared with third parties, other than state child protection agencies, unless an imminent and serious risk of harm exists. For example, in many jurisdictions, if a parent suspected of abuse or neglect explicitly refuses to allow the clinician to speak with parties outside the hospital who might be able to shed some light or provide collateral information about the family, this prohibition must be respected. The parent's refusal, however, may be construed as further evidence of protective concerns that should be reported.

Reporting obligations may vary based on who perpetrated the abuse. Some jurisdictions require a report only if a parent, legal guardian, or person with caretaking authority perpetrated or tolerated the abuse. Most states require reporting for any suspi-

cion or reasonable belief of abuse or neglect. Corporal punishment may be viewed differently depending on the jurisdiction. The reporting obligation can also be limited to those health care providers who have had professional or clinical interactions with the child. If abuse is suspected but a report is not made, the reasons for this decision must be documented. Because most jurisdictions have a sanction for not reporting and immunity for a false allegation, the consultant should take the legally prudent course and report to protective services if in doubt about the mandate to do so.

The consultant may report consensual sexual activity if he or she learns of a significant age disparity between the two individuals concerned or if the minor is below the legal age of consent. Each jurisdiction has specific laws regarding permissible age disparities, statutory rape, and the circumstances that trigger a mandatory report to the child abuse authorities. Sexual activity by a minor may also need to be reported if the consultant believes that the patient was coerced or intimidated into the activity, regardless of whether the minor describes the activity as consensual. In many states, a minor under age 16 cannot legally consent to sexual activity. Apart from any legal requirements, the care provider must consider the nature and extent of harm to the patient and the interventions that might potentially benefit his or her health and safety.

Jurisdictions may have reporting requirements that include notification regarding infectious diseases or disorders that could impair driving. These statutes may include substance abuse and emotional disorders that can potentially impair motor skills. Some laws authorize or require health care providers to breach confidentiality to issue warnings about certain dangers posed by a patient. Consultants may be required to disclose information that suggests that a patient may endanger self or risk the life or safety of another person, and they can be held legally liable for failure to do so. Similarly, patients who disclose thoughts or plans regarding suicidality lose their right to confidentiality and may face civil commitment procedures for involuntary hospitalization.

Custody Disputes

When the parents of a patient separate or divorce during the child's treatment, one or both parents may request a consultant's assistance in the custody hearing. Legal rules may prevent this testimony from being admitted in court, but even when it is legally allowable, the consultant should avoid allying with one of the parents because of the risk of jeopardizing the child's mental health treatment. Independent custody evaluations are preferable in these situations.

Privilege

Privilege rules govern the disclosure of confidential information in judicial and administrative proceedings. Statutes protect certain types of relationships at the expense of full disclosure to encourage open communication in these relationships. One type of privilege exists between physicians or psychotherapists and their patients, including child and adolescent patients. Federal regulations protect information disclosed in the course of psychotherapy, based on the assumption that effective treatment would be impossible if a patient did not feel assured of a confidential discourse. In work with children and adolescents, some important issues of privilege may arise. Information disclosed in the presence of a third person, such as a parent, has traditionally not been regarded as privileged, but this rule is under review in many jurisdictions. Another issue is whether information that a physician receives from family members or other third parties about a child's treatment is protected by privilege. Consultants need to be aware of the specific rulings on these questions in their jurisdiction.

Exceptions to Privilege

Several exceptions to the general rule of privilege apply to commitment proceedings, will contests, and criminal matters. In work with minors, exceptions are also made regarding information about child abuse or neglect. In some jurisdictions, privilege can be waived in child custody cases, even if the child and parents object.

Waiver of Privileges

Physician-patient privileges may be waived at the discretion of the patient or the person authorized to act on the patient's behalf. In some court hearings, a guardian ad litem is appointed to decide whether an incompetent child would choose to waive his or her privilege if competent to do so. Children and adolescents may decline to exercise their right to privilege, and in some jurisdictions, parents or legal guardians can waive privilege on behalf of their child. When parents are divorced or separated, the consultant must establish if this authorization to waive privi-

lege needs to be obtained from both parents. In custody disputes, parents often disagree about disclosure of confidential information. Privilege may also be waived when the patient has already testified about his or her treatment. The consultant should be particularly cautious about releasing information to lawyers or legal representatives unless the patient or parents have signed a release. This caution extends to subpoenaed requests for information.

Assessment for Parental Capacity and Medical Neglect

Physicians generally make determinations about a patient's decision-making capacity to ensure that the patient is able to make appropriate medical decisions. When patients are children and adolescents, consultants need to consider the parents' decision-making capacity. In a general sense, two kinds of competence exist: competence to decide (e.g., competence to refuse or consent to treatment) and competence to perform an act (e.g., competence to parent). The latter category is broader because it encompasses both decisions and actions (Gutheil and Appelbaum 2000). Issues of parental competence frequently arise in the hospital, often with regard to the parents' ability to adequately meet their child's medical needs. Parental abuse or neglect of physically ill children is not uncommon, and child protective services agencies often become involved during inpatient admission and are ultimately responsible for decisions regarding placement. Although *competence* is a legal concept determined by a judge, the consultant can be asked to give an opinion about parenting capacity.

Parental Capacity

Socialization, advocacy, and protection are important aspects of parental capacity (Barnum 2002). Parents have a responsibility to promote positive and social behaviors by providing adequate and consistent supervision and by setting developmentally appropriate limits on negative or antisocial behavior. Parents should foster the emotional development of the child by providing support, guidance, and direction. Chess and Thomas (1984) used the term "goodness of fit" to characterize the harmonious interaction between a mother and a child in regard to their capacities and styles of behavior. A poor fit is likely to lead to distorted development and maladaptive functioning.

Parents are expected to provide a safe and secure environment and protection from physical harm or exposure to emotional trauma, such as domestic violence and sexual or emotional abuse. Serious emotional injury may manifest as worsening of the child's behavior at home or in the community. A child with a difficult temperament places greater demands on the parent and is at higher risk of being abused. Parents must recognize and assist children with mental or physical disabilities, provide appropriate medical care for children with medical illnesses, and ensure that their children maintain satisfactory school attendance. Parents who cannot provide these basic functions may be defined as neglectful of their children's medical, emotional, or educational needs.

Medical Neglect

Medical neglect is the failure of parents or legal guardians to provide appropriate health care, including psychological treatment, for their child. In some cases, the reason for this failure is negligence or inability (e.g., physical, cognitive, or financial limitations). Social and financial assistance may be available when such inabilities limit parents' resources to provide adequate medical treatment for their child. Parents may also fail to provide medical care because of cultural norms, insufficient information, or religious beliefs. Cases in which parents withhold medical care based on their religious beliefs do not fall under the definition of medical neglect, but most jurisdictions are moving toward eliminating these religious exemptions.

Medical neglect can result in adverse health consequences, such as the worsening of the child's existing physical illness. According to the National Child Abuse and Neglect Data System, medical neglect accounted for 1.2% of child maltreatment fatalities in the United States in 2007 (U.S. Department of Health and Human Services 2007).

Concern is warranted when a parent refuses medical care for a child in an emergency or for treatment of an acute illness and when a parent ignores medical recommendations for a child who has a treatable chronic disease or disability, resulting in frequent hospitalizations or significant medical deterioration. Child protective services agencies generally will intervene when a child needs emergency medical treatment or when a child has a life-threatening or chronic illness that may result in disability or disfigurement if left untreated. Most jurisdictions issue

court orders to permit appropriate medical treatment in these situations.

Assessment

Most mental health consultants will be asked at some point to help assess parenting competence and medical neglect. In the hospital setting, the source of these referrals may be a child abuse protection team that consults with the pediatric team on all cases of suspected abuse or neglect. Preferred practice dictates that the patient and family have been told of the consultation and its purposes. The consultant should explicitly state to the family that the information and findings obtained in this assessment are not confidential or privileged and must be communicated to the pediatric team. If the parents refuse appropriate assessment, the refusal itself may constitute neglect.

As in the assessment of violence, the consultant needs to clarify the expectations underlying the request. Rarely is a professional certain that abuse has occurred, and allegations of sexual molestation and cases of Munchausen by proxy (see Chapter 12, "Munchausen by Proxy") can be particularly difficult to prove. The consultant must be clear that although he or she can provide a psychiatric assessment that includes parental psychopathology and a sense of the parent-child relationship, he or she is not a detective able to determine who abused or neglected whom. Table 4–2 summarizes parental qualities that should be assessed in the determination of parental capacity because they are particularly relevant to the treatment of physically ill children and adolescents.

In most jurisdictions, health care providers are mandated reporters of child abuse or neglect and should take this responsibility seriously. Symptoms that may be suggestive but not diagnostic of abuse might require further exploration and eventual reporting with state agencies in the absence of clear evidence. The legal standard for reporting to state child protection services is reasonable belief, not knowledge. The potential risks and benefits of filing a report should be explored, and the ultimate goal must be the best interest of the child. The medical team may decide that filing a report without much evidence to support allegations could lead to a ruptured treatment alliance, which would be detrimental to the child's health. Such decisions must be carefully explored, because the desire to preserve the treatment alliance may be driven by a reluctance to be confrontational with the family, contribute to the persistent deterioration of the child's health, and ultimately lead to harm.

Occasionally, the reluctance to report suspicions of abuse or neglect may stem from concerns about the lack of effective response from state agencies. Filing a report, however, can serve multiple purposes. First, filing the report could be a symbolic act that may serve as a check or deterrent to the parent's behaviors. Second, the filed report creates a paper trail of evidence indicating that care providers at some point had concerns about parental capacity. (Even if unsubstantiated, a series of reports could eventually help build a case for subsequent protective action.) Third, in the unfortunate event of a bad outcome as a result of parental abuse or negligence, evidence of reports filed by clinicians may place the legal burden

TABLE 4–2. Assessment of parental capacity

Parental strengths	Parental deficits
Cognitive understanding of child's physical, medical, and emotional needs	Cognitive limitations or mental retardation that interferes with understanding of child's physical or medical needs
Adequate organizational skills and ability to supervise child's treatment	Inadequate financial resources to support child's physical and emotional needs
Consistency	Inability to enforce discipline or set limits appropriately
Access to extended family and social support	Psychopathology
Capacity for emotional warmth and nurturance	Alcohol or substance abuse
	History of abuse or neglect

Source. Adapted from Barnum R: "Parenting Assessment in Cases of Neglect and Abuse," in *Principles and Practice of Child and Adolescent Forensic Psychiatry.* Edited by Schetky DH, Benedek EP. Washington, DC, American Psychiatric Publishing, 2002, pp. 81–96. Copyright 2002, American Psychiatric Publishing. Used with permission.

of responsibility on state protective agencies for not taking appropriate action.

Transfer of Custody and Termination of Parental Rights

Transfer of Custody

Depending on the state, custody transfer is usually a temporary arrangement involving transfer of legal and/or physical custody from the parents and may occur voluntarily or involuntarily.

Voluntary Transfer of Custody

Under voluntary transfer of custody, parents retain legal rights but voluntarily request the assistance of state agencies when a child is unable to function at home. The parents sign over physical custody for placement of the child in an appropriate setting.

Involuntary Transfer of Custody

Child protective services agencies can file a petition with the court for involuntary transfer of custody if the parents are found to be unfit, unwilling, or unable to competently manage their child's medical care. This transfer occurs when evidence shows that the child is at risk of significant harm as a result of the parents' behavior. In some instances, the child may remain within the physical custody of his or her parents while all legal decisions are made by court-appointed persons (e.g., guardians ad litem), state protective agencies, or the court itself. If the child is at ongoing risk of harm while living with the parents, the child is removed from the home and placed in the physical care of extended family members, foster parents, or state residential facilities. This arrangement is usually temporary, with the goal of reunification after treatment if possible.

The mere presence of parental psychopathology, such as depression, bipolar disorder, or alcohol abuse, does not automatically result in loss of custody unless evidence shows that a child is at significant risk of harm as a result of a parent's illness. Similarly, depending on the severity of cognitive limitations, parents with dementia or mental retardation may be adequate parents if their children have no special needs. When parents with cognitive impairments have a child with complex health issues and are unable to provide sufficient care despite external supports, a sufficient basis for transfer of custody may exist. On the other hand, parents who are cognitively competent and high functioning may be found unfit in certain situations (e.g., if they have a child with an eating disorder and contribute to their child's deterioration by forming an alliance with the illness, resisting treatment recommendations, and pulling their child out of treatment facilities).

Children can be placed in temporary foster care or other substitute care to give parents the opportunity to correct issues (e.g., mental health problems such as psychosis, mood disorders, or substance abuse) that are interfering with their ability to provide appropriate medical treatment for their children. Long-standing character pathology and cases such as Munchausen by proxy may be less amenable to immediate treatment. Children who are removed from their parents may experience the separation as unexpected and traumatic, because removal frequently occurs without preparation or adequate explanation to the child. Placement may disrupt the child's social support network and entail a change in schools. The consultant may be asked to assist in custody or placement evaluations and to make recommendations regarding the mental health needs of children placed in foster care. In making these decisions, the consultant should consider whether foster children are at greater risk for maltreatment and physical abuse than the general population. Despite the detriments of foster care and out-of-home placement, these situations may be necessary to lessen the likelihood of reinjury by parents or legal guardians.

Termination of Parental Rights

Parental rights may be permanently terminated in extreme circumstances, when the parents are found to be unlikely to be able to change their parenting behaviors within the foreseeable future (e.g., parents with severe dementia or mental retardation). Generally, termination of parental rights occurs only if supportive interventions are deemed insufficient and the child remains at ongoing risk of harm. Upon termination of parental rights, the child may be permanently placed in an adoptive home, and the adoptive parents are given full decision-making authority.

Concluding Comments

We end this chapter by reemphasizing the importance of legal and forensic issues in the pediatric setting. Although this chapter is too short to provide precise answers for every clinical situation, we have reviewed general guidelines that can be applied when consultants are faced with challenging legal and forensic issues. Mental health consultants

should establish a consulting relationship with a lawyer familiar with the pediatric setting and understand the specific statutes in their own jurisdictions that are most germane to their work setting. This partnership can have enormous impact on advancing patient care, and consultants should never hesitate to call for legal assistance.

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PART II

Referral Questions

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5

Delirium

Susan Beckwitt Turkel, M.D.

Delirium is a common clinical syndrome seen by the pediatric psychosomatic medicine consultant in general hospital settings. It is often unrecognized, overlooked, or misdiagnosed by physicians caring for the patient, and psychiatric consultations are usually requested for depression or agitation rather than delirium. The fluctuating nature of delirium often confounds the diagnosis (Inouye 1994). Psychiatrists consulting to pediatricians must be familiar with the clinical symptoms and approach to the treatment of delirium and recognize the risk delirium represents.

Delirium has been recognized since antiquity as a potentially lethal disorder. Hippocrates described mental abnormalities caused by fever, poisoning, or head trauma in 500 B.C. The term *delirium* was first used in medical writing by Celsus in the first century A.D. (Adamis et al. 2007). Over time, delirium has been called acute confusional state, acute brain syndrome, metabolic encephalopathy, toxic psychosis, intensive care unit (ICU) psychosis, global encephalopathy, and acute brain failure (Samuels and Neugroschl 2005).

Most studies of delirium, whether focusing on symptoms, etiology, risk factors, or prognosis, describe findings in elderly patients. These studies are difficult to apply to pediatric patients, whose brains have not undergone the changes in cytoarchitecture and neurochemistry that occur with advancing age. However, the delirium risk factors present in elderly patients, such as pathophysiological vulnerability, multiple medical problems, and the need for multiple medications (Rummans et al. 1995), may also be present in seriously ill children or adolescents. The etiology of delirium is complex and multifactorial, and although an attempt to identify the underlying condition that precipitated the delirium is usually considered essential, doing so is often impossible. Treatment begins with accurate diagnosis of delirium, followed by attempts to identify and address the presumed cause, and finally by efforts to ameliorate its effects on mood, behavior, and cognition.

Pathogenesis

Delirium is not a single disease entity but rather a syndrome that represents pervasive cerebral dysfunction due to a variety of etiologies (Rummans et al. 1995). More than one pathophysiological mechanism is likely involved in the development of delirium. A wide variety of etiologies and mechanisms may alter brain functions, leading toward a final common pathway that results in the symptoms of delirium (Francis et al. 1990).

Delirium often occurs in conjunction with infection or inflammation from other causes. The inflammatory response is a highly complex, interrelated process during which any cytokine can modulate the response of many others, depending on clinical, physiological, and immune factors (Rudolph 2008). Macrophages secrete cytokines in response to infections, surgery, or other tissue injury, and circulating

cytokines have been implicated in the pathogenesis of delirium (de Rooij et al. 2007).

Cytokines have major effects on cerebral function and cause changes in sleep patterns, mood, behavior, cognition, and memory (Dunlop and Campbell 2000). Treatment with cytokines such as interferon-α and interleukin-2 may cause dose-dependent cognitive, emotional, and behavioral disturbances, including delirium (Malek-Ahmadi and Hilsabeck 2007; van der Mast 1998). Interleukin-1, interleukin-2, interferon, and tumor necrosis factor can trigger excitatory central nervous system (CNS) effects of delirium, agitation, delusions, hallucinations, and seizures (Dunlop and Campbell 2000). Cytokines can also cause a reduction in acetylcholinergic pathways and impair cognition (de Rooij et al. 2007).

Delirium may be related to changes in the blood-brain barrier, which occur in response to systemic or local inflammation. Normally, the blood-brain barrier inhibits cytokines from crossing into the brain parenchyma, but in many situations related to the occurrence of delirium, the integrity of the blood-brain barrier may be compromised (Rudolph 2008). Chemokines, locally acting cytokines, compromise the blood-brain barrier and enhance migration of inflammatory cells into the brain (Rudolph 2008). Increased chemokine levels, but not cytokine levels, are found in patients with delirium (Rudolph 2008), and children with influenza and delirium have elevated levels of interleukin-6 (Fukumoto et al. 2007).

Delirium has been considered a "syndrome of cerebral insufficiency due to decreased oxidative metabolism in the brain" (Eikelenboom et al. 2002, p. 273). Patients identified with oxidative dysfunction develop delirium more often, independent of the severity of their underlying illness (Seaman et al. 2006). Interference with cerebral oxidative metabolism may be caused by many different factors, which include lack of oxygen, glucose, or amino acids; altered cerebral blood flow; increased permeability of the blood-brain barrier; toxins; hyperthermia or hypothermia; damage to cell membranes; or vitamin deficiencies (van der Mast 1998). Impairment of oxidative metabolism results in reduced synthesis of neurotransmitters, especially acetylcholine, which unbalances the cholinergic, dopaminergic, and noradrenergic systems (Eikelenboom et al. 2002). The following may underlie the symptoms and clinical presentation of delirium: decreased cholinergic function; excess release of dopamine, norepinephrine, and glutamate; decreased serotonin; and increased γ-aminobutyric acid (GABA).

Dopamine, norepinephrine, and serotonin are implicated in control of the sleep-wake cycle and arousal, and serotonin is also involved in modulating behavior, mood, and motor activity. Increased dopamine release and neurotransmission are linked to psychosis. Antipsychotic medications that block dopamine receptors are typically used to treat delirium (van der Mast 1998).

Abnormal neurotransmitter release, alteration in complex neurotransmitter interactions, and abnormal signal conduction contribute to delirium (Maldonado 2008b). Drugs or toxins that act on these neurotransmitter systems may produce delirium, particularly abnormalities of cholinergic neurotransmission produced by anticholinergic drugs (Rummans et al. 1995). In clinical settings, such as in the ICU or after surgery, opioids and other anticholinergic agents are widely used. Anticholinergic drugs that can cross the blood-brain barrier and are able to induce delirium. Hypoxia, which is frequent in these clinical settings, also leads to decreased release of acetylcholine and increased extracellular dopamine levels. In turn, excessive dopamine release can be neurotoxic by producing oxyradicals and releasing glutamate (van der Mast 1998).

The most prevalent cerebral neurotransmitters are GABA, which is the major inhibitory neurotransmitter, and its amino acid precursor, glutamate, which is a major excitatory neurotransmitter. GABA and glutamate may stimulate almost any neuron and are highly vulnerable to metabolic disturbances. Glutamate has been associated with psychosis, and increased levels of glutamate induce excessive calcium flux into neurons, which activates enzymes producing free radicals. These free radicals destroy other chemical and cellular components, particularly membranes and mitochondria, and may play a role in the production of delirium (van der Mast 1998).

Alterations in the majority of neurotransmitters, including acetylcholine, dopamine, GABA, glutamine, serotonin, and histamine, are documented in delirium and lead to alterations in their complex interactions. Intraneuronal signal transduction and second messenger systems may be disturbed and further alter synthesis and release of neurotransmitters. Neurotransmitter perturbation causes neuronal membrane hyperpolarization, which ultimately leads to spreading neuronal depression (McGowan and Locala 2003) and the routine electroencephalographic finding of nonspecific generalized slowing seen in most cases of delirium (Prugh 1980).

Clinical Characteristics

Delirium is a clinical syndrome characterized by acute onset and fluctuating course. It is characterized by disturbances of consciousness, attention, cognition, thought, language, memory, orientation, perception, sleep-wake cycle, behavior, mood, and affect (American Psychiatric Association 2000) (see Table 5–1). The *Diagnostic and Statistical Manual of Mental Disorders,* Fourth Edition, Text Revision (DSM-IV-TR; American Psychiatric Association 2000), criteria for the diagnosis of delirium were derived from studies in adults (Liptzin et al. 1993) and are applicable in children and adolescents (Turkel and Tavaré 2003) (see Table 5–2). Children may be especially susceptible to delirium due to febrile illnesses or medications (American Psychiatric Association 2000). Visual, auditory, and tactile hallucinations sometimes occur, as do delusions, although these are not needed for the diagnosis of delirium (Francis et al. 1990).

Delirium reflects neuronal dysfunction in susceptible areas of the cerebrum and reticular activating system, with relative sparing of the cerebellum (McGowan and Locala 2003). Many cortical and subcortical functions are altered in delirium. The prefrontal cortex and thalamus, which are critical in integrating higher cortical functions and behaviors, and the mesocortical dopaminergic pathway, which selectively modulates the role of the frontal cortex in maintaining and shifting attention, are particularly affected (Rummans et al. 1995). Memory impairment may be associated with disturbance of the basal forebrain cholinergic pathways. Changes in the level of consciousness may be associated with pontine cholinergic pathways that project to the forebrain and brain stem (Rummans et al. 1995).

The pattern and frequency of symptoms may vary within a delirium episode, with fewer symptoms present during the early or subclinical phases and during the later resolving phases than during the most fulminant phase, when symptoms are numerous and prominent. Most deliria are multifactorial, and the relative importance of differing etiologies occurring at different points in time within an episode of delirium may alter symptom expression. The symptoms of delirium that occur most consistently may result from a perturbation of critical neural circuitry, irrespective of etiology, and variation in symptoms may indicate the effects on neural circuits more related to differences in etiology or individual differences in brain structure, function, or response to illness (Trzepacz 2000).

In a study of the sensitivity and specificity of DSM-IV diagnostic criteria, Cole et al. (1993) found that inattention or clouding of consciousness was most sensitive for the diagnosis of delirium. Recognizing impaired attention in very young patients is difficult unless the examiner is familiar with engaging small children. Children present with irritability, withdrawal, and problems regulating state rather than the cognitive and behavioral changes seen in adults.

The inability to pay attention to external and internal stimuli predisposes an individual to disorientation. Ongoing attention is needed to reliably perceive passage of time, change in location, and recall of people in the environment. Typically, the sense of time is the first aspect of orientation to be distorted; however, time is a concept that young children have

Table 5–1. DSM-IV-TR diagnostic criteria for delirium

A. Disturbance of consciousness (i.e., reduced clarity of awareness of the environment) with reduced ability to focus, sustain, or shift attention.

B. A change in cognition (such as memory deficit, disorientation, language disturbance) or the development of a perceptual disturbance that is not better accounted for by a preexisting, established, or evolving dementia.

C. The disturbance develops over a short period of time (usually hours to days) and tends to fluctuate during the course of the day.

D. There is evidence from the history, physical examination, or laboratory findings that the disturbance is caused by the direct physiological consequences of a general medical condition.

Coding note: If delirium is superimposed on a preexisting vascular dementia, indicate the delirium by coding 290.41 vascular dementia, with delirium.

Coding note: Include the name of the general medical condition on Axis I, e.g., 293.0 delirium due to hepatic encephalopathy; also code the general medical condition on Axis III (see DSM-IV-TR Appendix G for codes).

TABLE 5–2. Clinical presentation of pediatric delirium (*N* = 84)

Clinical symptoms	*n* (%)
Impaired attention	84 (100)
Sleep disturbance	82 (98)
Confusion	81 (96)
Impaired concentration	80 (95)
Impaired responsiveness	80 (95)
Impaired state regulation	78 (93)
Irritability	72 (86)
Exacerbation at night	69 (82)
Affective lability	66 (79)
Impaired orientation (*N* = 57)	44 (77)
Not time	23 (40)
Not time, place	17 (30)
Not time, place, person	4 (7)
Agitation	58 (69)
Apathy	57 (68)
Anxiety	51 (61)
Impaired memory	44 (52)
Hallucinations	36 (43)
Visual, auditory	12 (14)
Visual alone	11 (13)
Visual, tactile	8 (10)
Auditory alone	3 (2)
Visual, auditory, tactile	2 (2)

Source. Reprinted from Turkel SB, Tavaré CJ: "Delirium in Children and Adolescents." *Journal of Neuropsychiatry and Clinical Neurosciences* 15:431–435, 2003. Copyright 2003, American Psychiatric Publishing. Used with permission.

not yet developed, and questions of orientation are difficult to assess in the very young.

Sleep disturbance is a common feature of delirium. The sleep-wake cycle may be reversed, or sleep may be fragmented and limited. Melatonin is related to the regulation of circadian rhythms, and changes in levels of melatonin may have a role in the sleep disturbance of delirium (Balan et al. 2003).

Most studies of delirium have emphasized risk factors and outcomes rather than the incidence or pattern of specific symptoms. Delirium is presumed to be the same syndrome across all ages, although the symptom profile and course may differ (Leentjens et al. 2008). Turkel et al. (2006) reported that sleep-wake disturbance, fluctuating symptoms, impaired attention, irritability, agitation, affective lability, and confusion were more often noted in children; that impaired memory, depressed mood, speech disturbance, delusions, and paranoia were more common in adults; and that impaired alertness, apathy, anxiety, disorientation, and hallucinations occurred similarly in both children and adults.

DELIRIUM SUBTYPES

Delirium has been subdivided by level of activity into four subtypes: hyperactive, hypoactive, mixed, and neither (Liptzin and Levkoff 1992). According to most studies, a mixed hyperactive-hypoactive psychomotor pattern is most common (O'Keeffe and Lavan 1999), which is consistent with the observation that symptoms tend to fluctuate in patients with delirium, and hypoactive symptoms are often seen in the same patients who had hyperactive features at other times. The hypoactive subtype is probably often missed and its frequency underestimated (Pandharipande et al. 2007; Peterson et al. 2006). A method of motion analysis has been suggested using a 24-hour accelerometer to distinguish hypoactive and hyperactive subtypes of delirium (Leonard et al. 2007).

Meagher and Trzepacz (2000) suggested that the different motoric disturbances of delirium may reflect different neurobiological causes, which in turn could reflect responses to treatment or the natural course of the underlying illness. Attempts to document different neurotransmitter levels during hyperactive or hypoactive episodes of delirium have not provided conclusive results. Changes in levels of acetylcholine, dopamine, serotonin, histamine, GABA, and norepinephrine have been described but have not been specifically linked to the different motoric patterns (Meagher and Trzepacz 2000).

Motoric subtypes (see Table 5–3) have been less studied in pediatric delirium than in adult delirium. In a study of two adolescents with delirium, Karnik et al. (2007) reported that one was agitated with presumably high dopamine levels and responded better to haloperidol, and the other presented with a more hypoactive or mixed picture and responded well to risperidone. The motoric pattern could be a reflection of medications given to the patient; for example, benzodiazepines or opioids make a patient hypoactive in higher doses and agitated with rapid withdrawal. Overall, the categorization of delirium by motoric subtype in adult patients has not been consistently correlated with etiology, symptom pattern,

TABLE 5–3. Definitions of motor subtypes of delirium

Motor subtype[a]	Clinical presentation
Hyperactive subtype	Increased motor activity Loss of control of activity Restlessness Reduced awareness of surroundings Wandering
Hypoactive subtype	Decreased motor activity Decreased speed of actions Decreased amount of speech Decreased speed of speech Listlessness Reduced alertness/withdrawal
Mixed motor subtype	Evidence of both hyperactive and hypoactive subtype in the past 24 hours
No motor subtype	No evidence of either hyperactive or hypoactive subtype in the past 24 hours

[a]Activity represents change from pre-delirium baseline.

Source. Reprinted from Meagher DJ, Moran M, Raju B, et al: "A New Data-Based Motor Subtype Schema for Delirium." *Journal of Neuropsychiatry and Clinical Neurosciences* 20:190, 2008. Copyright 2008, American Psychiatric Press. Used with permission.

outcome, or treatment response, despite many attempts at categorization (Meagher et al. 1996), and its significance and usefulness remain controversial.

MORTALITY

The prognosis of delirium reflects its underlying cause. It is often the first sign of an impending medical disaster and is associated with increased disease severity and mortality. When delirium occurs, it should be treated as a potentially life-threatening emergency (C.E. Schwartz 1999). A confirmation of a diagnosis of delirium indicates a potentially grave prognosis, predicated more on the severity of the underlying medical condition than on the occurrence of delirium (van Hemert et al. 1994). Overall, mortality rates in children and adolescents with delirium (20%) (Turkel and Tavaré 2003) are similar to rates in adults (20%–26%) (van Hemert et al. 1994).

The prevalence of delirium in medical and surgical settings has been documented to range between 10% and 50% and is as high as 80% in critically ill and postoperative patients (Eisendrath and Shim 2006). Delirium is an independent risk factor for increased mortality overall (Lacasse et al. 2006) and in mechanically ventilated patients in the ICU (Lin et al. 2004). It has been linked to increased length of stay (Schieveld et al. 2007) and morbidity and may adversely affect long-term outcomes (Eisendrath and Shim 2006). Children and adolescents with delirium may be at risk for persistent problems in cognition and behavior for up to 3 months (Prugh et al. 1980). In a study of pediatric patients in the ICU treated with either haloperidol or risperidone, 8% died of their underlying disorder, and delirium resolved in all the others (Schieveld et al. 2007).

ETIOLOGY, RISK FACTORS, AND EPIDEMIOLOGY

The most common cause of delirium in children and adolescents is probably infection due to viral, bacterial, fungal, and parasitic agents, usually with CNS involvement (Turkel and Tavaré 2003) (see Tables 5–4 and 5–5). Delirium due to medication is common and is associated with a variety of drug classes, including narcotics and other anticholinergics, sedative-hypnotics, benzodiazepines, anesthetics, and others. Delirium occurs in patients with CNS systemic lupus erythematosus (Turkel et al. 2001) and other vasculitides, such as periarteritis nodosa. Kidney, heart, lung, and bone marrow transplant patients are also at risk for delirium. In these cases, delirium may be related to the medications needed to maintain the transplant, to infection, or to an additional intercurrent illness. Leukemia, lymphoma, and other malignancies, especially CNS tumors, may be associated with delirium. This may be due to direct CNS invasion, sepsis or other infection, multiple medications, or neurotoxic chemotherapy (Turkel and Tavaré 2003). Typically, pediatric patients with delirium are very sick, with a long hospital stay and high mortality risk (Turkel and Tavaré 2003). Mortality is highest in patients with organ failure and lowest in patients with delirium following surgery or trauma (Turkel and Tavaré 2003).

The etiologies of delirium are typically severe diseases that result in serious metabolic and physiological changes, and its pathogenesis appears to be best explained by theories relating to abnormalities of oxidative metabolism, inflammation, and other causes of tissue injury. Any cause of inflammation, either locally in the CNS (e.g., encephalitis or meningitis) or diffuse (e.g., sepsis or systemic lupus erythematosus), can cause delirium. Postoperative,

TABLE 5–4. Differential diagnosis of pediatric delirium: the "I WATCH DEATH" mnemonic

Infection	Encephalitis,[a] meningitis,[a] syphilis, HIV, or sepsis[a]
Withdrawal	Alcohol, barbiturates, or sedative-hypnotics[a]
Acute metabolic	Acidosis, alkalosis, electrolyte disturbance,[a] hepatic failure, or renal failure
Trauma	Closed-head injury,[a] heatstroke, postoperative,[a] or severe burns[a]
CNS pathology	Abscess, hemorrhage, hydrocephalus, subdural hematoma, infection,[a] seizures,[a] stroke, tumors, metastases, or vasculitis[a]
Hypoxia	Anemia, carbon monoxide poisoning, hypotension, pulmonary failure, or cardiac failure
Deficiencies	Vitamin B_{12}, folate, niacin, or thiamine
Endocrinopathies	Hyper/hypoandrenocorticism, hyper/hypoglycemia, myxedema, or hyperparathyroidism
Acute vascular	Hypertensive encephalopathy, stroke, arrhythmia, or shock[a]
Toxins or drugs	Medications,[a] illicit drugs, pesticides, or solvents
Heavy metals	Lead, manganese, or mercury[a]

[a]More commonly seen in pediatric delirium.

Source. Reprinted from Wise MG, Brandt G: "Delirium," in *American Psychiatry Press Textbook of Neuropsychiatry,* 2nd Edition. Edited by Hales RE, Yudofsky SC. Washington, DC, American Psychiatric Press, 1992, p. 302. Copyright 1992, American Psychiatric Press. Used with permission.

toxic, and drug-related causes are also common (Turkel and Tavaré 2003). Although delirium is frequent in children with fever, a temporal relationship has been described between use of antipyretics and delirious behavior, which suggests that this common treatment may be problematic (Okumura et al. 2006). Steroids may contribute to delirium or may be used to treat it, depending on the etiology. Commonly used antibiotics have been associated with neurotoxic reactions. Neuropsychiatric symptoms have been seen with antifungal agents and cephalosporins (Snavely and Hodges 1984).

Postoperative delirium is probably related to exposure to anesthetics, narcotics, benzodiazepines, and anticholinergic medications (Marcantonio et al. 1994). Anticholinergic effects have been associated with impairment in memory and attention in normal subjects and may cause or exacerbate delirium in susceptible patients (Tune et al. 1992). Delirium related to anticholinergic side effects of medications is especially pertinent to the etiology of delirium in young people. Anticholinergic side effects occur with many commonly used medications, including antihistamines and opioids, and are additive when multiple anticholinergic agents are used together.

Sedative and analgesic medications used in the ICU to relieve anxiety and pain associated with intubation may contribute to the development of delirium. Although adequate sedation for mechanical ventilation in the ICU can be achieved in the short term with a combination of parenteral benzodiazepines and opioids (typically short-acting midazolam and fentanyl), long-term continuous infusion of these agents results in physiological tolerance and the need for dose escalation to maintain an appropriate level of sedation (Tobias 2000). Lorazepam has been reported to be an independent risk factor for transition to delirium (Pandharipande et al. 2006). Mechanically ventilated children often re-

TABLE 5–5. Etiology of pediatric delirium

Diagnosis	*n* (%)
Infection	28 (33)
Drug-induced	16 (19)
Trauma	8 (9)
Autoimmune	7 (8)
Post-transplant	7 (8)
Post-operative	6 (7)
Neoplasm	6 (7)
Organ failure	6 (7)
Total	84 (100)

Source. Reprinted from Turkel SB, Tavaré CJ: "Delirium in Children and Adolescents." *Journal of Neuropsychiatry and Clinical Neurosciences* 15:432, 2003. Copyright 2003, American Psychiatric Publishing. Used with permission.

main anxious, agitated, or combative despite or because of escalating doses of opioids and benzodiazepines (Harrison et al. 2002). In some children, additional doses seem paradoxically to exacerbate agitation and confusion, and antipsychotic medication is required, even in very young patients (Harrison et al. 2002).

Emergence delirium, emergence agitation, and *postanesthetic excitement* are terms referring to instances when patients experience alteration in orientation, confusion, lethargy, or violent behavior following administration of general anesthesia (Scott and Gold 2006). The introduction of newer inhaled anesthetics into pediatric practice has led to a greater incidence of emergence delirium in young patients. The severity may vary, and treatment with analgesics or sedatives is usually required and may risk prolonging delirium (Vlajkovic and Sindjelic 2007). Sevoflurane, desflurane, and possibly isoflurane are associated with a higher incidence of emergence delirium than are halothane and propofol, although repeated use of propofol has itself been associated with psychosis (Vlajkovic and Sindjelic 2007). The Pediatric Anesthesia Emergence Delirium Scale (Sikich and Lerman 2004) may be useful in documenting the incidence, presentation, risk factors, and treatment of emergence delirium in children.

Benzodiazepines and propofol have high affinity for the GABA receptor in the CNS, and GABA-mimetic effects can alter levels of numerous neurotransmitters believed to be deliriogenic. Novel sedative agents that are GABA receptor sparing may help to reduce some of the cognitive dysfunction seen postoperatively and in the ICU. Dexmedetomidine, an a_2-adrenergic agonist for short-term sedation in the ICU, is expensive but may be a viable alternative to benzodiazepines (Buck and Willson 2008). It has been shown to be helpful in decreasing the incidence and severity of emergence delirium when administered perioperatively to children undergoing general anesthesia with sevoflurane (Shukry et al. 2005). Compared to propofol and midazolam, dexmedetomidine is associated with a significantly lower incidence of postoperative delirium (Pandharipande et al. 2006).

Differential Diagnosis

The diagnosis of delirium is not generally as problematic in children and adolescents as in adults, in whom delirium and dementia can be difficult to differentiate (Meagher and Trzepacz 2007). Early pediatric delirium may be associated with subtle neuropsychiatric signs, including inattention, decreased awareness of the caregiver or surroundings, purposeless actions, restlessness, irritability, and inconsolability (Schieveld et al. 2007). Hallucinations occur in about 40% of pediatric patients with delirium, and visual, auditory, and tactile hallucinations are more common than olfactory and gustatory hallucinations (Rummans et al. 1995; Turkel and Tavaré 2003).

Delirium associated with high fever in children is likely due to systemic viral, bacterial, or other infections, including serious CNS infection. Abnormal neurological findings, such as meningeal signs, disturbed consciousness, and slowing on electroencephalogram (EEG), may indicate delirium due to meningoencephalitis (Kashiwagi et al. 2003).

Delirium is often misdiagnosed as depression, because disordered sleep, changes in activity level, cognitive impairment, irritability, or apathy may be present in both (Nicolas and Lindsay 1995). Agitation or withdrawal may suggest an adjustment disorder, but confusion and a fluctuating course indicate delirium instead. Missing the diagnosis is of concern when the presumption of depression or a reactive behavioral disturbance delays the appropriate care of a delirious patient (Boland et al. 1996).

Assessment and Diagnostic Tools

Although a thorough review of the patient's chart is important, a retrospective review of the medical record is an imprecise way of establishing the diagnosis of delirium (Johnson et al. 1992). The consultant also needs to review the patient's history and pertinent laboratory and radiographic studies and obtain information from the patient's family about baseline behavior, mood, and cognitive function. An astute history and physical examination, review of medications, and targeted laboratory tests should be adequate to assess for most potential causes of delirium. Further testing should be tailored to the specific clinical situation. A thorough review of a patient's current and recent medications is mandatory. Patients often receive a variety of psychotropic medications before psychiatric consultation is requested, and these medications can precipitate or exacerbate delirium. Attention should be given to the type, dosage, and recent addition or discontinuation of medications, with emphasis on sedative-hypnotic, opioid, and psychotropic drugs (Maldonado 2008a). Lumbar puncture and examination of the cerebro-

spinal fluid should be done whenever CNS infection is suspected. Brain imaging may be most useful with new focal neurological signs or a history of head trauma (Inouye 1994). In patients with no focal neurological signs, neuroimaging is unlikely to be helpful. Serious medical disease is a better predictor of the development of delirium than is the presence of abnormal brain imaging (Kishi et al. 1995).

In an early clinical study of delirium in children and adolescents, patients with acute CNS disorders of toxic, metabolic, traumatic, and other types of conditions considered associated with delirium were compared with other hospitalized children who were not suspected of having a CNS disorder (Prugh et al. 1980). The patients and controls were administered a battery of tests of neuropsychological function, including double simultaneous stimulation, synkinesia, astereognosis, graphesthesia, right-left orientation, examiner transposition orientation, identification of common objects, drawing of geometric shapes, modified Bender test, drawing of concentric circles, and subtraction of serial *7*s. These tests were done during the acute episode of delirium and again after recovery. Bedside EEG was performed on all the patients. At the end of the study, patients with delirium could be distinguished from the controls by abnormalities on electroencephalographic and neuropsychological parameters (Prugh et al. 1980).

Generalized slowing of background activity on EEG was once considered characteristic of delirium, but it is nonspecific and not useful in distinguishing subjects with and without delirium (Inouye 1994). Occasionally, abnormal occipital delta waves that are blocked by eye opening are seen in patients with more benign conditions, which may be useful in differentiating delirium associated with acute but benign febrile illness from more serious encephalitis and encephalopathy (Onoe et al. 2003).

Various published instruments are used to diagnose delirium and assess symptom severity in adults. They are usually structured to distinguish delirium from dementia, depression, or schizophrenia. Most consist of operationalized diagnostic criteria from DSM-IV-TR or the *International Statistical Classification of Diseases and Related Health Problems,* 10th Revision (ICD-10; World Health Organization 1992), usually in the form of a checklist, and incorporate information from patient observation and the medical record. Their breadth of symptom coverage varies, as does their applicability. No unique diagnostic criteria or rating instruments have been developed specifically to aid in diagnosing delirium in the pediatric population.

Using a standardized scale is of value in the diagnostic process, evaluation of treatment, and assessment of outcome. Some scales are designed for nursing or other nonphysician staff to administer when only a brief screening instrument is needed. Education of ICU staff about delirium and the use of the screening instrument is required for any instrument to be useful (Devlin et al. 2007). More quantifiable instruments for diagnosis and treatment evaluation are usually longer and more detailed and typically require the expertise of a psychiatrist.

For many years, brief cognitive tests, such as the Mini-Mental State Examination (Folstein et al. 1975), were used to diagnose delirium. Although these tests documented cognitive abnormalities, they could not distinguish between delirium and dementia (Robertsson 1999) and they are not suitable for younger children. The Children's Orientation and Amnesia Test (COAT) is designed to assess cognition in pediatric patients but has not been used to assess for delirium (Ruijs et al. 1992).

The Confusion Assessment Method (CAM) is based on DSM-III-R criteria for delirium. Three of four criteria—acute onset, fluctuating course, inattention, and disorganized thinking—are required to make the diagnosis of delirium (Ely et al. 2001). The CAM is the basis of the CAM-ICU method for adults in the ICU (Ely et al. 2001). The CAM-ICU and the Intensive Care Delirium Screening Checklist (ICDSC; Bergeron et al. 2001) were both designed to be applicable for intubated patients in the ICU (Polderman 2007). Using these two instruments, delirium was found to be an independent risk factor for adverse outcome and increased length of stay in the ICU (Polderman 2007). A pCAM-ICU version for assessing delirium in pediatric patients is under development (Bartoo 2009).

The Delirium Rating Scale (DRS), the most widely used scale for diagnosing delirium, has been translated into many languages (Trzepacz et al. 1988) and has been studied in children and adolescents (Turkel et al. 2003). Individual item scores and the total DRS scores are the same in adult and pediatric patients (Turkel et al. 2003). The DRS was revised in 1998 (DRS-R-98) (Trzepacz et al. 2001). The DRS appears to be more useful in patients younger than age 3, whereas the DRS-R-98 is preferable for older children and adolescents.

Management

The critical component of delirium treatment is to detect and address its underlying cause (Grace and Holmes 2006). Concentration on the management of overt symptoms, such as behavioral or sleep disturbance, may result in failure to manage the underlying physical condition causing the delirium (Grace and Holmes 2006). Treatment of the underlying disorder or its spontaneous resolution usually results in the rapid alleviation of the delirium (Rummans et al. 1995).

Environmental intervention is particularly important in the management of pediatric patients with delirium. Frequent and repeated reassurance and reorientation by someone familiar, such as a family member or a nurse known to the child, help to decrease fear and confusion and maintain the child's connection to the environment. Limiting staff changes and involving relatives are frequently overlooked in the management of patients with delirium (Meagher et al. 1996) but are essential for pediatric patients and often eliminate the need for medication. Providing a safe and uncluttered environment, but with calendars, clocks, pictures, and familiar objects from home, helps maintain orientation and reduces anxiety. Minimizing excess ambient noise and providing good lighting during the day and low light at night encourage day-night discrimination and decrease confusion from external environmental stimuli (Eisendrath and Shim 2006). Although nonpharmacological interventions are harder to implement and monitor than medication, they may have a significant protective effect against delirium (Inouye et al. 2003) and thus are an important component of treatment.

A large body of empirical evidence supports the usefulness of pharmacological treatment of delirium, but few double-blind randomized clinical trials or placebo-controlled studies have been reported (Trzepacz et al. 2008). Most studies are post hoc studies of drug management of delirium (Lonergan et al. 2007). Although no inclusive systematic review or meta-analysis of the effectiveness of antipsychotic medications for delirium has been published, antipsychotic agents are recommended and can be very beneficial for the agitated patient with perceptual disturbances, sleep-wake cycle abnormalities, and behavioral dyscontrol (Lonergan et al. 2007). Most medications used in pediatrics and child psychiatry, including antipsychotics to treat delirium, are used off-label, which means that special attention should be paid to information and consent procedures (Schieveld et al. 2007). Of the neuroleptic agents, haloperidol has been the most studied and is most often recommended to treat delirium (Lacasse et al. 2006).

Haloperidol is favored because it has few active metabolites, a safe parenteral form, few anticholinergic and hypotensive side effects, and relatively less sedation than other agents. The intravenous route appears to be more effective than the enteral route and should be considered when rapid acute control of agitation is required (Brown et al. 1996). The risk of extrapyramidal dystonia is considered to be reduced with intravenous administration. Although widely used, the intravenous route does not have approval from the U.S. Food and Drug Administration for the treatment of delirium (Eisendrath and Shim 2006).

Akathisia may be particularly problematic with haloperidol and other typical neuroleptics when treating delirium. Because the sense of inner restlessness may be clinically difficult to distinguish from confusion or agitation, it can lead to the prescription of increased doses of medication, which in turn worsens the problem (Eisendrath and Shim 2006). Taking a baseline electrocardiogram and monitoring the QTc interval as well as magnesium and potassium levels are recommended because of reports of prolongation of the QTc and risk of torsades de pointes with antipsychotics (American Psychiatric Association 1999). For patients with agitated or hyperactive delirium, antipsychotic medication and restraints are typically employed. Patients with hypoactive delirium, who are rarely recognized or treated, also benefit from antipsychotic medication (Hart et al. 1996). Haloperidol has been reported to be helpful in pediatric patients with delirium, including an agitated, critically ill pediatric patient with burns (Brown et al. 1996) and mechanically ventilated patients in the ICU (Harrison et al. 2002).

Compared with haloperidol, droperidol has a more rapid onset of action, shorter duration of effect, and lower incidence of extrapyramidal side effects (Resnick and Burton 1984). Droperidol is more sedating than haloperidol and has less risk of cardiac arrhythmia (Frye et al. 1995). Multiple doses of haloperidol may be required to achieve the same rapid control of acute agitation as a single dose of droperidol (Bostwick and Masterson 1998). Droperidol is available only in a parenteral form, but this may be an advantage in delirious patients who are unable to take oral medication. It may be a bet-

ter alternative for the management of agitation with less risk of side effects, but its use in treating delirium is not well studied.

Newer atypical antipsychotics may provide greater efficacy based on their broad and varied neurotransmitter effects, and their use is a reasonable first-line approach to the pharmacological treatment of delirium (T.L. Schwartz and Masand 2002). Both olanzapine and risperidone may be effective and safe alternatives for treating delirium in critically ill patients (Schieveld et al. 2007; Sipahimalani and Masand 1998; Skrobik et al. 2004). Olanzapine and risperidone are available in tablet or oral disintegrating forms, and risperidone is also available as a liquid for oral use. Ziprasidone is now available in oral and parenteral formulations, and the parenteral form has been reported to be effective in treating delirium (Young and Lujun 2004). Ziprasidone is contraindicated in patients with a QTc interval exceeding 500 milliseconds or uncompensated heart failure, and baseline electrocardiogram and cardiac monitoring are recommended.

In a study of delirium in pediatric patients in the ICU, children were treated with haloperidol parenterally or risperidone orally (Schieveld et al. 2007). All patients made a complete recovery from the delirium, although two patients treated with haloperidol developed side effects of acute torticollis. Olanzapine, risperidone, and quetiapine are effective and safe in children and adolescents, and olanzapine and risperidone are effective and safe in infants and toddlers with delirium (Turkel et al. 2008a, 2008b).

Benzodiazepines have been used to sedate the agitated patient, but they add to confusion and memory impairment; increase agitation, particularly in young patients; and often interfere with the treatment of delirium (Grace and Holmes 2006). Benzodiazepine monotherapy is reserved for treatment of delirium caused by withdrawal from alcohol or sedative-hypnotics (American Psychiatric Association 1999). Other sedative-hypnotics also may initially put the patient to sleep, but they produce paradoxical agitation in children and adolescents. Mianserin (Uchiyama et al. 1996), cholinesterase inhibitors (Grace and Holmes 2006), anticonvulsants, and melatonin (Hanania and Kitain 2002) have been tried, with minimal benefit.

Preservation of the ability to think clearly is an important goal of palliative care. Mild cognitive impairment in attention and short-term memory may be warning signs of early delirium and warrant treatment in the terminally ill (Greenberg 2003).

Although consistently suspected in adult populations, symptoms of alcohol abuse and withdrawal are often overlooked in pediatric patients (Repper-DeLisi et al. 2008). Although benzodiazepines are generally considered the treatment of choice for alcohol withdrawal, guidelines for when to treat and how much medication to give vary considerably. Most protocols recommend an initial benzodiazepine dose based on a patient's alcohol use and symptom severity, dose titration to control symptoms, and then a gradual taper for detoxification, in either a fixed amount or a symptom-triggered fashion with dose based on severity (Repper-DeLisi et al. 2008). All benzodiazepines are equally effective, but diazepam (long-acting) and lorazepam (short-acting) are most often used. Lorazepam is metabolized by conjugation, has no active metabolites, and is preferable for patients with impaired hepatic function. Either medication can be administered orally or intravenously (Repper-DeLisi et al. 2008).

Concluding Comments

Delirium represents a symptom complex from a variety of etiologies that results in a global encephalopathic process. It may result from CNS or systemic infection, toxic effects, or oxidative injury. Anticholinergic, sedative-hypnotic, or other agents may contribute to its occurrence. Having a high index of suspicion for the development of delirium in patients who are severely ill is important, because the rapid identification and treatment of delirium are essential to prevent associated severe morbidity and high mortality. Delirium in children and adolescents is similar in presentation, etiology, and outcome to that in adults. The DRS and DRS-R-98 are useful for diagnosis and for monitoring patients with delirium. The accurate diagnosis of delirium leads to attempts to address the underlying medical condition that led to its development. Environmental support is important in the treatment of delirium, and antipsychotic medications, both typical and atypical, are useful in controlling its symptoms. Although the presentation, etiology, risk factors, and treatment of delirium are most studied in the elderly and least in the young, increased interest and improved methodologies for its detection will lead to further essential studies on the treatment and outcome of delirium in pediatric populations.

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6

Mood Disorders

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Mood disorders impact the health of children, adolescents, and adults worldwide. The World Health Organization estimates that by the year 2020, depression will remain a leading cause of adult disability, second only to cardiovascular disease (World Health Organization 2000). Evidence also supports the presence of disabling mood disorders during childhood and adolescence. Estimates suggest that as many as 2% of children may be depressed at any period of time (Kaufman et al. 2001; Kessler et al. 2001), and the rate increases during adolescence. Lifetime prevalence rates for adolescent depression derived from community studies range from 5% (Lewinsohn et al. 1993) to 14% (Kessler and Walters 1998; Kessler et al. 2003). Depression is highly comorbid with other psychiatric disorders. More than 60% of adolescent patients with depression also meet diagnostic criteria for an anxiety disorder, and many go on to develop disorders of substance use. In children, depression also co-occurs with anxiety and disruptive behavior disorders.

When compared with the general population, people with physical illnesses are more likely to have mood disorders, specifically depression (Egede 2007; McDaniel and Blalock 2000; Patten 2001). Mood disorders are associated with higher health care costs, adverse health behaviors, significant functional impairment, lost work productivity, occupational disability, and increased health care utilization (Katon 2003).

Although much of the research on depression has focused on adults, growing numbers of children and adolescents living with general medical conditions face similar comorbidities. Evidence suggests that youngsters with physical illnesses are twice as likely to have depression as those in the community without physical illnesses. Those with depression are also at increased risk for worse medical outcomes and quality of life (McDaniel and Blalock 2000). Strong associations between depression and physical illness have been found among adolescents with obesity (Pine et al. 2001), headaches (Pine et al. 1996), and asthma (Mrazek et al. 1998). Adolescent depression has been associated with increased risk for medical hospitalizations and suicide (Kramer et al. 1998). Also, growing evidence indicates that depression may be a cause or consequence of some physical illnesses, such as cardiovascular disease, HIV/AIDS, cancer, epilepsy, and stroke (Evans and Charney 2003).

Mania is even less well studied than depression in children and adolescents. Controversy exists regarding the presence and recognition of pediatric mania. Evidence suggests that mania is not rare in this age group, although it can be difficult to recognize, and its diagnosis requires careful assessment (Biederman et al. 1998; Leibenluft et al. 2003; Wozniak et al. 1999). Current lifetime prevalence estimates for pediatric mania range from 0.9% to 1.2% (Gould et al. 1998; Kessler et al. 1994; Robins and Price 1991). Pediatric mania has been significantly associated

with increased suicidal ideation and attempts (Gould et al. 1998).

Despite the recognition of increased comorbidity of mood disorders and their potential adverse impact, they remain underdiagnosed and undertreated in pediatric patients with physical illnesses. In this chapter, we review clinical features and considerations in depression among children with physical illness, challenges to diagnostic assessment, risks associated with comorbid depression, features of depression in specific populations, and approaches to treatment.

Definitions

In the *Diagnostic and Statistical Manual of Mental Disorders,* Fourth Edition, Text Revision (DSM-IV-TR; American Psychiatric Association 2000), the depressive disorders include major depressive disorder, dysthymic disorder, adjustment disorder with depressed mood, and mood disorder due to a general medical condition. For the last category, the specific condition causing the depressive symptoms must be specified and must be a physical illness known to cause depression. The diagnostic criteria for a major depressive episode, which are the same for all ages, require that 1) five or more of the symptoms of depression be present nearly every day for most of the day during a 2-week period and 2) at least one of the two symptoms of a) depressed or irritable mood or b) markedly diminished interest or pleasure in most activities must be present (see Table 6–1).

According to DSM-IV-TR, manic episodes are characterized as a distinct period lasting at least 1 week during which the individual has an abnormally and persistently elevated, expansive, or irritable mood (American Psychiatric Association 2000). Hypomania is a manic episode in which the disturbance is not severe enough to cause marked impairment in social or occupational functioning or to require hospitalization, and no psychotic symptoms are present. Manic episodes may be part of a primary bipolar disorder, but they also may be secondary to a general medical condition or induced by exposure to medications or toxic features. A diagnosis of secondary mania or mood disorder secondary to a general medical condition requires evidence of a prominent and persistently elevated, expansive, or irritable mood, as well as evidence from the history or the physical and laboratory assessments demonstrating that the disturbance is the direct physiological consequence of a physical condition (see Table 6–2).

Diagnosis of Mood Disorders in Individuals With Physical Illness

Making the diagnosis of mood disorder in youngsters with physical illness can be challenging. One factor in the failure to recognize depression in physically ill patients involves commonly held beliefs that depression is an understandable reaction to illness and that treatment should focus on the underlying physical condition. Furthermore, in the pediatric setting, families and care providers are more likely to focus on physical signs and symptoms and may be reluctant to stigmatize the patients with psychiatric illness. Another challenge in diagnosis lies in the frequent overlap of mood and organic symptoms. Depression, irritable mood, loss of interest, anhedonia, anorexia, weight loss, fatigue, sleep pattern changes, psychomotor agitation or retardation, and poor concentration can all be manifestations of a psychological reaction, a direct effect of a general medical condition or its treatment, an effect of a primary depressive disorder, or some combination of all three (Waller and Rush 1983).

Pain and physical disability resulting in decreased interest and enjoyment of previously pleasurable activities as well as separation from family and friends can cause confounding symptoms as well as the loss and grief experienced with the new onset of a chronic physical illness. Furthermore, the symptoms of depression in physically ill patients may manifest in atypical forms, such as somatic symptoms, oppositionality, and treatment nonadherence (Starace et al. 2002). Feelings of worthlessness, inappropriate guilt, or thoughts of suicide are seen much less commonly in patients with depression related to a physical illness (Goldston et al. 1994).

Problems of psychological adjustment to physical illness or injury are common among the pediatric population, supporting the need to screen for depression and other psychiatric disorders (Borowsky et al. 2003). Although depression is relatively common in physically ill patients, it is frequently underdiagnosed and undertreated (Newport and Nemeroff 1998). Studies suggest that pediatricians identify less than 20% of their patients with mental health issues (Wells et al. 2001). This underdiagnosis is unfortunate because evidence suggests that the early identification of depression provides opportunities for improved quality of life, shortened hospital stays, increased adherence to treatments, and decreased suicide (Koenig et al. 1997; Strain 1998).

TABLE 6–1. DSM-IV-TR diagnostic criteria for major depressive episode

A. Five (or more) of the following symptoms have been present during the same 2-week period and represent a change from previous functioning; at least one of the symptoms is either (1) depressed mood or (2) loss of interest or pleasure.

Note: Do not include symptoms that are clearly due to a general medical condition, or mood-incongruent delusions or hallucinations.

(1) depressed mood most of the day, nearly every day, as indicated by either subjective report (e.g., feels sad or empty) or observation made by others (e.g., appears tearful). **Note:** In children and adolescents, can be irritable mood.

(2) markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day (as indicated by either subjective account or observation made by others)

(3) significant weight loss when not dieting or weight gain (e.g., a change of more than 5% of body weight in a month), or decrease or increase in appetite nearly every day. **Note:** In children, consider failure to make expected weight gains.

(4) insomnia or hypersomnia nearly every day

(5) psychomotor agitation or retardation nearly every day (observable by others, not merely subjective feelings of restlessness or being slowed down)

(6) fatigue or loss of energy nearly every day

(7) feelings of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick)

(8) diminished ability to think or concentrate, or indecisiveness, nearly every day (either by subjective account or as observed by others)

(9) recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide

B. The symptoms do not meet criteria for a mixed episode.

C. The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.

D. The symptoms are not due to the direct physiological effects of a substance (e.g., a drug of abuse, a medication) or a general medical condition (e.g., hypothyroidism).

E. The symptoms are not better accounted for by bereavement, i.e., after the loss of a loved one, the symptoms persist for longer than 2 months or are characterized by marked functional impairment, morbid preoccupation with worthlessness, suicidal ideation, psychotic symptoms, or psychomotor retardation.

To diminish the effects of confounding physical symptoms with depression, DSM-IV-TR suggests an exclusive and etiological approach to diagnosing depression in a physical illness. In this approach, symptoms should be excluded if they are judged by the mental health clinician to be etiologically related to a general medical condition. Studies examining these approaches have found that an inclusive approach, in which one includes all of the symptoms without exclusions, is the most sensitive and reliable approach to diagnosis (Koenig et al. 1997). Given this context, many screening instruments are available to assist the mental health clinician with the identification of depression among physically ill children and adolescents (see Table 6–3).

CLINICAL CONSIDERATIONS

Many elements in the evaluation of depression in pediatric patients are similar to those in adult evaluations; however, important differences must be considered throughout every component of the evaluation (American Academy of Child and Adolescent Psychiatry 2009). The importance of the child's developmental level in assessing emotional and cognitive experiences of illness and the effect of the family on medical outcomes are two important factors that are discussed in Chapter 3, "The Pediatric Psychosomatic Medicine Assessment." In this chapter, we discuss other clinical considerations relevant to the evaluation and management of children and adolescents in the medical setting.

TABLE 6–2. DSM-IV-TR diagnostic criteria for a manic episode

A. A distinct period of abnormally and persistently elevated, expansive, or irritable mood, lasting at least 1 week (or any duration if hospitalization is necessary).
B. During the period of mood disturbance, three (or more) of the following symptoms have persisted (four if the mood is only irritable) and have been present to a significant degree:
(1) inflated self-esteem or grandiosity
(2) decreased need for sleep (e.g., feels rested after only 3 hours of sleep)
(3) more talkative than usual or pressure to keep talking
(4) flight of ideas or subjective experience that thoughts are racing
(5) distractibility (i.e., attention too easily drawn to unimportant or irrelevant external stimuli)
(6) increase in goal-directed activity (either socially, at work or school, or sexually) or psychomotor agitation
(7) excessive involvement in pleasurable activities that have a high potential for painful consequences (e.g., engaging in unrestrained buying sprees, sexual indiscretions, or foolish business investments)
C. The symptoms do not meet criteria for a mixed episode.
D. The mood disturbance is sufficiently severe to cause marked impairment in occupational functioning or in usual social activities or relationships with others, or to necessitate hospitalization to prevent harm to self or others, or there are psychotic features.
E. The symptoms are not due to the direct physiological effects of a substance (e.g., a drug of abuse, a medication, or other treatment) or a general medical condition (e.g., hyperthyroidism).
Note: Manic-like episodes that are clearly caused by somatic antidepressant treatment (e.g., medication, electroconvulsive therapy, light therapy) should not count toward a diagnosis of bipolar I disorder.

Depression as a Continuum

Psychological adjustment problems are common for youngsters affected by physical conditions; however, many of the psychological symptoms that are recognized by the pediatrician or assessed by the mental health clinician do not meet threshold criteria for a DSM-IV-TR diagnosis (Bennett 1994). Evidence strongly suggests that these subthreshold symptoms of depression may impact outcome and should be a focus of intervention (Oguz et al. 2002; Todaro et al. 2000). In a study of 159 children ages 4–16 undergoing tonsillectomy, 17% had transient symptoms of a depressive episode, which had resolved 3 months later, suggesting the need to identify at-risk populations prior to procedures and to provide follow-up for persistent cases (Papakostas et al. 2003).

Another significant contributory factor to the presentation of psychological distress in the pediatric patient is the presence or absence of social support. In studies examining depression in patients with chronic illness, absence of social support has been associated with the onset of depressive symptoms (von Weiss et al. 2002). Further complicating the assessment of depression are the predictable grief reactions that accompany the diagnosis of a new chronic physical illness. Although most patients will move beyond this mourning and learn to live with their chronic illness, those with more risk factors, such as prior histories of depression, high familial conflict, or early life trauma, are likely to develop a depressive disorder.

The factors described above contribute to the differing meanings of depression in the medical setting. Depression may range from a transient mood change requiring no treatment to a severe clinical disorder associated with thoughts of death requiring psychiatric hospitalization (Beasley and Beardslee 1998). Because of their focus on severe psychopathology, mental health classification systems may be of limited value to pediatricians considering a wider range of behavioral and emotional symptoms. To address this issue, the *Diagnostic and Statistical Manual for Primary Care, Child and Adolescent Version,* has been introduced to provide a system to identify and classify emotional disorders ranging on a continuum from developmental variation to problem to disorder (Wolraich et al. 1996).

Depression and Physical Symptom Perception

Observations based on adult studies suggest that patients with depressive symptoms have more medically unexplained symptoms, even when controlling for the severity of their physical illnesses, and have a heightened awareness of and tendency to focus on the physical illness symptoms as well as other organic symptoms (Katon 2003; Walker and Howard 1996). Researchers have demonstrated that for adults with physical symptoms who report psychological distress, the number of self-reported psychological symptoms highly correlates with the number of their physical symptoms (Pennebaker et al. 1982).

Although fewer studies have focused on pediatric than adult populations, similar associations have been described for children and adolescents (Apley 1967; Campo et al. 2002). In a cross-sectional study, Konijnenberg et al. (2006) examined psychiatric morbidity in children with medically unexplained chronic pain and pediatricians' abilities to identify psychological factors that might contribute to chronic pain symptoms using clinical judgment or a screening tool. In the study of 134 chronic pain patients ages 8–18 presenting in a university-based outpatient clinic, psychiatric morbidity was found in 60%, with 40% meeting criteria for an anxiety disorder and 35% for depressive disorders. The investigators found that clinical judgment and the screening tool were equally effective for identifying psychiatric disorders and allowing for interventions (Konijnenberg et al. 2006).

Pediatric patients with depression often have cooccurring physical symptoms, which include joint pain, limb pain, back pain, gastrointestinal problems, fatigue, weakness, and appetite changes. Chronic abdominal pain and headaches are particularly common manifestations of depression in children, although other physical symptoms may include diarrhea, insomnia, and nervousness (Croffie et al. 2000; Deda et al. 2000).

Depression may go undiagnosed in the primary care pediatric setting, because the physical symptoms associated with depression may be interpreted as symptoms of physical illness. Patients with physical illness frequently deny having any emotional disturbance or stress and may resist mental health referrals and/or treatment with psychiatric medications. The term *alexithymia* has been used to describe patients with somatization and a reduced ability to express psychological distress in direct ways. Nevertheless, patients with a high number of physical symptoms are more likely to have a mood disorder. For example, in a study of adults in primary care, Kroenke et al. (1994) found that the presence of any physical symptoms doubled the likelihood that a patient had a mood disorder. It is important for clinicians to take into account that physical symptoms—in particular, complaints of pain—tend to increase the duration of a depressed mood. Treatments that do not address pain and other physical symptoms are likely to be associated with incomplete treatment response to depression. In contrast, improvement in physical symptoms is correlated with improvement in symptoms of depression.

Depression and Functional Impairment

Similar to adult studies, studies of pediatric patients have found that depression has been associated with increased functional disability (Kashikar-Zuck et al. 2001, 2002; Katon 2003; Smith et al. 2003). Cooccurring depression and physical illnesses have been associated with disruptions of functioning at home, at school, and in recreational activities. In a study examining depression among youngsters with chronic pain, Kashikar-Zuck et al. (2001) found depression to be strongly associated with functional disability but not with pain severity. Adult studies have shown an association between the improvement of depressive symptoms and improvements on measures of functional impairment (Ormel et al. 1993).

Depression and Health Care Behaviors

The impact of depression on treatment adherence has been an important area of investigation. For physically ill children and adolescents, treatment nonadherence is a serious problem, resulting in significant morbidity and mortality (DiMatteo et al. 2000). The relationship between depression and poor treatment adherence has been demonstrated in many pediatric illnesses, including asthma (Norrish et al. 1977), HIV disease (Murphy et al. 2001), renal disease (Brownbridge and Fielding 1994; Simoni et al. 1997), and diabetes mellitus (Ciechanowski et al. 2000). Depression has also been associated with higher rates of adverse health risk behaviors, including overeating, smoking, physical inactivity (Goodman and Whitaker 2002), increased sexual risk behaviors (Lehrer et al. 2006), and substance abuse (Bukstein et al. 1989).

TABLE 6–3. Selected screening tools used for depression in the pediatric setting

Beck Depression Inventory for Youth (J.S. Beck et al. 2005)

Description: Self-report measure for individuals ages 7–18 years; assesses emotional/social impairment and maladaptive cognitions/behaviors; includes a depression subscale

Advantages
- Brief and acceptable to youth
- Easy to understand, administer, and score
- Useful for DSM-IV-TR diagnosis
- Good internal consistency, validity, and reliability

Disadvantages
- Requires further study in clinical and diverse populations

Behavior Assessment System for Children–2nd Edition (C.R. Reynolds and Kamphaus 2005)

Description: Adult-report measure of behavior, emotional development, personality characteristics, and self-perception for youth ages 2–25 years

Advantages
- Comprehensive

Disadvantages
- Complicated to administer
- Lengthy manual
- Lack of formal reliability and validity scores for 2nd edition because it is relatively new

Child Behavior Checklist (Achenbach 1991)

Description: Parent-scored symptom checklist designed to identify competencies and behavioral-emotional problems in preschool-age children (1.5–5.0 years) and in children through adolescents (6–18 years)

Advantages
- Well-validated psychometric properties in community and clinical samples
- Available in many languages
- Adolescent and Teacher versions
- High sensitivity and specificity when used as screen for psychiatric disorders (non–medically ill)
- Identifies children at risk for psychopathology

Disadvantages
- Low sensitivity, positive and negative predictive value, and high specificity when used for physically ill, making it a poor screen for this population (Canning and Kelleher 1994)
- Does not yield diagnosis
- Lengthy

Child Depression Inventory (Kovacs 1992)

Description: Self- and parent-report measures assessing depressive symptomatology in children 7–17 years

Advantages
- Brief administration
- Well-validated psychometric properties
- Reliably identifies depression in physically ill populations

Disadvantages
- Does not yield diagnosis

Children's Depression Rating Scale–Revised (Poznanski and Mokros 1996)

Description: Clinician-administered instrument to assess depression in children ages 6–12 years

Advantages
- Easy to administer
- Input from multiple informants (self, parent, clinician)
- Good internal consistency, reliability, and validity
- Commonly used in conjunction with a structured interview

TABLE 6–3. Selected screening tools used for depression in the pediatric setting *(continued)*

MacArthur Health and Behavior Questionnaire (Armstrong and Goldstein 2003)

Description: Adult-report measure for symptomatology and adaptive behaviors in children ages 4–8 years

Advantages
- Parent and Teacher versions
- Considers close association between mental health and physical health
- High reliability and validity in mental health and primary care settings
- Results correspond to DSM-IV
- Brief and acceptable to parents

Disadvantages
- Available only in English
- New instrument with limited data

Patient Health Questionnaire for Adolescents (Johnson et al. 2002)

Description: Self-report screening instrument for identification of common psychiatric disorders in primary care setting among adolescents ages 13–18 years

Advantages
- Brief and highly acceptable to patients

Disadvantages
- Not validated against a gold standard
- No reliability data reported
- High specificity, making measure prone to substantial underdiagnosis of depression and other disorders (Johnson et al. 2002)

Reynolds Adolescent Depression Scale–2nd Edition (W.M. Reynolds 2002)

Description: 30-item self-report scale for depression in adolescents ages 11–20 years

Advantages
- High internal consistency and reliability
- Well validated for school-based and clinical populations
- Only measure specifically designed to measure depression in adolescents

Reynolds Child Depression Scale (W.M. Reynolds 1989)

Description: 30-item self-report measure to identify presence and severity of depression in children ages 8–13 years

Advantages
- Easy to administer and score
- Strong validity and reliability
- Studied in large diverse populations

Disadvantages
- Limited data about ability to discriminate emotional distress from depression

Mood disorders have economic implications by altering patterns of medical service use. Youngsters with depression and anxiety have been shown to have higher health care utilization rates and health care costs (Bernal et al. 2000; Haarasalsilta 2003). Spady et al. (2005) used administrative health care data over a 1-year period to examine the relationships between psychiatric and medical comorbidity and health care usage in over 400,000 Canadian youngsters ages 6–17 years. Examining all psychiatric diagnoses and medical illness groups, the authors found a high prevalence of psychiatric disorders (13.6%); among those children with psychiatric disorders, more than 90% had a physical illness, and those with psychiatric disorders had a greater total use of medical services than those without a psychiatric disorder.

Suicide in Physically Ill Populations

Adult studies have found associations between a variety of physical diseases and completed suicide (Hughes and Kleepsies 2001). Several studies sug-

gest associations of increased suicide risk in cancer (Luohovori and Hakam 1979), HIV/AIDS (Marzuk et al. 1997), and end-stage renal disease (Abrams et al. 1971). Because of limited data regarding the prevalence or risks for suicide among youngsters with physical illnesses, clinical practice is guided by the existing pediatric suicide studies and adult physically ill populations. A comprehensive evaluation with a focus on developmental, environmental, psychosocial, and biological risks or triggers is the best method for assessing the probability of suicide risks in physically ill children and adolescents (Hughes and Kleepsies 2001).

The presence of a life-threatening illness does not explain suicidal ideation. The majority of patients with chronic physical illnesses do not attempt suicide. Evidence from adult studies suggests that patients with physical illnesses who do attempt suicide have the same risk factors as healthy individuals. The Canterbury Suicide Project, a case-control study of individuals ages 13–24 years in New Zealand, studied 200 suicides, 302 medically serious suicide attempts, and 1,028 control subjects (Beautrais et al. 1997). Serious suicide attempters were equally distributed by gender; twice as many females as males ingested pills, whereas males tended to choose the more lethal means. Factors associated with serious attempts were sexual abuse, low parental care, poor parental relationships, poverty, residential mobility, mood disorders, substance abuse, conduct disorder, legal problems, and interpersonal relationship difficulties. Increasing severity of suicide attempts appeared to be related to lower levels of self-disclosure (Beautrais et al. 1997). In another study seeking risk factors for suicide in adolescents, the presence of a DSM-IV Axis I diagnosis (predominately mood disorder) was identified in more than 90% of the suicides (Brent 1995). In other studies, identified risk factors have included previous suicide attempts, alcohol and substance abuse, conduct disorder (males), panic disorder (females), aggressive-impulsive behaviors, hopelessness, and pessimism (Shaffer 1998; Zalsman et al. 2008).

Management of suicidal risk begins with a thorough assessment, including open and frank queries about suicidal ideation, plans, and attempts. This evaluation should weigh the risk and protective factors for suicide so that a risk-rescue ratio can be determined (see Table 6–4). This ratio contrasts the relative strength of suicidal intent (risk) versus the wish for help (rescue) (Wharff and Ginnis 2007). Physically ill patients who are stable medically and deemed not to be at imminent risk for suicide can be discharged from the pediatric setting with outpatient mental health follow-up.

Youngsters with physical illnesses who are at significant suicidal risk should be admitted to an acute psychiatric setting as early as possible. Depending on the type and severity of the physical illness, the outside psychiatric facility may or may not accept the admission. Ideally, inpatient child psychiatric units that have expertise in managing co-occurring childhood physical illnesses—units that are often embedded within a medical hospital—should be

TABLE 6–4. Risk and protective factors for childhood suicide

Risk	Protection
Risk-taking activities	Peer social support
Friend or family member with prior attempt or completed suicide	Help-seeking behavior
Impaired thinking or judgment	Future-oriented thinking
Current social stressors and family conflict	Insight into problem
Substance abuse	Family support and adaptability
Access to firearms	Well-developed coping strategies
Male gender	Female gender
Peer victimization	Religion or spirituality
Sexual orientation conflicts	Hopefulness
Current psychiatric illness (especially depressive disorders)	

Source. Reprinted from Wharff EA, Ginnis KB: "Assessment and Management of Suicidal Patients," in *Comprehensive Pediatric Hospital Medicine.* Edited by Zaoutis LB, Chang VW. Philadelphia, PA, Elsevier, 2007, p. 1049. Copyright 2007, Elsevier. Used with permission.

identified ahead of time. At the time of referral, the patient's current medical status should be specifically described and clearly communicated to the accepting facility, with transfer occurring only in the context of clear medical stability.

For physically ill youngsters who are at significant risk of suicide and in need of continued medical treatment, the primary intervention goal is the creation of a safe environment in the pediatric setting through frequent assessment and monitoring, as well as the treatment of any contributory conditions. Intervention requires discussion with the family about the need for safety and support, consultation and planning with the health care staff, one-to-one observation by an assistant trained to recognize signs of potential harm and distress, removal of all objects that can be used for self-harm, and prevention of elopement. Any underlying physical conditions contributing to impulsive behaviors, such as delirium, psychosis, and intoxication or withdrawal syndromes, should be aggressively treated, because impulsivity has been associated with dangerous behaviors in the medical setting (Reich and Kelly 1976). Agitation and active suicide attempts in the hospital may require the use of physical and/or chemical restraints (Bostwick and Levinson 2005).

Primary Mood Disorders

Physically ill pediatric patients must meet the full DSM-IV-TR criteria for primary depressive episode for this diagnosis to be made; however, no standardized approach currently exists for diagnosing depression among individuals who are physically ill. Clinicians are challenged to determine whether the classic signs and symptoms of clinical depression, such as dysphoria, anhedonia, fatigue, pain, psychomotor retardation, anorexia, weight loss, cognitive impairment, and insomnia, represent demoralization, the physical illness itself, the effects of medical treatments, and/or prolonged separations from family and friends. The presence of feelings of worthlessness, inappropriate guilt, diminished ability to think, or suicidal thoughts is generally more consistent with the diagnosis of a primary depressive episode (Goldston et al. 1994). Youngsters at risk for a primary depression are those who have had a previous depressive episode, histories of parental depression, adverse family environments, a family history of mood disorders, and the experiences of early life trauma (Evans et al. 2005b). Although thoughts of death or a hastened desire for death is not a reliable sign for depressive disorders in this population and may instead represent demoralization (Kissane et al. 2001; Radloff 1977), a careful assessment remains essential. Youngsters with a primary depressive disorder who are at increased risk for suicide are those who have a history of prior suicide attempts, current suicidal ideation, intent and plan, psychiatric comorbidity, hopelessness, poor social and family supports, histories of childhood sexual abuse, and impulsivity (Evans et al. 2005b).

Mood Disorder as a Reaction to Physical Illness

Most children and their families adapt well to chronic physical illness (Eiser 1994); however, psychological distress and adjustment problems in response to pediatric illness are relatively common (Borowsky et al. 2003). The onset of a serious physical illness may be associated with helplessness and a profound sense of loss, which may manifest as symptoms of depression. Most individuals are able to work through these initial phases of sadness and anger, which are understandable responses to the many stressors associated with having a chronic illness.

Adjustment Disorders

Some children with a diagnosis of physical illness will go on to have maladaptive reactions and impairments in function that exceed the typical reaction to illness. Individuals identified as having depressive symptoms in response to an identifiable stressor and within 3 months of the onset of the stressor meet criteria for an adjustment disorder with depressed mood (see Table 6–5). The diagnostic criteria for adjustment disorders specify that the symptoms must be clinically significant but not meet threshold criteria for a depressive disorder or bereavement. Adjustment disorders are accompanied by dysphoria that tends to be milder in form and responsive to distraction and to differ from normal grief and demoralization based on the severity of impairment. Currently, because no absolute criteria will help the mental health clinician distinguish this disorder, the clinician must use clinical judgment to make the diagnosis.

Adjustment disorders are among the most common psychiatric diagnoses. Prevalence estimates for adjustment disorders range from 12% in general hospital inpatients referred for mental health consulta-

TABLE 6–5. DSM-IV-TR diagnostic criteria for adjustment disorders

A. The development of emotional or behavioral symptoms in response to an identifiable stressor(s) occurring within 3 months of the onset of the stressor(s).

B. These symptoms or behaviors are clinically significant as evidenced by either of the following:

(1) marked distress that is in excess of what would be expected from exposure to the stressor

(2) significant impairment in social or occupational (academic) functioning

C. The stress-related disturbance does not meet the criteria for another specific Axis I disorder and is not merely an exacerbation of a preexisting Axis I or Axis II disorder.

D. The symptoms do not represent bereavement.

E. Once the stressor (or its consequences) has terminated, the symptoms do not persist for more than an additional 6 months.

Specify if:

Acute: if the disturbance lasts less than 6 months

Chronic: if the disturbance lasts for 6 months or longer

Adjustment disorders are coded based on the subtype, which is selected according to the predominant symptoms. The specific stressor(s) can be specified on Axis IV.

309.0 With Depressed Mood

309.24 With Anxiety

309.28 With Mixed Anxiety and Depressed Mood

309.3 With Disturbance of Conduct

309.4 With Mixed Disturbance of Emotions and Conduct

309.9 Unspecified

tion to 50% among adults with specific medical problems and stressors (Newcorn et al. 2000). Studies in children and adolescents with diabetes found rates as high as 36%–60% (LeBlanc et al. 2003). Prior depressive episodes and family and genetic factors may increase the risk for the development of an adjustment disorder. Adolescents with adjustment disorders with depressed mood are at increased risk for the development of major depression.

Regression

Another consideration in the evaluation of youngsters with depression is the possibility that the stress of their illness has led to emotional and/or behavioral regression. Pediatric patients commonly regress in the hospital in the face of overwhelming stress. Behavioral regression is a predictable response to the forced helplessness and passivity imposed by the pediatric setting and may be an adaptive response in that it allows others to care for the patient. Regressed behavior in a child or adolescent may manifest in several ways, which include clinginess, social withdrawal, and tearfulness, and may mimic symptoms of depression. These symptoms are particularly common during the inpatient phases of a child's treatment and generally resolve spontaneously when the stress of the illness or hospitalization is over.

Bereavement

Many children with life-limiting illnesses die in the hospital setting. Some studies suggest that up to 49% of children who have terminal cancer die in the hospital (Wolfe et al. 2000). Differentiating the sadness and dysphoria that appropriately occur when a young person with terminal illness faces death from the symptoms of a primary depressive disorder can be difficult (see Table 6–6). Increased somatic symptoms, worries, fears, hopelessness and helplessness, depressed mood, and irritability may be manifestations of emotional distress rather than a primary depression (Freyer et al. 2006).

Depressive disorders, however, are still common among those facing the end of their lives, and these disorders remain underdiagnosed and undertreated. Suicidal ideation or thoughts for hastened death, although commonly believed to accompany terminal illness, generally suggest the presence of a depres-

TABLE 6–6. Comparison of grief with major depression in terminally ill patients

Grief characteristics	Depression characteristics
Patients experience feelings, emotions, and behaviors that result from a loss.	Patients experience feelings, emotions, and behaviors that fulfill criteria for major depression that is generalized in all facets of life.
Almost all terminally ill patients experience grief, but only a minority develop a mood disorder requiring treatment.	Major depression occurs in 1%–5% of terminally ill patients.
Patients usually cope with distress on their own.	Medical or psychiatric intervention is usually necessary.
Patients experience somatic distress, loss of usual patterns of behavior, agitation, sleep and appetite disturbance, decreased concentration, and social withdrawal.	Patients experience similar symptoms, plus hopelessness, helplessness, worthlessness, guilt, and suicidal ideation.
Grief is associated with disease progression.	Depression has increased prevalence in patients with advanced disease; pain is a major risk factor.
Patients retain the capacity for pleasure.	Patients enjoy nothing.
Grief comes in waves.	Depression is constant and unremitting.
Patients express passive wishes for death to come quickly.	Patients express intense and persistent suicidal ideation.
Patients are able to look forward to the future.	Patients have no sense of a positive future.

Source. Reprinted from Block S: "Assessing and Managing Depression in the Terminally Ill Patient." *Annals of Internal Medicine* 132:209–218, 2000. Copyright 2000, American College of Physicians. Used with permission.

sive disorder. Findings from some studies among terminally ill adults suggest that the presence of depression is an important precipitant for suicidal ideation and desire for hastened death (Breitbart et al. 2000).

Mental health clinicians are often asked to assess mood symptoms and to make recommendations for psychopharmacological treatments in the palliative care setting. Often, the consultation is motivated by the medical team's distress about their inability to help the child and family. Although psychopharmacological interventions may prove helpful for some children, the clinician should make an effort to help the patient, family, and medical team work through their feelings of loss and to interpret the symptoms of depression as a normal and important part of the grieving process.

Mood Disorder Due to a General Medical Condition

Mood disorder due to a general medical condition, also known as a secondary mood disorder, is a critical consideration in assessing mood symptoms in a physically ill patient (see Table 6–7). The diagnosis of secondary depression or mania requires the presence of prominent, persistent, distressing, or functionally impairing depression and/or elevated, expansive, or irritable mood that is thought to be the result of a physical condition and/or its treatment (e.g., medications). The type of mood episode—manic or depressive—and whether these symptoms meet the threshold for the disorder must be specified. The lists of general medical conditions that may present with mood symptoms (see Table 6–8) and medications that may be associated with mood symptoms (see Table 6–9) are long.

The distinction between primary and secondary mood disorders is often based on a temporal relationship between the onset of a physical illness and the onset of mood symptoms. The symptoms of secondary mood disorders are similar to those of primary mood disorders, although in the former the presence of cognitive impairments with the depressive or manic symptoms is uncommon. Although the prevalence and course of these disorders are unknown, evidence indicates that secondary mood disorders have a poorer prognosis than primary mood disorders because the secondary mood disorders are primarily related to continuous, remitting,

TABLE 6–7. DSM-IV-TR diagnostic criteria for mood disorder due to a general medical condition

A. A prominent and persistent disturbance in mood predominates in the clinical picture and is characterized by either (or both) of the following:

(1) depressed mood or markedly diminished interest or pleasure in all, or almost all, activities

(2) elevated, expansive, or irritable mood

B. There is evidence from the history, physical examination, or laboratory findings that the disturbance is the direct physiological consequence of a general medical condition.

C. The disturbance is not better accounted for by another mental disorder (e.g., adjustment disorder with depressed mood in response to the stress of having a general medical condition).

D. The disturbance does not occur exclusively during the course of a delirium.

E. The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Specify type:

With Depressive Features: if the predominant mood is depressed but the full criteria are not met for a major depressive episode

With Major Depressive–Like Episode: if the full criteria are met (except Criterion D) for a major depressive episode

With Manic Features: if the predominant mood is elevated, euphoric, or irritable

With Mixed Features: if the symptoms of both mania and depression are present but neither predominates

Coding note: Include the name of the general medical condition on Axis I, e.g., 293.83 Mood Disorder Due to Hypothyroidism, With Depressive Features; also code the general medical condition on Axis III.

Coding note: If depressive symptoms occur as part of a preexisting vascular dementia, indicate the depressive symptoms by coding the appropriate subtype, i.e., 290.43 vascular dementia, with depressed mood.

or relapsing courses of physical illnesses (American Psychiatric Association 1994).

The associations between the presence of depression and physical illnesses have been a focus of much investigation among adults. Depression is present in almost all physical illnesses in which the connection has been studied, including cardiac disease, certain neurological disorders, epilepsy, diabetes, cancer, AIDS, and chronic pain syndromes (Evans et al. 2005a). Significant confounding overlaps between DSM-IV-TR symptoms of depression and symptoms of physical illness and/or its treatment must be considered (see Table 6–10).

Less is known about secondary mania. Potential predisposing factors for its development include a personal or family history of an affective disorder or bipolar disorder (Jorge et al. 1993). Furthermore, making the diagnosis may be more complicated in a patient with preexisting manic illness or vulnerability to manic illness. Secondary mania can sometimes present as inattention, agitation, poor sleep, and psychosis, resembling delirium. The onset can occur within hours to days of an organic insult and can be difficult to distinguish from delirium. The diagnosis of secondary mania is more likely if the patient has no prior history or family history of manic illness, has focal neurological findings or cognitive dysfunction, and has mood symptoms that have been poorly responsive to treatments (Jorge et al. 1993).

SUBSTANCE-INDUCED MOOD DISORDER

Manic or depressive episodes may result from medications, alcohol or drugs of abuse, or toxic agents. DSM-IV-TR specifies that the mood disturbance, either manic or depressive, must have developed within 1 month of substance intoxication or withdrawal; that the substance (or medication) must be etiologically related to the disturbance; and that these clinical conclusions must be based on the medical history, physical examination, or laboratory findings (see Table 6–11). Alcohol, cannabis, opiates, cocaine, stimulants, sedatives, and anabolic steroids are commonly associated with depressive symptoms in adolescents with manic symptoms.

TABLE 6–8. General medical conditions that may present with mood symptoms

Autoimmune disorder	**Neoplasms**
Systemic lupus erythematosus	Central nervous system primary and metastatic tumors
Endocrine disorders	Endocrine tumors
Diabetes mellitus	Paraneoplastic syndromes
Gonadotropic hormonal disturbances	**Neurological and cerebrovascular disorders**
Hyperadrenalism	Brain neoplasms
Hyperparathyroidism	Epilepsy
Hyperthyroidism	Head trauma
Hypoadrenalism	Huntington's disease
Hypoglycemia	Idiopathic calcification of basal ganglia
Hypoparathyroidism	Metachromatic leukodystrophy
Hypothyroidism	Migraine
Panhypopituitarism	Multiple sclerosis
Pheochromocytoma	Narcolepsy
Infectious diseases	**Normal-pressure hydrocephalus**
AIDS	Postconcussion stroke
Bacteremia and viremia	Posttraumatic encephalopathy
Brain abscess	Stroke
Infectious mononucleosis	**Nutritional deficiencies**
Neurosyphilis	Folate deficiency
Pediatric autoimmune neuropsychiatric disorders	Malnutrition/dehydration
Streptococcal infections	Nicotinic acid
Tuberculosis	Thiamine deficiency
Viral hepatitis	Trace metal deficiency
Viral meningitides and encephalitides	Vitamin B_{12} deficiency
Metabolic and systemic disturbances	**Toxins**
Chronic hypoxemia	Environmental toxins (e.g., lead, carbon monoxide)
Fluid and electrolyte disturbances	Intoxication or withdrawal from substances
Hepatic encephalopathy	Medications (over-the-counter or prescribed)
Hepatolenticular degeneration (Wilson's disease)	
Hypertensive encephalopathy	
Hypotension	
Porphyria	
Uremia	

The diagnostic criteria are based on the large body of evidence generated from adult studies, because few studies have focused on adolescents. The available evidence indicates that depression is much more likely in individuals who abuse drugs and alcohol, although little evidence supports any lasting neuropsychiatric syndrome that is related to substance use or abuse (Bukstein et al. 1992; Riggs et al. 1995). More than 50% of patients with severe alcohol abuse have symptoms of depression that may be indistinguishable from a primary mood disorder. The rapid resolution of these symptoms following

TABLE 6–9. Selected medications associated with mood symptoms

Depression	Mania
Cardiovascular	Anabolic steroids
Atenolol	Bronchodilators
Clonidine	Albuterol
Methyldopa	Terbutaline
Nadolol	Cardiovascular
Procainamide	Captopril
Propafenone	Clonidine withdrawal
Propranolol	Methyldopa
Chemotherapeutic agents	Chemotherapeutic agents
Amphotericin B	Procarbazine
Interferon	Corticosteroids
L-asparaginase	Decongestants
Procarbazine	Histamine-2 receptor antagonists
Vinblastine	Cimetidine
Vincristine	Psychiatric medications
Corticosteroids	Alprazolam
Prednisone	Amphetamines
Histamine-2 receptor antagonists	Antidepressants
Cimetidine	Bromocriptine
Immunosuppressants	Buspirone
Cyclosporine	Cyproheptadine
Tacrolimus	Isoniazid
Interferon	L-dopa
Isotretinoin	Lorazepam
Narcotics	Methylphenidate/stimulants
Methadone	St. John's wort
Oxycodone	Thyroid preparations
Oral contraceptives	Tolmetin
Statins	Yohimbine
	Zidovudine

abstinence (2–14 days in adults) helps make the diagnosis (Schuckit 1982). The absence of a rapid resolution among adolescents makes the diagnosis more difficult and suggests a different etiological mechanism (Schuckit 1986). Identifying substance use in this population is important, because it is a risk factor for suicidal behavior and completed suicide (Brent et al. 1987).

Mood Disorders in Specific Physical Illnesses

Depression co-occurring with physical illness worsens the prognosis of many general medical conditions. The presence of depression is associated with higher morbidity and mortality rates in many adult physical illnesses (Evans et al. 2005a). In this section, we briefly review specific illness conditions for

TABLE 6–10. Confounding overlaps between DSM-IV-TR symptoms of depression and symptoms of physical illness and/or its treatment

Weight loss and/or decreased appetite		
Cancer	Diabetes mellitus	Malabsorption
Cancer chemotherapy agents	Infection (e.g., HIV, tuberculosis)	Renal failure
Cystic fibrosis	Inflammatory bowel diseases	Vitamin deficiencies
Weight gain and/or increased appetite		
Anticonvulsant medications	Cushing's disease	Hypothyroidism
Antihistamine medications	Hypogonadism	Insulinoma
Corticosteroids	Hypothalamic lesions	Polycystic ovary disease
Insomnia		
Alcohol	Duodenal ulcers	Psychostimulant medications
Asthma	Hyperthyroidism	Restless legs syndrome
Caffeine	Nocturia	Sleep apnea
Corticosteroids	Pain	Sympathomimetic amines
Hypersomnia		
Brain tumors	Hypercapnia	Opiates
Diabetic ketoacidosis	Hypothyroidism	Sleep apnea (daytime hypersomnia)
Encephalitis	Liver failure	Uremia
Fatigue and/or loss of energy		
Addison's disease	Heart failure	Narcolepsy
Anemia	Hepatitis	Poliomyelitis
Anticonvulsant medications	Mononucleosis	Rheumatoid arthritis
Chronic physical illnesses	Motor neuron disease	Tumors
Endocarditis	Multiple sclerosis	Uremia
Guillain-Barré syndrome	Muscular dystrophy	Vitamin B_{12} deficiency
Difficulty with thinking or concentration		
Cirrhosis	Lead poisoning	Opiates
Dementia	Marijuana	
Huntington's disease	Metachromatic leukodystrophy	
Loss of interest in sex		
Cirrhosis	Hormonal disorders	
Hemochromatosis	Substance abuse	
Psychomotor agitation		
Hypercalcemia	Reye's syndrome	Wernicke-Korsakoff syndrome
Psychostimulant medications	Substance withdrawal or abuse	

TABLE 6–11. DSM-IV-TR diagnostic criteria for substance-induced mood disorder

A. A prominent and persistent disturbance in mood predominates in the clinical picture and is characterized by either (or both) of the following:

(1) depressed mood or markedly diminished interest or pleasure in all, or almost all, activities

(2) elevated, expansive, or irritable mood

B. There is evidence from the history, physical examination, or laboratory findings of either (1) or (2):

(1) the symptoms in Criterion A developed during, or within a month of, substance intoxication or withdrawal

(2) medication use is etiologically related to the disturbance

C. The disturbance is not better accounted for by a mood disorder that is not substance induced. Evidence that the symptoms are better accounted for by a mood disorder that is not substance induced might include the following: the symptoms precede the onset of the substance use (or medication use); the symptoms persist for a substantial period of time (e.g., about a month) after the cessation of acute withdrawal or severe intoxication or are substantially in excess of what would be expected given the type or amount of the substance used or the duration of use; or there is other evidence that suggests the existence of an independent non-substance-induced mood disorder (e.g., a history of recurrent major depressive episodes).

D. The disturbance does not occur exclusively during the course of a delirium.

E. The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Note: This diagnosis should be made instead of a diagnosis of substance intoxication or substance withdrawal only when the mood symptoms are in excess of those usually associated with the intoxication or withdrawal syndrome and when the symptoms are sufficiently severe to warrant independent clinical attention.

Code [Specific Substance]–Induced Mood Disorder:

(291.89 Alcohol; 292.84 Amphetamine [or Amphetamine-Like Substance]; 292.84 Cocaine; 292.84 Hallucinogen; 292.84 Inhalant; 292.84 Opioid; 292.84 Phencyclidine [or Phencyclidine-Like Substance]; 292.84 Sedative, Hypnotic, or Anxiolytic; 292.84 Other [or Unknown] Substance)

Specify type:

With Depressive Features: if the predominant mood is depressed

With Manic Features: if the predominant mood is elevated, euphoric, or irritable

With Mixed Features: if symptoms of both mania and depression are present and neither predominates

Specify if:

With Onset During Intoxication: if the criteria are met for Intoxication with the substance and the symptoms develop during the intoxication syndrome

With Onset During Withdrawal: if criteria are met for withdrawal from the substance and the symptoms develop during, or shortly after, a withdrawal syndrome

which the relationships between mood disorders and general medical conditions have been well established. We include discussions of cancer, epilepsy, diabetes mellitus, end-stage renal disease, and HIV disease. Detailed discussion of these illnesses can be found in other chapters of this text.

Cancer

Receiving a diagnosis of cancer can be a devastating experience for youngsters and their families. Cancer is the leading fatal pediatric disease, with as many as 12,400 new cases each year (American Cancer Society 2005). Although cancer was once considered a fatal illness, as many as 75% of children with cancer survive 5 years or more, and many of these survivors live an average of seven decades after being diagnosed (Apter et al. 2003). Despite medical advances, cancer and its treatment still pose significant challenges for the children and their families.

Prevalence estimates indicate that 0%–38% of adults with cancer experience major depression, and

0%–58% develop depressive spectrum disorders (Massie 2004). Among pediatric patients, prevalence estimates for depression and depressive symptoms range from 7% to 32% (Kerson and Elia 2007). Many factors are thought to influence this variance, including the type of cancer, length of time since diagnosis, measurements used, disease severity, and type of treatment (Raison and Miller 2003).

Although the mechanisms are unknown, depression in cancer patients has been associated with a poorer prognosis, higher disease mortality (Evans et al. 2005a), longer hospital stays, behavior problems, and poor adherence to medical treatments (Apter et al. 2003). Depression may result from the psychological distress associated with a recent diagnosis, antineoplastic treatments, underlying neurological or medical problems, medications, endocrine disturbances, nutritional problems, metastasis, or recurrence of a preexisting mood disorder.

Depression can be difficult to diagnose in cancer patients. Symptoms of anorexia, fatigue, and weight loss are common manifestations of advanced-stage cancer. Although the diagnosis of depression in the context of cancer relies on the presence of such symptoms as anhedonia, hopelessness, despair, worthlessness, guilt, and suicidality, an inclusive approach is recommended (Chochinov et al. 1998).

Epilepsy

With a prevalence rate of 1% in the general population, epilepsy affects 4 of 1,000 children (Hauser and Hesdorffer 1990). It is one of the most common childhood neurological disorders. Although 5% of children experience a seizure episode before age 20 years, only one-fourth of these will go on to develop a seizure disorder (Franks 2003). Like other chronic illnesses, epilepsy impacts the social, cognitive, and emotional development of children and adolescents.

Depression and other mood disorders have been observed in youngsters with seizure disorders at a rate much higher than in the general population. Studies suggest that as many as 12%–26% of children with epilepsy have some type of mood disorder (Caplan et al. 1998; Davies et al. 2003; Weisbrot and Ettinger 2001). Understanding the behavioral effects of epilepsy is complicated by several factors: 1) it is a disease of the central nervous system; 2) antiepileptic medications can contribute to behavioral symptoms; and 3) complex individual, family, and social factors, including the stigma that can be associated with epilepsy, can increase the risk for poor adjustment to illness for a child or adolescent.

In a well-designed study, Caplan et al. (2005) examined the prevalence of depression and anxiety in pediatric epilepsy. Using structured psychiatric assessments, these authors studied 171 children ages 5–16 years with epilepsy and 93 matched controls. Over 32% of the children with epilepsy had affective and anxiety disorders, compared with 6% of the controls. Depression as a single diagnosis occurred in only 5.2% of the children; however, 26% of the patients with depression had comorbid anxiety and disruptive disorders. Caplan et al. further discovered that 20% of the children with psychiatric diagnosis had suicidal ideation, with 37% of the ideators having a plan, whereas 9% of children in the control group had suicidal ideation. Trends for higher rates of anxiety disorders among younger children and depressive disorders among older children were also found in this study. The overall findings suggest high rates of anxiety and disruptive disorders in pediatric patients with epilepsy, in contrast to high rates of depression and anxiety in adult patients with epilepsy (Baker et al. 1996), suggesting that the distribution of psychiatric disorders may differ in pediatric and adult populations. Among those youngsters with co-occurring epilepsy and depression, risk factors appear to include negative attitudes toward their illness, dissatisfaction with family relationships, loss-of-control feelings, family or personal history of depression, parent and family depression in response to diagnosis of the illness, and use of depression-inducing antiepileptic medications (e.g., phenobarbital) (Franks 2003; Weisbrot and Ettinger 2001).

Diabetes Mellitus

Depressive disorders are common in patients with diabetes mellitus. A large body of evidence supports high rates of depression for adult and pediatric populations, with rates of depression being twice as common among those with diabetes mellitus as among the general population (Eaton 2002; Kokkonen et al. 1997). Prevalence rates for depression among pediatric patients with diabetes mellitus have been reported to be as high as 26% (Kovacs et al. 1997).

Studies focusing on psychiatric comorbidities in patients with diabetes mellitus have found that depression is common among those newly diagnosed with diabetes mellitus (Kovacs et al. 1997). Increased rates of depression were found among adolescent females recently diagnosed with type 1 diabetes mellitus (Vila et al. 1995). Some investigators

have described a second period of elevated depression risk at the end of the second year, attributed to the acceptance of learning to live with diabetes mellitus (Grey et al. 1995). Factors associated with psychiatric comorbidity in pediatric patients with diabetes mellitus were the first year of diagnosis, preexisting anxiety, and maternal psychopathology. Studies have found higher rates of depressive episode recurrence and lower rates of recovery in patients with diabetes mellitus compared with the non–medically ill population (Kovacs et al. 1997).

The identification and treatment of depression are important, because depression is a significant risk factor for poor outcomes in diabetes mellitus. Depression has been associated with poor mental and physical functioning as well as poor glycemic control (Lemmark et al. 1999; Lustman et al. 2000). It has also been related to nonadherence to dietary and medication requirements, reduced self-worth (Jacobson et al. 1997), and lower quality of life (Grey et al. 1998).

End-Stage Renal Disease

Chronic kidney disease differs from other physical illnesses in that patients are extremely dependent on artificial means for survival and need to adhere to complex treatment protocols that require significant time demands, lifestyle adjustments, and behavior changes for the child and family. In this context, chronic kidney disease stands out among physical illnesses, with psychosocial factors having an especially strong influence on adherence and medical outcomes, including mortality and psychological distress (Christensen and Ehlers 2002). Evidence suggests that pediatric patients have higher rates of psychiatric disorder and psychosocial adjustment difficulties (Fukunushi and Kudo 1995; Simoni et al. 1997). The evidence further suggests that increased mental health burdens and family distress are experienced by the caregivers of children with chronic kidney disease (Brownbridge and Fielding 1994).

HIV Disease

More than 65 million people worldwide, including 1 million children, have been infected with HIV, the cause of AIDS. An estimated 39.5 million people worldwide are living with HIV. During 2003, about 4.3 million were newly infected, including 2.8 million in sub-Saharan Africa. Rates of infection have risen more than 50% in Eastern Europe and Central Asia (Joint United Nations Programme on HIV/AIDS 2004). Although common in developing countries, mother-to-child transmission occurs rarely in the United States due to voluntary screening for pregnant women and antiretroviral treatments for HIV-positive mothers and their children. Since the development of antiretroviral therapies, many children who were infected with HIV congenitally have become young adults. Approximately 40% of all new HIV infections in the United States occur in individuals younger than age 25, and HIV is the sixth leading cause of death among adolescents. Because highly active antiretroviral therapy has transformed HIV illness into a chronic condition, youngsters now struggle with its associated medical and psychological morbidities while coping with issues of identity and maturation. Young people living with HIV have reported lower quality of life and heightened psychological distress (Lightfoot et al. 2005).

Studies examining prevalence of depression among HIV-positive youth who have acquired their illnesses through vertical transmission estimate that these youngsters exhibit higher rates of depression than healthy peers, with rates ranging from 25% to 47% (Misdrahi et al. 2004; Scharko 2006). In contrast, other studies have found no association between congenital HIV infection and behavioral symptoms (Mellins et al. 2003). Although highly active antiretroviral therapy has transformed HIV into a chronic illness, it remains a progressive and chronic illness without a cure. Adolescents are living longer with HIV and its complicated medication and lifestyle requirements at a time when the establishment of relationships and intimacy is developmentally appropriate. Understandably, these adolescents report high levels of psychological distress, despite better overall physical health (Lightfoot et al. 2005).

TREATMENT

The growing knowledge of the increased prevalence of depressive disorders among physically ill children and adolescents has not resulted in higher rates of recognition or treatment (Kessler et al. 2003). Well-controlled studies are emerging that support the efficacies of pharmacotherapy and psychotherapies for the treatment of depression in those patients affected by cancer, diabetes, HIV disease, heart disease, and neurological disorders. Despite the fact that these studies have focused predominately on adults, they provide direction for future investigation.

Psychopharmacology

A growing body of evidence supports the use of antidepressants for the treatment of depressive symptoms in the physically ill adult population (Evans and Charney 2003; Evans et al. 2005a). A comprehensive review of psychopharmacological treatments for physically ill children can be found in Chapter 30, "Psychopharmacology in the Physically Ill Child."

Psychotherapeutic Interventions

Psychological distress is a predictable response to the stressor of being diagnosed with a new illness. The acceptance of a physical illness is a process that begins with shock and disbelief and proceeds through feelings of sadness, anger, and eventually resolution. Transient depression and anxiety are common in all illness groups discussed at the initial diagnosis. Psychotherapies in the pediatric setting can help children and their families navigate the transition from healthy child to a child with an illness or disability. For children with underlying conditions that might make the transition more difficult, such as children with risk factors for psychiatric disorders or depression or children with families exhibiting high levels of conflict, other empirically validated therapies are helpful. In this chapter, we briefly review the evidence-based therapies for mood disorders in the pediatric setting. More in-depth discussion is provided in Chapter 28, "Individual Psychotherapy," and Chapter 29, "Family Interventions."

Individual Psychotherapy

Cognitive-behavioral therapies are the most widely tested effective treatment for youngsters with depression among the general population and among the physically ill population (Chambliss and Ollendick 2001). Cognitive-behavioral therapies are problem-focused treatments that seek to identify maladaptive beliefs about oneself, others, and one's environments. A.T. Beck et al.'s (1979) cognitive model identifies previous social learning, developmental history, and significant experiences as the foundation for the unique set of meanings and assumptions (beliefs) that form the foundation for how one perceives and experiences the world. Assumptions that are extreme, dysfunctional, and resistant to change are thought to underlie and maintain some psychiatric symptoms or disorders (A.T. Beck et al. 1979).

Cognitive-behavioral therapy is a highly structured short-term intervention that focuses on changing beliefs that underlie behavior. It is a well-validated effective treatment for mild to moderate depression in the pediatric population (Brent et al. 1997), and accumulating evidence provides strong support for its effectiveness for depression in physically ill populations (Emmelkamp and van Oppen 1993; Szigethy et al. 2006, 2007).

Supportive therapy interventions may minimize distress by providing an opportunity to identify and express feelings, cope with the illness and demands of treatment, strengthen supports, and provide the support needed to move beyond the psychological crisis generated by physical illness (Spiegel and Classen 2000). Insight-oriented psychotherapies have limited demonstrated applicability to the pediatric inpatient setting, because acuity of illness may impair self-expression, the ability to participate, or the ability to tolerate the feelings and anxiety generated by this approach.

Family Therapy

Family therapies attempt to alter interactions among family members for the purpose of improving the functioning of the family unit while also recognizing each family member as a distinct individual member of this unit. Medical family therapy is the biopsychosocial treatment of individuals affected by physical illness; it emphasizes the collaboration among the medical team, the family, and the family therapist, with the goals of recognizing the impact of the illness on the family and providing a framework for working with the illness while promoting active involvement of the family in the management of the illness (Sholevar and Sahar 2003). Most families with a physically ill child adjust to the demands of living with the illness while maintaining an intact family structure; however, this adjustment can be altered when an individual family member suffers from depression (Jacobs 2000). Family therapy may be an effective adjunct treatment for the physically ill child with depression.

Family therapy has demonstrated some effectiveness for the improvement of depression in adolescents. In a well-controlled study examining the effectiveness of individual cognitive-behavioral therapy, systemic behavior family therapy, and individual nondirective supportive therapy in 107 clinically referred depressed adolescents (ages 12–17 years) over 12–16 sessions, cognitive-behavioral therapy dem-

onstrated a lower rate of major depression at the end of treatment than nondirective supportive therapy. Cognitive-behavioral therapy resulted in higher rates of remission (64.7%) than systemic behavior family therapy (37.9%) or nondirective supportive therapy (39.4%), although systemic behavior family therapy and nondirective supportive therapy appeared to demonstrate some efficacy (Brent et al. 1997). In a randomized, controlled trial comparing psychodynamic psychotherapy and family therapy in 72 patients ages 9–15 years, Trowell et al. (2007) reported the resolution of depression in both treatment conditions, with 74.3% of the psychodynamic psychotherapy participants reporting no further clinical depression compared with 75.7% of the participants in family therapy.

Concluding Comments

Mood symptoms are common among those individuals with acute and chronic physical illnesses. The challenge for the mental health clinician is to differentiate the multiple factors that may contribute to the presentation: direct effects of a physical illness, treatment effects of the illness, adjustment to the illness, and/or primary mood disorder may all underlie the clinical presentation of a youngster with a physical illness presenting with disabling mood symptoms. Thorough medical and psychiatric evaluations of the child and family are required to understand the presenting symptoms. Strong evidence is emerging that supports the effectiveness of psychotherapies for mood disorders in physically ill children and adolescents; less data support the use of psychopharmacology in this population. When present, troubling mood symptoms and/or the presence of a mood disorder can significantly complicate the course of medical treatment for affected children and their families. Mood difficulties should be identified early and treated aggressively.

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7

Anxiety Symptoms and Disorders

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Anxiety is an emotion experienced at one time or another by all human beings. It functions as a biological warning system that alerts an individual to the presence of danger and can also arise as a consequence of loss or psychological conflict. An important distinction to make is between anxiety experienced as a normative reaction to a challenging environment or situation and an anxiety disorder, which is a mental health diagnosis that deviates from the norm. Child and adolescent anxiety disorders are characterized by excessive or developmentally inappropriate anxiety that interferes with psychological, academic, and social functioning (Vasa and Pine 2006).

Symptoms of anxiety are very common in patients and family members in the pediatric setting. Depending on the context and severity, symptoms of anxiety can significantly impair functioning and recovery. Anxiety may also influence aspects of treatment, including adherence. Anxiety is a risk factor for several general medical conditions (e.g., hypertension) and may exacerbate the symptoms of specific illnesses (e.g., asthma, irritable bowel syndrome). Symptoms of anxiety may be secondary to the direct effects of an illness, be a psychological reaction to an illness, indicate the presence of a comorbid anxiety disorder, or be a combination of all three (see Figure 7–1).

With respect to pediatric psychosomatic medicine, the evaluation and treatment of anxiety depend strongly on consideration of the context in which the symptoms present and the environment in which symptoms are maintained. Biopsychosocial (Engel 1977) and social-ecological (Bronfenbrenner 1979) models that emphasize the interdependent and mutually influencing relationships among biological, psychological, individual, family, and community subsystems are particularly useful frameworks for better understanding anxiety that may arise in the context of pediatric illness (Kazak et al. 2009a). The consultant needs to appreciate that anxiety symptoms may be caused or exacerbated by a child's emotional reaction to an acute hospitalization and separation from home. However, interpreting physical symptoms such as tachycardia, shortness of breath, or sweating as symptoms of anxiety may or may not be appropriate, depending on the context in which they arise. Specific anxiety symptoms may be present as part of another psychiatric disorder (e.g., depressive or somatoform disorder) or may accompany another disorder as a primary comorbid anxiety disorder (Shaw and DeMaso 2006). In the pediatric setting, untangling these diagnostic dilemmas and making recommendations are integral to successful clinical care.

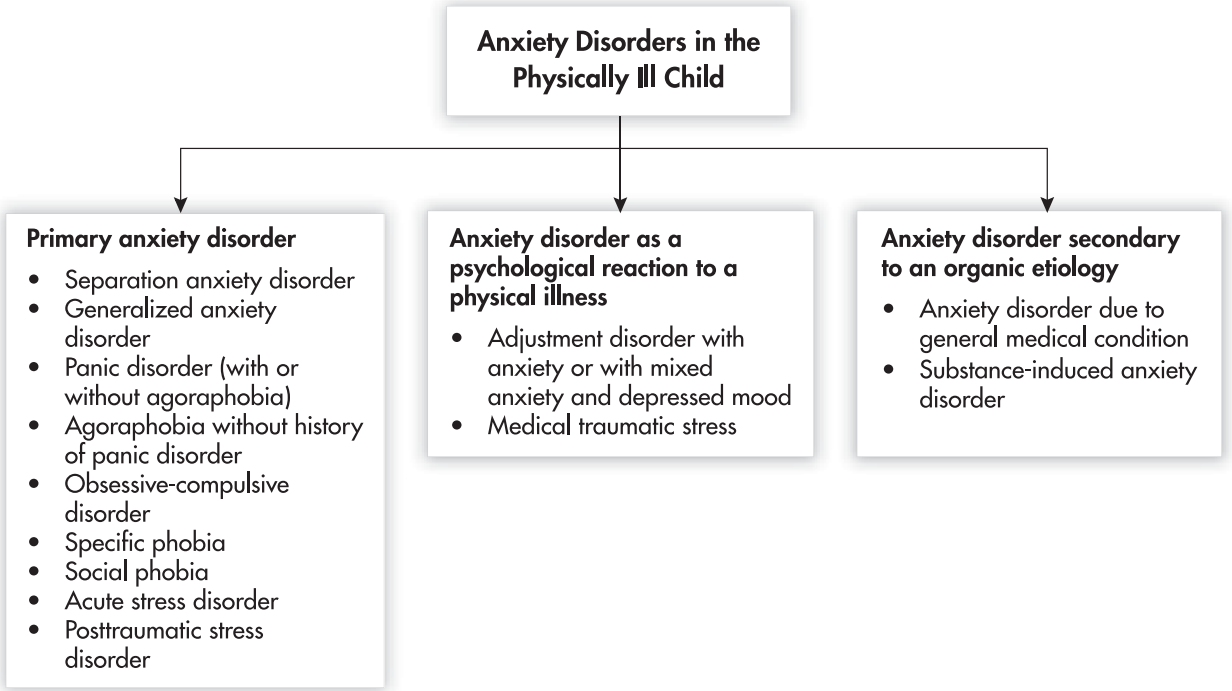

FIGURE 7–1. Classification of anxiety disorders in the medically ill child.

Source. Adapted from Shaw RJ, DeMaso DR: "Anxiety Symptoms and Disorders," in *Clinical Manual of Pediatric Psychosomatic Medicine: Consultation With Physically Ill Children and Adolescents.* Washington, DC, American Psychiatric Publishing, 2006, p. 122. Copyright 2006, American Psychiatric Publishing. Used with permission.

EPIDEMIOLOGY

The *Diagnostic and Statistical Manual of Mental Disorders,* Fourth Edition, Text Revision (American Psychiatric Association 2000), is considered the gold standard for the assessment of anxiety disorders, and its glossary of technical terms defines anxiety as "the apprehensive anticipation of future danger or misfortune accompanied by a feeling of dysphoria or somatic symptoms of tension. The focus of anticipated danger may be external or internal" (p. 820). The lifetime prevalence of DSM-IV anxiety disorders is 28.8%, with a median age at onset of 11 years (Kessler et al. 2005). The age at onset distributions for anxiety disorders are diverse, with specific phobia and separation anxiety disorders having a very early median onset at age 7 years, social phobias at age 13 years, and other anxiety disorders from ages 19 to 31 years (Kessler et al. 2005). Research examining 5-year trajectories of anxiety disorders during adolescence shows a slight decrease in panic disorder, school anxiety, and separation anxiety symptoms over time and stability in social phobia symptoms (Hale et al. 2008). In general, girls are more likely than boys to report an anxiety disorder (Costello et al. 2004), and symptoms of generalized anxiety disorder symptoms appear to slightly increase for girls and decrease for boys during adolescence (Hale et al. 2008).

Patients with chronic physical illnesses have a higher adjusted lifetime prevalence of anxiety disorders (Colon and Popkin 2002), and strong evidence supports associations among anxiety disorders, chronic medical illness, low levels of physical health–related quality of life, and physical disability (Roy-Byrne et al. 2008). For example, various studies examining the prevalence of any anxiety disorder and comorbid medical illness among adults have reported rates of 23%–52% for patients with asthma, 18%–33% for patients with cancer, and 17%–35% for patients with chronic pain (Roy-Byrne et al. 2008). These rates do not differentiate premorbid anxiety disorders from anxiety symptoms that develop in response to the medical illness or its treatment. For instance, Schuckit (1983) reported that physical causes of anxiety (i.e., toxic or medical etiologies for symptoms), separate from a patient's psychological reaction, are seen in 10%–40% of

adult patients presenting with anxiety or depression. Frequent users of medical care also display increased rates of anxiety (Barsky et al. 1999). Panic disorder in particular may be more common in physically ill patients, especially those with respiratory disease (Coffman and Levenson 2005).

Etiology

The likelihood of developing anxiety involves a combination of genetic/biological factors, psychological traits, and life experiences. Anxiety symptoms and disorders are so heterogeneous that the relative roles of these factors are likely to differ such that some have a stronger genetic basis and others are more rooted in stressful life events. Differences that exist among the types of risk factors that precede the development of either a generalized anxiety disorder or a major depressive episode suggest that these two disorders should not be considered different manifestations of a single underlying internalizing syndrome (Kessler et al. 2008). Considerable epidemiological and clinical evidence suggests that anxiety disorders, as well as depressive disorders, can adversely affect patient self-care and increase the risk of incident medical illness, complications, and mortality (Roy-Byrne et al. 2008).

Psychological Reactions to Illness

Anxiety is a common psychological reaction to the stress of a major physical illness. Patients with genetic/biological vulnerabilities to develop anxiety symptoms are likely to have more intense reactions to diagnosis and treatment of a physical illness, although these same conditions can induce disabling anxiety in patients with no prior history of anxiety. Multiple psychological sources of anxiety should be considered during evaluation (Epstein and Hicks 2005; Goldberg and Posner 2000). In Table 7–1, we highlight the primary psychological sources of anxiety associated with pediatric physical illness, along with important factors that should be considered.

Primary Anxiety Disorders

Pediatric patients may present with a history of preexisting anxiety disorder or develop an anxiety disorder after a medical illness is diagnosed. Because anxiety disorders often present with physical symptoms, particularly complex diagnostic issues can be generated in children and adolescents with comorbid medical conditions that may also be associated with somatic symptoms. The psychological symptoms of anxiety are routinely associated with physical signs of autonomic activity (e.g., palpitations, shortness of breath, tremulousness, flushing, faintness, dizziness, chest pain, dry mouth, muscle tension). The most common somatic symptoms reported by children and adolescents with DSM-IV-TR anxiety disorders (i.e., social, separation, and generalized anxiety disorders) were as follows: restlessness (74%), stomachaches (70%), blushing (51%), palpitations (48%), muscle tension (45%), sweating (45%), and trembling/shaking (43%) (Ginsburg et al. 2006).

Several subtypes of anxiety disorders are seen in the medical setting (see Figure 7–1). We describe the following DSM-IV-TR anxiety disorders (American Psychiatric Association 2000) as "primary" to the extent that they are not specifically a psychological or physical reaction to a physical illness or substance (see left-hand column of Figure 7–1). *Separation anxiety disorder* involves inappropriate and excessive anxiety concerning separation from caregivers and/or home and is particularly common in younger children admitted to the hospital. *Generalized anxiety disorder* presents with a pattern of excessive anxiety and worry for 6 months or longer that is associated with symptoms of restlessness, fatigue, difficulty with concentration, irritability, muscle tension, and sleep disturbance and may also be heightened during the stress of an inpatient admission. *Obsessive-compulsive disorder* in the physically ill child may include obsessive preoccupation or fears about physical illness and/or aspects of the medical setting (e.g., contamination fears). *Specific phobias* may be particularly problematic in the pediatric setting in patients with fears about needlesticks and blood. Patients with claustrophobia similarly may have difficulties with procedures such as magnetic resonance imaging or the need for protective isolation due to an infectious disease or immunosuppression. *Social phobia,* characterized by anxiety in response to social or performance situations, may contribute to children having difficulty actively engaging with medical personnel around treatment and/or limit their adherence to recommendations.

Panic disorders can overlap and blend with the symptoms of the accompanying general medical condition. The hallmark of these disorders is the presence of panic attacks, in which a sudden onset of intense psychological fear co-occurs with various unpleasant physical symptoms. Panic disorders may

TABLE 7–1. Psychological sources of anxiety associated with pediatric physical illness

Source of anxiety	Factors to consider
Illness diagnosis	Patients often experience symptoms of anxiety around the time of diagnosis of a physical illness. Individuals with a family history of a specific medical condition may experience anxiety symptoms due to excessive fear that they will be affected. This fear can cause elevated symptoms of anxiety related to routine pediatric appointments during the period between the initial evaluation of a symptom and its diagnosis. Anxiety may also occur when a patient has an abnormal laboratory test that does not lead to a diagnosis but that does require follow-up or monitoring.
Physical integrity	Beginning around age 4 or 5 years, children become more concerned about bodily injury and are more cognitively aware of the physical effects of illness; as a result, they frequently experience anxiety. Fears about amputation, loss of vision, and/or pain are common and understandable. Adolescents in particular may worry about the cosmetic effects of an illness or treatment due to excessive concerns about social stigma.
Hospital anxiety	Hospitalized children have to adjust to the presence of pediatric staff and to disruptions to their daily routine. These children may experience anxiety about the presence of hospital staff, particularly when the staff become associated with stressful medical procedures or the delivery of disturbing medical information. Children under age 4–5 years are particularly prone to separation anxiety. Patients who have not adhered to their medical treatment or who have engaged in risk-taking behaviors may conceal important medical information because of anticipatory anxiety about the potential disapproval of their physicians.
Impact of illness	Children frequently report symptoms of anxiety related to the impact of the illness and its treatment on their own lives and on family members. They may be concerned about missing school or falling behind academically. Adolescents may be particularly troubled by their separation from peers as well as by feeling "different" from others. Children may feel guilty about their need for increased parental attention and assistance. Some children report worries about the financial impact of their illness on the family because their parents have to take time off from work or because of the costs of treatment.
Prognosis and death	Patients may experience anxieties about their prognosis and death that can be based on both realistic and unrealistic appraisals of their illness. Children can develop symptoms of anxiety related to fears about the recurrence of an illness such as cancer. Such fears are not necessarily assuaged by a favorable statistical prognosis. A family history of medical illness or knowledge of the death of a family member or peer can influence these fears. Children may also report concerns about the emotional impact of their death on parents or siblings.

present either *with* or *without agoraphobia* (i.e., anxiety about, or avoidance of, places or situations from which escape may be difficult). Studies of adult patients have shown that individuals with panic attacks are high utilizers of medical care (Barsky et al. 1999). This is particularly true for patients who experience chest pain and who repeatedly present at emergency rooms or are referred for diagnostic workups. However, when symptoms of agoraphobia are also present, patients may have particular difficulty participating in treatment within the medical setting and adhering to follow-up appointments.

Acute stress disorder and *posttraumatic stress disorder* (PTSD) are characterized by the reexperiencing of a traumatic event accompanied by avoidance of related stimuli and physiological symptoms of increased arousal (see Tables 7–2 and 7–3). These two disorders are differentiated primarily by the duration of the associated symptoms and, depending on the context in which they arise, may be considered a primary anxiety disorder or a psychological reaction to a physical illness. Patients presenting in the medical setting as a direct result of a traumatic event can experience acute stress disorder symptoms that may or may not persist. Furthermore, patients can be struggling with symptoms connected with a trauma unrelated to their presenting medical issue (e.g., a history of physical or sexual abuse) or develop

TABLE 7–2. DSM-IV-TR diagnostic criteria for acute stress disorder

A. The person has been exposed to a traumatic event in which both of the following were present:
   (1) the person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others
   (2) the person's response involved intense fear, helplessness, or horror

B. Either while experiencing or after experiencing the distressing event, the individual has three (or more) of the following dissociative symptoms:
   (1) a subjective sense of numbing, detachment, or absence of emotional responsiveness
   (2) a reduction in awareness of his or her surroundings (e.g., "being in a daze")
   (3) derealization
   (4) depersonalization
   (5) dissociative amnesia (i.e., inability to recall an important aspect of the trauma)

C. The traumatic event is persistently reexperienced in at least one of the following ways: recurrent images, thoughts, dreams, illusions, flashback episodes, or a sense of reliving the experience; or distress on exposure to reminders of the traumatic event.

D. Marked avoidance of stimuli that arouse recollections of the trauma (e.g., thoughts, feelings, conversations, activities, places, people).

E. Marked symptoms of anxiety or increased arousal (e.g., difficulty sleeping, irritability, poor concentration, hypervigilance, exaggerated startle response, motor restlessness).

F. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning or impairs the individual's ability to pursue some necessary task, such as obtaining necessary assistance or mobilizing personal resources by telling family members about the traumatic experience.

G. The disturbance lasts for a minimum of 2 days and a maximum of 4 weeks and occurs within 4 weeks of the traumatic event.

H. The disturbance is not due to the direct physiological effects of a substance (e.g., a drug of abuse, a medication) or a general medical condition, is not better accounted for by brief psychotic disorder, and is not merely an exacerbation of a preexisting Axis I or Axis II disorder.

symptoms of *medical traumatic stress* as a reaction to the current physical illness or treatment being received, as discussed further in the following section.

Anxiety Disorder as a Psychological Reaction to Physical Illness

In this section, we discuss the DSM-IV-TR diagnostic categories that conceptualize the nature of the anxiety as a specific psychological reaction or response to the child's physical illness (see center column of Figure 7–1). A child's adjustment to an illness diagnosis and the medical procedures that are intended to help treat the illness can fluctuate over time and can significantly impact his or her experience of anxiety symptoms. Included are discussions of adjustment disorder, which is commonly seen within hospital and medical settings, and medical traumatic stress, a special subtype of PTSD that is particularly relevant to medical settings.

Adjustment Disorder

A diagnosis of *adjustment disorder* is appropriate to consider when symptoms cause significant impairment, appear to be a psychological response to an identifiable stressor within 3 months of the onset of the stressor, and do not meet the criteria for another specific DSM-IV-TR Axis I disorder. The "with anxiety" specifier is appropriate for an individual with a clinically significant level of symptoms, such as nervousness, worry, jitteriness, or separation fears, whereas the "with mixed anxiety and depressed mood" specifier is more appropriate for an individual with a combination of depression and anxiety symptoms.

TABLE 7–3. DSM-IV-TR diagnostic criteria for posttraumatic stress disorder

A. The person has been exposed to a traumatic event in which both of the following were present:
   (1) the person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others
   (2) the person's response involved intense fear, helplessness, or horror. **Note:** In children, this may be expressed instead by disorganized or agitated behavior.

B. The traumatic event is persistently reexperienced in one (or more) of the following ways:
   (1) recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions. **Note:** In young children, repetitive play may occur in which themes or aspects of the trauma are expressed.
   (2) recurrent distressing dreams of the event. **Note:** In children, there may be frightening dreams without recognizable content.
   (3) acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative flashback episodes, including those that occur on awakening or when intoxicated). **Note:** In young children, trauma-specific reenactment may occur.
   (4) intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event
   (5) physiological reactivity on exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event

C. Persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (not present before the trauma), as indicated by three (or more) of the following:
   (1) efforts to avoid thoughts, feelings, or conversations associated with the trauma
   (2) efforts to avoid activities, places, or people that arouse recollections of the trauma
   (3) inability to recall an important aspect of the trauma
   (4) markedly diminished interest or participation in significant activities
   (5) feeling of detachment or estrangement from others
   (6) restricted range of affect (e.g., unable to have loving feelings)
   (7) sense of a foreshortened future (e.g., does not expect to have a career, marriage, children, or a normal life span)

D. Persistent symptoms of increased arousal (not present before the trauma), as indicated by two (or more) of the following:
   (1) difficulty falling or staying asleep
   (2) irritability or outbursts of anger
   (3) difficulty concentrating
   (4) hypervigilance
   (5) exaggerated startle response

E. Duration of the disturbance (symptoms in Criteria B, C, and D) is more than 1 month.

F. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Specify if:

Acute: if duration of symptoms is less than 3 months

Chronic: if duration of symptoms is 3 months or more

Specify if:

With Delayed Onset: if onset of symptoms is at least 6 months after the stressor

Medical Traumatic Stress

Pediatric illnesses, injuries, and treatments may be experienced as traumatic events by patients and family members (Stuber and Shemesh 2006). Although often not reaching criteria for a diagnosis of acute stress disorder or PTSD, key symptoms of these disorders—particularly reexperiencing, physiological arousal, and avoidance—are common across illness groups and across the course of the illness (Kazak et al. 2006). The National Child Traumatic Stress Network (2009) defines *pediatric medical traumatic stress* as "a set of psychological and physiological responses of children and their families to pain, injury, serious illness, medical procedures, and invasive or frightening treatment experiences." Research on traumatic stress in pediatric illness has increased markedly over the past decade across multiple illness and injury samples. Based on meta-analyses, the prevalence of medical traumatic stress is estimated to be 19% for injured children and 12% for ill children (Kahana et al. 2006).

Traumatic reactions that precipitate these traumatic stress symptoms can occur at the onset of a physical illness. For example, the news of a diagnosis, which can result in distressing reactions, has been labeled an *information stressor* (Green 1994). Traumatic stress responses can also develop as a reaction to traumatic aspects of the medical treatment, whether acute or chronic. Traumatic stress responses are remarkable for their persistence over time. However, in many cases, traumatic stress responses are normative reactions to life threat and the circumstances around diagnosis and treatment initiation, with patients and families ultimately coping well with the aid of short-term supportive interventions (Kazak et al. 2009b).

PTSD in children has been classified into two subtypes (Terr 1991). Single-incident trauma results in type I PTSD, which is classically associated with reexperiencing symptoms via flashbacks, intrusive memories, and other mechanisms. Serial exposure to traumatic events causes type II PTSD, which is characterized by a greater prevalence of numbing, dissociation, and denial. Type I trauma is common following the initial diagnosis of an illness, whereas type II trauma is seen more often in patients with chronic physical illnesses (e.g., long-term survivors of cancer).

Table 7–4 summarizes posttraumatic stress research findings across a growing number of pediatric patient groups and settings. For example, evidence of traumatic stress has been reported in pediatric populations such as solid organ transplant recipients (Farley et al. 2007; Young et al. 2003), patients with epilepsy (Iseri et al. 2006), burn victims (Rizzone et al. 1994), and injured children (de Vries et al. 1999). Posttraumatic stress has also been reported in siblings of childhood cancer survivors (Alderfer et al. 2003).

Posttraumatic stress symptoms, as well as PTSD, are much more common in parents than in pediatric patients, across diseases, and can occur from the time of diagnosis and throughout treatment phases (see Table 7–4). The largest body of evidence comes from pediatric cancer. For instance, in a sample of 150 families of adolescent cancer survivors, nearly all (99%) had at least one parent meet symptom criteria for reexperiencing, and 20% of the families had at least one parent with current PTSD (Kazak et al. 2004a). Parental traumatic stress and PTSD have also been found in parents of premature infants in a neonatal intensive care unit (Shaw et al. 2006).

Immediately after a pediatric injury, acute stress symptoms in patients are common, and these symptoms have been linked with later persistence and severity of traumatic stress responses (Bryant et al. 2007; De Young et al. 2007; Kassam-Adams et al. 2005; Meiser-Stedman et al. 2005). Parental acute stress symptoms, often at the level of indicating a diagnosis of acute stress disorder, are common during the early weeks and months of treatment for childhood cancer (Kazak et al. 2005; Patiño-Fernández et al. 2008). Although a single acute traumatic medical event can trigger posttraumatic stress symptoms, cumulative stress related to a child's illness and subsequent treatment is most commonly involved in symptom development. Parents' appraisal of the potential life threat and intensity of treatment, rather than objective medical measures, is most strongly predictive of posttraumatic stress symptoms. Parents with a history of life stress or inadequate levels of social support are more at risk for developing PTSD.

Anxiety Disorder Secondary to Organic Etiology

The final category of DSM-IV-TR anxiety disorders includes anxiety symptoms determined to result from the direct physiological consequence of either a general medical condition or substance. These categories are considered in the paragraphs that follow, with special consideration given to the more common anxiety symptoms that co-occur with specific physical conditions encountered in the medical setting.

TABLE 7–4. Rates of posttraumatic stress among patients and parents across pediatric samples and settings

	Rate (%)	
Sample/setting	**Patient**	**Parent**
Cancer: in-treatment	~10	23–71
Cancer: survivors	12–52	20–43
Cardiac surgery	24–29	~16
Organ transplantation	11–29	27–58
HIV	~33	—
Asthma	11–20	14–29
Diabetes	~5	20–46
Epilepsy	—	~31
Burns	6–53	12–37
Motor vehicle/pedestrian	12–55	3–15
Traumatic brain injury	21–49	—
Spinal cord	25–46	~53
Disfigurement	21	—
Pediatric intensive care unit	21–48	13–27

Note. A dash means that no data are available.
Source. Data from Baxt and Schneider 2008.

Anxiety Disorder Due to a General Medical Condition

Many medical conditions may result in symptoms of anxiety, and the consultant should consider this possibility if the history is not typical for a primary anxiety disorder or if anxiety symptoms are resistant to treatment (see Table 7–5). Medical etiologies are also more likely when physical symptoms of anxiety, such as shortness of breath, tachycardia, or tremor, are more marked. Anxiety that is secondary to a medical condition should be differentiated from comorbid anxiety or anxiety that is a reaction to the underlying medical illness. Table 7–6 lists some of the more common medical conditions that may result in symptoms of anxiety.

With respect to anxiety disorders due to medical conditions, the mental health consultant needs to appreciate that all patients facing a physical illness and its treatment will experience *noncategorical* effects of anxiety. From this perspective, children and their families are seen as experiencing stress as a result of being ill and not because of specific factors associated with a particular disease. For example, invasive medical procedures (e.g., venipunctures, intravenous lines) are common across illness types and can cause anxiety. Rather than being related to a specific physical illness, these anxiety symptoms are more related to the child's premorbid anxiety vulnerability, developmental stage, family functioning, and degree of psychosocial stress in the environment. In the following subsections, we provide brief overviews of some of the more frequently encountered specific general medical conditions associated with physiological symptoms of anxiety.

Cancer

Anxiety is common at various points throughout the diagnosis and treatment of pediatric cancer (Pao and Kazak 2008). Most anxiety experienced by children and their parents is understandable, given their discomfort, grief over the medical condition, and uncertainty of daily and longer-term outcomes. Procedures (e.g., bone marrow aspirates, central line access, repeated venipunctures, preparations for radiation therapy) are all potentially anxiety producing for children and adolescents. Anxiety symptoms can interfere with patients' ability to tolerate important components of their medical treatment, including

TABLE 7–5. DSM-IV diagnostic criteria for anxiety disorder due to general medical condition

A. Prominent anxiety, panic attacks, or obsessions or compulsions predominate in the clinical picture.

B. There is evidence from the history, physical examination, or laboratory findings that the disturbance is the direct physiological consequence of a general medical condition.

C. The disturbance is not better accounted for by another mental disorder (e.g., adjustment disorder with anxiety in which the stressor is a serious general medical condition).

D. The disturbance does not occur exclusively during the course of a delirium.

E. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Specify if:

With Generalized Anxiety: if excessive anxiety or worry about a number of events or activities predominates in the clinical presentation

With Panic Attacks: if panic attacks predominate in the clinical presentation

With Obsessive-Compulsive Symptoms: if obsessions or compulsions predominate in the clinical presentation

Coding note: Include the name of the general medical condition on Axis I, e.g., 293.84 Anxiety Disorder Due to Pheochromocytoma, With Generalized Anxiety; also code the general medical condition on Axis III.

invasive diagnostic procedures and treatment. Anticipatory nausea and vomiting are also common and frequently have an anxiety component. Several of the medications used in the treatment of cancer can cause symptoms of anxiety as possible side effects. Antiemetic medications, such as prochlorperazine or metoclopramide, can cause symptoms of akathisia, which may be misdiagnosed as anxiety. Anxiety symptoms are also elevated in patients experiencing disease-related pain. Although anxiety tends to decrease over time, medical setbacks can increase anxiety. Even after treatment has ended, anxiety is common during follow-up visits.

Gastrointestinal Disorders

Studies of patients with inflammatory bowel disease suggest that they may be more vulnerable than healthy comparison adolescents to developing psychiatric disorders, including symptoms of anxiety and depression (Hommel 2008; Mackner and Crandall 2006; Mackner et al. 2006). Anxiety symptoms can occur in the context of any treatment with a corticosteroid. Evidence is mixed regarding whether patients' inflammatory bowel disease relapses are related to times of increased stress in adults (Creed and Olden 2005), and less is known about the role of stress in inflammatory bowel disease symptom exacerbation in pediatric patients (Mackner et al. 2006).

Pediatric patients with functional gastrointestinal disorders (i.e., those not clearly associated with a structural, infectious, inflammatory, or biochemical etiology) have been found to have elevated levels of anxiety that, although similar to anxiety levels reported by children with organic gastrointestinal diagnoses, are significantly higher than those of healthy children (Banez and Cunningham 2003; Scharff 1997; Walker et al. 1993). Patients with a history of functional abdominal pain are at increased risk of having irritable bowel syndrome and higher levels of psychosocial distress, disability, and health service use over time (Walker et al. 1998). Considerable clinical and scientific progress has been made in understanding the etiologies of, diagnosing, and treating functional gastrointestinal disorders in children (Li 2009).

Heart Disease

A meta-analysis reviewing the psychological functioning of pediatric patients with congenital heart disease found that older children and adolescents with congenital heart disease displayed an increased risk of overall, internalizing, and (to a lesser extent) externalizing behavior problems (Karsdorp et al. 2007). Anxiety symptoms can appear in patients as a direct result of cardiac failure caused by worsening congenital heart disease or an acute myocarditis. Anxiety states can also occur in a patient early in the course of unrecognized subacute bacterial endocarditis. Although the emotional functioning of patients with pediatric heart disease is generally not in the psychopathology range, those children who are

TABLE 7–6. Medical conditions etiologically related to anxiety

Neurological disorders
Encephalopathy
Mass lesion
Postconcussive syndrome
Poststroke
Seizure
Vertigo
Endocrine disorders
Carcinoid syndrome
Hyperadrenalism
Hypercalcemia
Hyperthyroid
Hypocalcemia
Hypoglycemia
Hypomagnesemia
Hypothyroid
Pheochromocytoma
Cardiac
Arrhythmias
Congestive heart failure
Hypovolemia
Valvular disease
Miscellaneous
Anaphylaxis
Asthma
Diabetes mellitus
Hyperkalemia
Hyperthermia
Hypoxia
Pancreatic tumor
Pneumothorax
Porphyria
Pulmonary edema
Pulmonary embolism
Systemic lupus erythematosus

Source. Reprinted from Shaw RJ, DeMaso DR: "Anxiety Symptoms and Disorders," in *Clinical Manual of Pediatric Psychosomatic Medicine: Consultation With Physically Ill Children and Adolescents,* Washington, DC, American Psychiatric Publishing, 2006, p. 130. Copyright 2006, American Psychiatric Publishing. Used with permission.

at higher risk for anxiety generally have other risk factors (e.g., cognitive and/or family functioning) that need to be considered (DeMaso 2004).

Hormone-Secreting Tumors

Pheochromocytoma is a rare disorder that can occur in both children and adults and is associated with catecholamine secretion from a tumor in the renal medulla. This secretion results in acute, episodic, or chronic symptoms of anxiety that are often associated with hypertension. Clinical symptoms include increased heart rate, increased blood pressure, myocardial contractility, and vasoconstriction. Patients may present with headache, sweating, palpitations, apprehension, and a sense of impending doom (Goebel-Fabbri et al. 2005). A pediatric case report documents a 15-year-old with pheochromocytoma who presented with panic attacks, depression, headache, and jaundice (Gökçe et al. 1991). Thyroid adenoma or carcinoma, parathyroid tumor, adrenocorticotropic hormone–producing tumors, and insulinomas are other hormone-secreting tumors associated with anxiety symptoms.

Poststroke Anxiety

Among adult patients, anxiety disorders are common after experiencing a stroke, with prevalence estimates of 25%–30% (Carson et al. 2005), and often include generalized anxiety or PTSD symptoms, including intrusive revisiting of the event, as well as increased somatic preoccupation. Poststroke anxiety is typically associated with right-hemisphere lesions, whereas symptoms of depression are correlated with left-hemisphere lesions (Epstein and Hicks 2005). Although 10% of children with sickle cell disease experience a stroke before age 20, placing them at greater risk for neurocognitive difficulties (Helps et al. 2003; Lemanek et al. 2003), little is known about pediatric poststroke symptoms of anxiety. A dysregulation of affect, including symptoms of anxiety, has been reported for both adults and children who experience lesions in the "limbic cerebellum" (vermis and fastigial nucleus) that can result from stroke or other conditions (Schmahmann et al. 2007).

Pulmonary Disease

Hypoxia can be anxiety provoking in any individual. The patient experiences symptoms of air hunger. This etiology is particularly common in high-risk situations, such as an intensive care unit admission

that might be due to a primary respiratory concern or something unrelated (e.g., postsurgery recovery). After experiencing a lack of oxygen, some patients can develop secondary anxiety symptoms that interfere with efforts to wean them from a ventilator. Posttraumatic stress symptoms have been reported in patients who experience episodes of acute respiratory distress syndrome (Shaw et al. 2001). Patients may develop posttraumatic stress symptoms without any conscious recollection of the specific traumatic events that occurred during their intensive care unit treatments. Posttraumatic stress symptoms have been reported in pediatric asthma patients who present with symptoms of acute respiratory distress (Shaw et al. 2002).

Research supports that children and adolescents with asthma have more anxiety and other internalizing problems than do their peers (Katon et al. 2004, 2007; McQuaid and Walders 2003). The strong overlap between symptoms of asthma and anxiety makes differential diagnosis confusing. Asthma and anxiety disorders, particularly panic disorder, often present together in the same individual (Katon et al. 2004; Rietveld et al. 2005). The anxiety may be secondary to the stress of asthma, or hypercapnia and hyperventilation may predispose the individual to panic attacks. Episodes of respiratory distress and the side effects of asthma medications may increase anxiety. In addition, anxiety and psychological distress are thought to provoke and increase the severity of asthma attacks. An increased prevalence of anxiety symptoms in pediatric patients with cystic fibrosis has been reported; some studies have suggested rates as high as 50%–60% (Hains et al. 1997). However, reviews of more recent research suggest mixed evidence for elevated rates of anxiety among pediatric patients with cystic fibrosis (Stark et al. 2003). Pulmonary embolism is uncommon in children but has also been associated with symptoms of anxiety.

Hyperventilation syndrome occurs across the life span and presents with symptoms of anxiety such as faintness, visual disturbances, nausea, vertigo, headaches, palpitations, dyspnea, diaphoresis, and paresthesias (Coffman and Levenson 2005). The symptoms may be reproduced by observation of the patient's response to overbreathing. Hyperventilation syndrome is a form of panic disorder in which hyperventilation causes an excessive elimination of carbon dioxide and a reduction in cerebral blood flow. Research examining adolescents in laboratory settings using voluntary hyperventilation challenge protocols has shown that more advanced adolescent pubertal status and greater emotional reactivity to the protocol are associated with greater levels of reported panic symptoms and somatic complaints (Leen-Feldner et al. 2007).

Vocal cord dysfunction is a respiratory syndrome often confused with asthma, although the conditions can also co-occur. In vocal cord dysfunction, which can affect pediatric and adult patients, pronounced inspiratory wheezing is loudest over the larynx while the chest is otherwise clear (Coffman and Levenson 2005). Vocal cord dysfunction is considered a functional disorder that generates secondary anxiety, which further exacerbates the condition (Coffman and Levenson 2005). Pediatric patients with vocal cord dysfunction have been reported to experience significantly higher levels of anxiety and have had higher numbers of anxiety-related diagnoses on a structured psychiatric interview than case-control patients with asthma (Gavin et al. 1998).

Seizure Disorders

Anxiety disorders frequently co-occur with seizure disorders, with prevalence rates of depression and anxiety disorders reported to be 16%–31% among children with epilepsy assessed through epidemiological samples (Plioplys et al. 2007). Researchers using structured interviews to assess DSM-IV-TR diagnoses reported that 33% of children with epilepsy who were of average intelligence, compared with 6% of children without epilepsy, reported mood and anxiety disorders and that anxiety disorders were the most common psychiatric diagnosis (Caplan et al. 2005). In a separate study, rates of DSM-IV anxiety disorders were reported for 35.8% of children with epilepsy versus 22% of healthy comparison children ($P<0.05$) (Jones et al. 2007). Notably, complex partial seizures can cause symptoms associated with panic disorder, including fear, depersonalization, dizziness, and paresthesias (Carson et al. 2005). This overlap makes it difficult to differentiate panic attacks from complex partial seizures based purely on the clinical symptoms.

Transplantation

Evidence suggests that pediatric transplant recipients experience elevated levels of psychosocial problems that can last long after surgery (Rodrigue and Sobel 2003). Patients who have undergone solid organ transplantations can develop symptoms of anxiety as a direct result of their immunosuppressant

medications, particularly corticosteroids. They can also experience reactive anxiety symptoms at any point in the treatment course—during the waiting period for transplantation, the immediate postoperative time period, a rejection episode, and/or the transition to home and school. Among pediatric kidney and liver transplant recipients, lower illness-related uncertainty was found to be related to lower levels of anxiety and depression (Maikranz et al. 2007). PTSD in adolescent solid organ transplant recipients is often related to the traumatic aspects of the patient's surgical intensive care treatment, as well as the general sequelae of their illness (Shemesh et al. 2007).

Traumatic Brain Injury and Postconcussive Syndrome

Adult patients who have sustained traumatic brain injury have an increased prevalence of anxiety disorders, including generalized anxiety disorder, panic disorder, obsessive-compulsive disorder, and phobias (Fann et al. 2005). Among pediatric patients, a study examining the onset of obsessions and compulsions within 1 year of severe traumatic brain injury found these symptoms to be common (29.2% of the sample) and associated with the co-occurrence of DSM-III-R anxiety disorders (Grados et al. 2008). In a separate study examining the impact of mild, moderate, and severe childhood traumatic brain injury, Barker-Collo (2007) reported rates of emotional/behavioral symptoms that were within normal limits across groups, with the moderate traumatic brain injury group having the highest levels of somatic and anxious-depressed symptoms. Although these symptoms may be transient, some patients develop more sustained symptoms. Notably, adult patients with traumatic brain injury have been found to have an increased risk of symptoms of acute stress disorder and subsequent PTSD (Harvey and Bryant 2000). Even when cerebral concussion does not result in any irreversible anatomic lesions, it may be followed with periods of retrograde amnesia. A small proportion of individuals may develop a constellation of symptoms postconcussion, including anxiety, impairment of sleep and appetite, irritability, light-headedness, headaches, and poor concentration (Goldberg and Posner 2000). Recent research examining adults with mild traumatic brain injury found anxiety, particularly for women, to be the strongest predictor of long-term postconcussive syndrome (Dischinger et al. 2009).

Thyroid Disease

Patients with thyroid gland disorders often experience anxiety symptoms. Hyperthyroidism is associated with symptoms of anxiety and may be difficult to differentiate from a primary anxiety disorder. In pediatric patients, hyperthyroidism frequently presents with hyperactivity, irritability, anxious dysphoria, and problems with attention (Bhatara and Sankar 1999). These symptoms can predate the medical diagnosis of hyperthyroidism by 6 months to 1 year and are often associated with deterioration in school performance during this time (Bhatara and Sankar 1999). Signs indicating thyrotoxicosis in adults typically include persistent acute anxiety, warm and dry hands, and fatigue accompanied by the desire to be active (Colon and Popkin 2002). Anxiety symptoms usually resolve when the underlying thyroid condition is treated, but anxiety should be treated with beta-blockers during the acute treatment phase. Clinicians should perform routine thyroid function tests in patients presenting with new-onset anxiety, anxiety disorders that are resistant to treatment, and anxiety that is accompanied by prominent physical symptoms. Anxiety has also been reported in hypothyroidism.

Substance-Induced Anxiety Disorder

Anxiety may be induced by a variety of substances or medications, either as a direct effect of a substance or as a withdrawal reaction (see Table 7–7). Corticosteroids, anticholinergic medications, beta-adrenergic agonists, and asthma medications are all potential causes of anxiety, particularly if the medication has recently been started or the dosage has changed (see Table 7–8). Table 7–9 serves as a reference for how anxiety disorders relate to the specific DSM-IV-TR specifiers of substance dependence, abuse, intoxication, withdrawal, and intoxication delirium for specific classes of substances.

TREATMENT

Treatment of pediatric anxiety disorders in physically ill children and adolescents follows many of the same principles as treatments used in the nonmedical setting. However, anxiety symptoms related to procedures and medical treatment are much more frequently seen in medical settings than in general psychiatric practice. Within this section, we briefly review the most common treatment approaches currently used to address anxiety in the pediatric set-

TABLE 7–7. DSM-IV diagnostic criteria for substance-induced anxiety disorder

A. Prominent anxiety, panic attacks, or obsessions or compulsions predominate in the clinical picture.

B. There is evidence from the history, physical examination, or laboratory findings of either (1) or (2):

(1) the symptoms in Criterion A developed during, or within 1 month of, substance intoxication or withdrawal

(2) medication use is etiologically related to the disturbance

C. The disturbance is not better accounted for by an anxiety disorder that is not substance induced. Evidence that the symptoms are better accounted for by an anxiety disorder that is not substance induced might include the following: the symptoms precede the onset of the substance use (or medication use); the symptoms persist for a substantial period of time (e.g., about a month) after the cessation of acute withdrawal or severe intoxication or are substantially in excess of what would be expected given the type or amount of the substance used or the duration of use; or there is other evidence suggesting the existence of an independent non-substance-induced anxiety disorder (e.g., a history of recurrent non-substance-related episodes).

D. The disturbance does not occur exclusively during the course of a delirium.

E. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Note: This diagnosis should be made instead of a diagnosis of substance intoxication or substance withdrawal only when the anxiety symptoms are in excess of those usually associated with the intoxication or withdrawal syndrome and when the anxiety symptoms are sufficiently severe to warrant independent clinical attention.

Code [Specific Substance]–Induced Anxiety Disorder

(291.89 Alcohol; 292.89 Amphetamine (or Amphetamine-Like Substance); 292.89 Caffeine; 292.89 Cannabis; 292.89 Cocaine; 292.89 Hallucinogen; 292.89 Inhalant; 292.89 Phencyclidine (or Phencyclidine-Like Substance); 292.89 Sedative, Hypnotic, or Anxiolytic; 292.89 Other [or Unknown] Substance)

Specify if:

With Generalized Anxiety: if excessive anxiety or worry about a number of events or activities predominates in the clinical presentation

With Panic Attacks: if panic attacks predominate in the clinical presentation

With Obsessive-Compulsive Symptoms: if obsessions or compulsions predominate in the clinical presentation

With Phobic Symptoms: if phobic symptoms predominate in the clinical presentation

Specify if:

With Onset During Intoxication: if the criteria are met for intoxication with the substance and the symptoms develop during the intoxication syndrome

With Onset During Withdrawal: if criteria are met for withdrawal from the substance and the symptoms develop during, or shortly after, a withdrawal syndrome

ting. For additional information regarding treatment, the reader is directed to Part 4 of this book, which includes chapters on individual psychotherapy (Chapter 28), family interventions (Chapter 29), psychopharmacology (Chapter 30), and preparation for procedures (Chapter 31).

In terms of general treatment approaches, a number of empirically supported treatment methods are useful for reducing pediatric anxiety, with strong evidence for the use of individual and group cognitive-behavioral therapy (CBT) for anxiety and phobic disorders (Silverman et al. 2008). Reinforced practice and participant modeling procedures have the most empirical support, followed by systematic desensitization, live or symbolic modeling, and CBT components in treating pediatric anxiety (Morris et al. 2008). Although randomized clinical trials provide strong evidence for the relative effectiveness of these treatments in comparison with no-treatment control conditions, limited data are available regard-

TABLE 7–8. Medications and substances associated with anxiety

Direct effect
Amphetamines
Androgens
Anticholinergics
Antidepressants (including SSRIs)
Antiemetics
Antipsychotics
Baclofen
Beta-adrenergic agonists
Caffeine
Cocaine
Corticosteroids
Dopaminergics
Estrogens
Insulin
Metronidazole
Progestins
Sumatriptans
Sympathomimetics
Theophylline
Thyroid preparations
Withdrawal
Alcohol
Barbiturates
Benzodiazepines
Caffeine
Opiates

Note. SSRI = selective serotonin reuptake inhibitor.

Source. Reprinted from Shaw RJ, DeMaso DR: "Anxiety Symptoms and Disorders," in *Clinical Manual of Pediatric Psychosomatic Medicine: Consultation With Physically Ill Children and Adolescents.* Washington, DC, American Psychiatric Publishing, 2006, p. 133. Copyright 2006, American Psychiatric Publishing. Used with permission.

ing the relative efficacy of these approaches in specific contexts such as the medical setting (Morris et al. 2008). Current practice guidelines recommend that treatment of anxiety disorders of mild severity should begin with psychotherapy; however, valid reasons for combining medication treatment with psychotherapy may be indicated for acute symptom reduction for children with moderate to severe anxiety, as well as in other circumstances (Connolly and Bernstein 2007).

With respect to psychosocial and behavioral treatment approaches for anxiety in the pediatric setting, the short duration of the patient's hospital stay often necessitates a brief and focused approach. Supportive psychotherapy and reassurance play an important role in correcting patients' misconceptions about the significance of physical symptoms. When more intensive psychotherapeutic support is indicated, CBT-based interventions are recommended because they have received the most empirical support for the treatment of pediatric anxiety disorders (Connolly and Bernstein 2007; Graczyk and Connolly 2008). CBT approaches essentially include three core components: psychoeducation, cognitive restructuring (i.e., uncovering and correcting misinterpretations and irrational thoughts that are associated with symptoms of anxiety), and behavioral experiments (Coyne et al. 2008). In the past decade, numerous child-focused CBTs have been developed, including applications with very young children, family-based CBT models, and acceptance- and mindfulness-based approaches, and have been adapted for use across multiple settings (e.g., primary care, behavioral health) (Coyne et al. 2008).

Strong evidence supports the use of behavioral and cognitive-behavioral approaches for invasive procedures in pediatrics (Powers 1999). Cognitive-behavioral tools such as systematic desensitization and exposure can help in treating phobias that interfere with medical treatment or treatment adherence. Techniques such as guided imagery, progressive muscle relaxation, and self-hypnosis can help to alleviate anxiety related to symptoms and/or medical treatment in both inpatient and outpatient contexts (Spirito and Kazak 2006). Treatments that integrate cognitive-behavioral approaches with family therapy have also been found effective in reducing symptoms of traumatic stress in adolescents with cancer and their families (Kazak et al. 2004b).

Within the medical setting, symptoms of pain and anxiety are often intertwined. The effective treatment of pain is often a critical part of the overall approach to care, and the treatment of pain also benefits from CBT. Anxiety can play a significant role in the management of pain for pediatric patients experiencing either acute or chronic pain. Research has shown that adolescent surgical patients who report higher levels of preoperative anxiety and anticipated pain have higher postoperative pain

TABLE 7–9. Degree of use/withdrawal associated with anxiety disorders by substance class

Substance class	Dependence	Abuse	Intoxication	Withdrawal	Intoxication delirium	Anxiety disorders
Alcohol	X	X	X	X	I	I/W
Amphetamines	X	X	X	X	I	I
Caffeine			X			I
Cannabis	X	X	X		I	I
Cocaine	X	X	X	X	I	I/W
Hallucinogens	X	X	X		I	I
Inhalants	X	X	X		I	I
Nicotine	X			X		
Opioids	X	X	X	X	I	
Phencyclidine	X	X	X		I	I
Sedatives, hypnotics, or anxiolytics	X	X	X	X	I	W
Polysubstance	X					
Other	X	X	X	X	I	I/W

Note. X, I, W, or I/W indicates that the category is recognized in DSM-IV-TR. In addition, *I* indicates that the specifier "with onset during intoxication" may be noted for the category (except for intoxication delirium); *W* indicates that the specifier "with onset during withdrawal" may be noted for the category (except for withdrawal delirium); and *I/W* indicates that either "with onset during intoxication" or "with onset during withdrawal" may be noted for the category.

Source. Adapted from American Psychiatric Association: *Diagnostic and Statistical Manual of Mental Disorders,* 4th Edition, Text Revision. Washington, DC, American Psychiatric Association, 2000, p. 193. Used with permission.

scores and pain medication use (Logan and Rose 2005). Moreover, among adolescents with functional abdominal pain, anxiety symptoms at the onset of pain have been found to predict continued high levels of symptoms and impairment 5 years later (Mulvaney et al. 2006). The reader is referred to Chapter 9, "Pediatric Pain," for a review of pain issues encountered in the medical setting.

Pediatric patients in the acute inpatient setting often require medication at least temporarily while the treatment team explores other treatment options. Selective serotonin reuptake inhibitor (SSRI) medications have the most empirical support and are the first-line choice for treatment of many pediatric primary anxiety disorders (Connolly and Bernstein 2007; Rynn and Regan 2008); however, these medications take time to work and may not be appropriate based on the acuity of the child's symptoms. Although the safety and efficacy of medications other than SSRIs have not been established for pediatric anxiety disorders, other classes of medications are suggested as alternatives for use alone or in combination with SSRIs (Connolly and Bernstein 2007). To help in evaluating concerns about potential adverse events related to these medications in the medical setting, the treatment team should obtain an accurate baseline record of all physical symptoms prior to treatment. This record is used to clarify whether events may be attributable to the new medication, the child's anxiety symptoms, or symptoms related to the medical condition.

Concluding Comments

Anxiety is a particularly common experience in the medical setting for pediatric patients and their family members. When assessing and treating pediatric anxiety in these settings, the clinician needs to consider the context in which the symptoms present and the environment in which symptoms are maintained due to the strong degree of overlap between symptoms of anxiety and certain medical disorders. Anxiety symptoms may be present as part of a primary or preexisting psychological disorder, as a psychological reaction to a physical illness, or as the result of an organic etiology. In addition to the more familiar DSM-IV-TR–based anxiety disorders, medical traumatic stress has emerged as a relatively common set of symptoms. Medical conditions such as cancer, gastrointestinal disorders, heart disease, hormone-secreting tumors, stroke, pulmonary disease, seizure disorders, transplantation, traumatic brain injury, and thyroid disease may be associated with anxiety symptoms for pediatric patients. In addition, a range of medications and substances should be considered as potential contributors to anxiety symptoms presenting in the medical setting. The evaluation of anxiety in the pediatric setting should be approached in a systematic fashion that takes into account the role of preexisting primary anxiety disorders as well as anxiety symptoms arising as a result of a psychological or physiological reaction to an organic condition. Treatment of anxiety disorders in the medical setting follows many of the same principles as treatment occurring in other settings, although a brief problem-focused approach is often necessary. Strong empirical evidence supports the use of individual and group CBT for anxiety as a first-line treatment; however, patients in the inpatient medical setting often require pharmacological treatment of anxiety, at least temporarily, to help alleviate acute distress while treatment providers develop a more comprehensive approach to treating particular anxiety issues.

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8

Somatoform Disorders

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Medically unexplained physical symptoms are common in childhood. Although potentially chronic and disabling, they often do not result in referrals for psychiatric evaluation or treatment (Campo et al. 1999; Mayou et al. 2003). According to the *Diagnostic and Statistical Manual of Mental Disorders,* Fourth Edition, Text Revision (DSM-IV-TR; American Psychiatric Association 2000), somatoform disorders are characterized by the presence of one or more physical complaints for which an adequate medical explanation cannot be found. The symptoms are severe enough to cause significant distress or impairment in functioning and result in the family seeking medical help. Key features of these disorders include a temporal relationship between a stressor and symptom onset, debilitation beyond expected symptom pathophysiology, and concurrent psychiatric disorders (Garralda 1999).

Somatization is a pattern of seeking medical help for physical symptoms that cannot be fully explained by pathophysiological mechanisms but are nevertheless attributed to physical disease by the individual (Campo and Fritsch 1994; Lipowski 1988). Between 2% and 20% of children present to medical professionals with "functional" aches and pains that have no known organic cause (Goodman and McGrath 1991). Somatization has been described as the tendency to experience and express psychological distress through somatic complaints (Abbey 1996). Stoudemire (1991) suggested that somatization occurs universally in young children who have not yet developed the cognitive and linguistic skills needed to comprehend and communicate their feelings. Somatization is also common in cultures that accept physical illness but not psychological symptoms as an excuse for disability.

Community surveys of children and adolescents suggest that recurrent somatic complaints generally fall into four symptom clusters: cardiovascular, gastrointestinal, pain/weakness, and pseudoneurological (Garber et al. 1991). Large community samples have found that children commonly report recurrent complaints of headache and abdominal pain as well as fatigue and gastrointestinal symptoms (De-

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Maso and Beasley 2005). Nausea, sore muscles, back pain, blurred vision, and food intolerance are also common complaints (Garber et al. 1991). The prevalence of somatization is roughly equal among boys and girls in early childhood, but rates for females may rise in adolescence. A survey of adolescents ages 12–16 found that somatic symptoms were present in 11% of girls and 4% of boys (Silber and Pao 2003). Children and adolescents with a history of somatization are more likely to experience emotional and behavioral difficulties, be absent from school, and exhibit poor academic performance. Pediatric somatization is strongly correlated with the presence of depression and anxiety (Campo et al. 1999). About one-third to one-half of children with somatization have comorbid emotional spectrum disorders, such as depression and anxiety, usually developing after the onset of somatic complaints (Garralda 1999).

Risk Factors for Pediatric Somatization

A variety of risk factors have been associated with somatization in children and adolescents. These include genetic factors, stressful life events, personality traits and coping styles, learned complaints, family factors, and childhood physical illness.

Genetic Factors

Somatization clusters in families. This is particularly true for somatization disorder, which occurs in 10%–20% of first-degree relatives of patients with this disorder. Somatization disorders show a concordance rate of 29% in monozygotic twin studies (Kaplan et al. 1994). Rates of anxiety and depression are also higher in family members of somatizing children and adolescents, suggesting a possible genetic etiology (Fritz et al. 1997). Mothers of children who somatize are more likely to report an excess of functional abdominal pain, anxiety, depression, and other somatic symptoms and are more likely to have a history of irritable bowel syndrome, chronic fatigue, and somatoform disorder (Campo et al. 2007). A study by Marshall et al. (2007) suggests that compared with children of parents with long-term medical illness, children of parents with somatoform disorders tend to demonstrate higher levels of "problematic health cognitions," as do their parents. Some studies indicate that parental physical illness may be associated with childhood somatization (Kaplan et al. 1994).

Recent imaging studies have the potential to help explain some of the neural mechanisms involved in somatization. Functional magnetic resonance imaging studies with conversion disorder have shown decreased or absent activation in the contralateral sensorimotor cortex during sensory or motor tasks (Ghaffar et al. 2006; Vuilleumier 2005). Lower rates of cerebral glucose metabolism have also been demonstrated in patients with somatization disorder (Hakala et al. 2006). Debate continues as to whether these neuroimaging studies suggest an exclusion of sensorimotor representations from awareness through attentional processes or whether the findings might better be explained by the modulation of such representations by primary affective or stress-related factors (Vuilleumier 2005). Researchers have also proposed that serotonergic amino acids, specifically decreased plasma concentrations of tryptophan (a precursor of serotonin), or perhaps elevated plasma levels of bradykinin, may be implicated in somatization (Fukuda 2003; Rief et al. 2004).

Stressful Life Events

Stressful life events, including childhood trauma, have been associated with the development of somatization later in life (Campo and Fritsch 1994). Chronic stressors can have an effect on the body's stress response systems, such as the hypothalamic-pituitary-adrenal (HPA) axis. Although elevations of cortisol may be associated with acute stress, prolonged exposure to stress can suppress the HPA axis, resulting in the lowered cortisol levels that are associated with somatic complaints (Lackner et al. 2004). Somatoform symptoms have been linked to traumatic events experienced in both childhood and adulthood (Binzer et al. 1997; Roelofs et al. 2002). Roelofs et al. (2005) have found that the number of traumatic events an individual has experienced is associated with the number of conversion disorder symptoms exhibited. Of traumatic events experienced, those pertaining to relationship and occupational problems are most likely to trigger immediate somatic symptoms in adults (Roelofs et al. 2005). Evidence suggests that childhood traumatic events alone may not have the power to trigger somatic symptoms but rather that events experienced as an adult together with previous childhood trauma may result in heightened somatic complaints (Roelofs et al. 2005).

A high correlation has been found between sexual abuse and somatic symptoms (Brooks 1985; Campo

and Fritsch 1994). Salmon et al. (2003) showed a significant associations between sexual abuse, psychological abuse, and somatization in patients who have nonepileptic seizures. In a study of Finnish high school students, Poikolainen et al. (1995) found significant correlations between somatic symptoms and several psychosocial stressors, including family conflict, physical injury or illness in the family, breakup with a boyfriend or girlfriend, and increased parental absence. In a study of adults with hypochondriasis, Barsky et al. (1994) found that hypochondriacal adult patients recalled more conflict between parents, more traumatic childhood sexual experiences, and more victimization by violence than did a comparison group. In a study comparing 22 adults with a history of unexplained somatic symptoms with healthy controls, R.J. Brown et al. (2005) found that the former group had more reported emotional and physical abuse and that the number of unexplained symptoms correlated significantly with the severity of the abuse.

In a study of 892 adult psychiatric outpatients, Sack et al. (2007) found that compared with nontraumatized patients, sexually traumatized patients reported a significantly higher incidence of somatic complaints pertaining to pain or discomfort in sexual organs or sexual indifference. In their study of women with headache and lower back pain, Yücel et al. (2002) found that physical abuse and neglect were the most commonly reported types of childhood maltreatment.

Personality Traits and Coping Styles

Despite the recognized relationship between adverse life events and somatoform disorders, not all children who experience traumatic stress develop these disorders. Difficult temperament appears to place children at higher risk for these disorders (Tschann et al. 1996). Krishnakumar et al. (2006) found that children with conversion disorders not only had experienced more adverse life events than normal children but also scored lower on threshold of responsiveness, emotionality, and persistence. This combination of being more sensitive to change in environment, having more negative affect, and not persisting in the completion of tasks may place a child at risk for conversion disorders (Krishnakumar et al. 2006).

A negative attachment style may make patients who have experienced significant life traumas more vulnerable to the development of somatoform disorders. Evidence indicates that survivors of sexual abuse are more likely to have insecure adult attachment styles (Alexander 1993; Stalker 1995; Styron and Janoff-Bulman 1997). These early childhood experiences may lead children to develop beliefs that the self is unworthy and that support from others is unreliable. When these beliefs persist into adulthood, they may cause individuals to minimize negative affect and possibly compensate by overreporting physical complaints (Waldinger et al. 2006).

Shapiro (1996) postulated that somatization occurs in individuals who are unable to verbalize emotional distress and instead express their distress in the form of physical symptoms. Children with heightened pain and other somatic complaints have been shown to use fewer and/or less effective coping strategies (Bonner and Finney 1996; Rector and Roger 1996; Walker et al. 2001) and to report higher levels of anger (Jellesma et al. 2006; Miers et al. 2007; Rieffe et al. 2004). Introspective or internalizing personality traits, poor self-concept, and pessimistic thinking have been associated with somatization (Abbey 2005). The term *alexithymia* has been used to describe individuals with somatic concerns who do not have a verbal vocabulary to describe their moods (Stoudemire 1991).

Somatizing children and adolescents have often been described as conscientious, obsessional, sensitive, insecure, anxious, and/or high achieving (Garralda 1999). It has been postulated and is a common clinical observation that childhood physical complaints may be a result of and/or be exacerbated by an excessive concern with academic achievement (Garralda 1999).

Somatic complaints in adults have been linked to what has been termed *somatosensory amplification,* or the tendency to experience normal somatic sensations as "intense, noxious and disturbing" (Barsky et al. 1988b, p. 510). Patients with this form of somatization tend to be hypervigilant to their own bodily sensations, overreact to these sensations, and interpret them as indicating physical illness (Barsky et al. 1988b). Electroencephalographic examinations of evoked potentials suggest that somatizing patients are not able to discriminate between relevant and irrelevant physical stimuli and have an inability to habituate to repetitive stimuli (James et al. 1989).

Learned Complaints

Principles of operant conditioning suggest that behaviors that are rewarded will increase in strength or frequency, whereas behaviors that are inhibited or punished will decrease. Secondary gains, such as at-

tention and sympathy from others and/or decreased responsibilities, may reinforce somatic complaints. If somatic symptoms are reinforced early in the course of a somatoform disorder, then these behaviors are likely to continue. A child may learn the benefits of assuming the sick role and be reluctant to give up the symptoms. Increased parental attention and/or the avoidance of unpleasant school pressures may further reinforce symptoms. Social learning theory also suggests that somatic symptoms may be a result of "modeling" or "observational learning" within the family (Jamison and Walker 1992). Patients with somatoform disorders often have family members with similar physical complaints (symptom model) (DeMaso and Beasley 2005).

Family Factors

According to family systems theory, somatization may serve the function of drawing attention away from other areas of tension, such as marital conflict (Stuart and Noyes 1999). Minuchin et al. (1978) suggested that family enmeshment, overprotectiveness, rigidity, and lack of conflict resolution predisposed family members to the development of somatization. Parental overprotection has been associated with somatization and hypochondriasis (Noyes et al. 2002). Problematic parent interactions have been reported to be predictive of significant somatic complaints by children and adolescents (Borge and Nordhagen 2000; Lackner et al. 2004). R.J. Brown et al. (2005) found that patients with unexplained symptoms score lower on family cohesion and higher on ratings of conflict. Children in families with significant degrees of conflict may develop somatic complaints as a mechanism to avoid emotional expression that may potentially exacerbate familial stress.

Parental psychopathology or attitudes toward illness may foster a heightened somatic focus in their children. Children who are living with a mother who has a chronic illness, a somatoform disorder, or a history of childhood adversity appear to be at greater risk to develop a somatoform disorder. Craig et al. (2002) found that mothers with somatoform disorder appear to imprint their health concerns onto their children, making them more likely to develop emotional and behavioral problems. Parents who neglect their children emotionally but respond selectively to physical symptoms reinforce illness behavior and symptom reporting, a phenomenon that could persist into adulthood (Mechanic 1977; Parker and Lipscomb 1980; Violon 1985).

Childhood Physical Illness

Although data are mixed and retrospective, a connection appears to exist between childhood physical illness and the later development of somatization. Adults with hypochondriasis reported being sick more often as children and missing school more often for health reasons (Barsky et al. 1994). Persistent abdominal pain in childhood has also been associated with multiple adult somatic complaints (Hotopf et al. 1999). Poikolainen et al. (2000) found that approximately 66% of men and 75% of women who reported frequent adult somatic symptoms reported significant somatic concerns when in high school.

Model of Pediatric Somatization

Figure 8–1 outlines a model of pediatric somatization that details the pathways associated with the development of somatic symptoms. Physical symptoms may be generated by authentic physical illness and/or as an indirect result of psychological distress. Physical symptoms may be promoted and given more attention by the individual through the process of somatosensory amplification, described earlier in "Personality Traits and Coping Styles." In somatoform disorders, these physical symptoms are frequently reinterpreted and attributed to medical illness. Patients who have had a prior traumatic physical illness (e.g., cancer) may be particularly prone to scan their bodies for physical symptoms and interpret these symptoms, often incorrectly, as heralding recurrence of illness. This pathway continues toward clinically significant somatization and the diagnosis of somatoform disorder.

The process of somatization may be reinforced by attention from caregivers and physicians and/or avoidance of stressful situations (e.g., attending school, participating in competitive athletics) as a consequence of the illness behavior. These feedback loops may help establish a pattern of the illness behavior that persists beyond the original reason for the symptom, whether it was physiological or psychological in nature. Psychological trauma may play an important role in amplifying and fostering somatoform symptoms.

The Somatoform Disorders

DSM-IV-TR recognizes five major somatoform disorders: somatization disorder, conversion disorder,

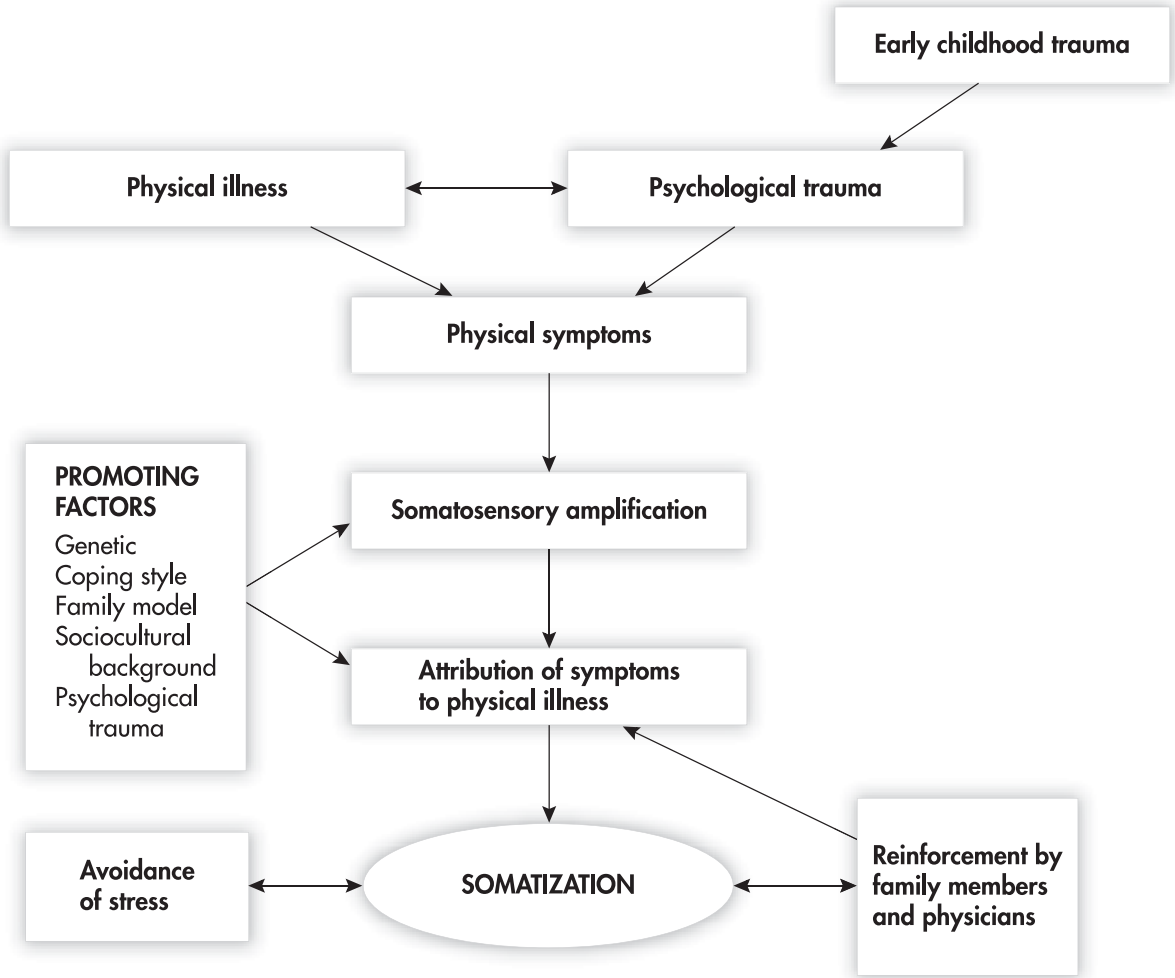

FIGURE 8–1. Developmental model of pediatric somatization.

hypochondriasis, body dysmorphic disorder, and pain disorder. Somatoform disorders should be differentiated from malingering, in which the essential feature is the intentional production of false or grossly exaggerated physical or psychological symptoms motivated by external incentives such as avoiding work, obtaining financial compensation, evading criminal prosecution, or obtaining drugs. The first four somatoform disorders are discussed in the following subsections; pediatric pain disorders are discussed in Chapter 9.

In the *International Statistical Classification of Disease and Related Health Problems,* 10th Revision (ICD-10), the World Health Organization (2006) defines the main features of somatoform disorders as "the repeated presentation of physical symptoms together with persistent requests for medical investigations, in spite of repeated negative findings and reassurances by doctors that the symptoms have no physical basis. If any physical disorders are present, they do not explain the nature and extent of the symptoms or the distress and preoccupation of the patient" (Chapter V, F45). The ICD-10 includes somatization disorder, undifferentiated somatoform disorder, hypochondriacal disorder, persistent somatoform pain disorder, and other somatoform pain disorder, all of which correlate with their DSM-IV-TR counterparts. The ICD-10 differs from DSM-IV-TR by also including somatoform autonomic dysfunction and by excluding body dysmorphic disorder, which has been hypothesized to have features more in common with obsessive-compulsive disorder.

Somatization Disorder

Definition

Somatization disorder is a chronic and debilitating illness characterized by the presence of multiple

somatic complaints that cannot be adequately explained on the basis of physical or laboratory investigations (see Table 8–1). The combination and number of pain, gastrointestinal, sexual/reproductive, and pseudoneurological symptoms required over a several-year time period and the inclusion of criteria that are appropriate only for postpubertal and/or sexually active patients mitigate against the diagnosis of somatization disorder in childhood and adolescence (DeMaso and Beasley 2005). As a result, this disorder has likely been underdiagnosed in pediatric patients, leading to suggestions for the development of revised criteria for children and adolescents (Fritz et al. 1997).

Epidemiology

The lifetime prevalence of DSM-IV-TR somatization disorder in adults is estimated to be between 0.2% and 2% for women and less than 0.2% for men (American Psychiatric Association 2000). Women with somatization disorder generally outnumber men by 5–20 times. This disorder is more commonly observed in families in which a relative has somatization disorder and in children who have been exposed to sexual abuse. Adults with this diagnosis often date the onset of their symptoms to adolescence. Surveys examining somatic complaints in childhood and adolescence have identified polysymptomatic "somatizers" (Campo and Fritsch 1994). Although Offord et al. (1987) reported that 11% of girls and 4% of boys ages 12–16 years endorsed recurrent and distressing somatic symptoms, Garber et al. (1991) found that only 1.1% of 547 school-age children met diagnostic criteria for this disorder.

Clinical Features

Somatization disorder presents with an evolving medical history of recurrent unexplained physical complaints. Symptoms in childhood commonly include headaches, fatigue, muscle aches, abdominal distress, back pain, and/or blurred vision (Garber et al. 1991). Complaints of headache and abdominal

TABLE 8–1. DSM-IV-TR diagnostic criteria for somatization disorder

A. A history of many physical complaints beginning before age 30 years that occur over a period of several years and result in treatment being sought or significant impairment in social, occupational, or other important areas of functioning.

B. Each of the following criteria must have been met, with individual symptoms occurring at any time during the course of the disturbance:

   (1) *four pain symptoms:* a history of pain related to at least four different sites or functions (e.g., head, abdomen, back, joints, extremities, chest, rectum, during menstruation, during sexual intercourse, or during urination)

   (2) *two gastrointestinal symptoms:* a history of at least two gastrointestinal symptoms other than pain (e.g., nausea, bloating, vomiting other than during pregnancy, diarrhea, or intolerance of several different foods)

   (3) *one sexual symptom:* a history of at least one sexual or reproductive symptom other than pain (e.g., sexual indifference, erectile or ejaculatory dysfunction, irregular menses, excessive menstrual bleeding, vomiting throughout pregnancy)

   (4) *one pseudoneurological symptom:* a history of at least one symptom or deficit suggesting a neurological condition not limited to pain (conversion symptoms such as impaired coordination or balance, paralysis or localized weakness, difficulty swallowing or lump in throat, aphonia, urinary retention, hallucinations, loss of touch or pain sensation, double vision, blindness, deafness, seizures; dissociative symptoms such as amnesia; or loss of consciousness other than fainting)

C. Either (1) or (2):

   (1) after appropriate investigation, each of the symptoms in Criterion B cannot be fully explained by a known general medical condition or the direct effects of a substance (e.g., a drug of abuse, a medication)

   (2) when there is a related general medical condition, the physical complaints or resulting social or occupational impairments are in excess of what would be expected from the history, physical examination, or laboratory findings

D. The symptoms are not intentionally produced or feigned (as in factitious disorder or malingering).

pain are most common among prepubertal children, whereas complaints of limb pain, fatigue, and muscle aches appear to increase in frequency with age. Specific constellations of symptoms may result in the diagnosis of syndromes such as irritable bowel syndrome, chronic fatigue, and/or fibromyalgia. Patients with somatization disorder often have a history of concurrent treatment from several physicians, which typically results in fragmented care and contradictory treatment plans, along with multiple workups for the same symptoms. Comorbid anxiety, depressive, conduct, and/or substance abuse symptoms are common.

Conversion Disorder

Definition

Conversion disorder presents as disturbances of voluntary motor or sensory function that cannot be medically explained after thorough investigation (see Table 8–2). DSM-IV-TR specifies that symptoms must be associated with psychological factors that include conflicts or other stressors that precede the development or worsening of the conversion symptom. As in other somatoform disorders, the symptom must not be consciously feigned and must produce clinically significant distress or impairment in functioning. The symptoms must be viewed as abnormal within the individual's own culture.

The term *conversion* derives from the psychoanalytical concept that the somatic symptom is the result of an unconscious resolution of a psychological conflict—commonly a sexual or aggressive impulse—in which the mind "converts" psychological distress into a physical symptom. This "self-hypnosis" acts as a defense mechanism against overwhelming stressful or traumatic events (Roelofs et al. 2002). The resulting reduction in anxiety may explain in part the phenomenon of *la belle indifference,* or the apparent lack of concern sometimes observed in patients with conversion disorder. However, *la belle indifference* is not always seen in children with conversion disorder; in fact, one study found that less than 8% of children with conversion disorder displayed this phenomenon (Spierings et al. 1990).

Primary gain is obtained by keeping the psychological conflict out of consciousness and minimizing anxiety. The symptom allows the partial expression of the forbidden wish, but in a disguised form so that the patient does not need to consciously confront the unacceptable impulse or feeling. *Secondary gain* in the form of receiving increased attention from caregivers or being excused from various pressures or responsibilities may also contribute to the development or continuation of conversion symptoms.

Epidemiology

Conversion disorder is the most common type of somatoform disorder in children and adolescents. In studies of pediatric patients, the incidence varies between 0.5% and 10% (DeMaso and Beasley 2005). Conversion disorder is three times more common in

TABLE 8–2. DSM-IV-TR diagnostic criteria for conversion disorder

A.	One or more symptoms or deficits affecting voluntary motor or sensory function that suggest a neurological or other general medical condition.
B.	Psychological factors are judged to be associated with the symptom or deficit because the initiation or exacerbation of the symptom or deficit is preceded by conflicts or other stressors.
C.	The symptom or deficit is not intentionally produced or feigned (as in factitious disorder or malingering).
D.	The symptom or deficit cannot, after appropriate investigation, be fully explained by a general medical condition, or by the direct effects of a substance, or as a culturally sanctioned behavior or experience.
E.	The symptom or deficit causes clinically significant distress or impairment in social, occupational, or other important areas of functioning or warrants medical evaluation.
F.	The symptom or deficit is not limited to pain or sexual dysfunction, does not occur exclusively during the course of somatization disorder, and is not better accounted for by another mental disorder.
Specify type of symptom or deficit:	
	With Motor Symptom or Deficit
	With Sensory Symptom or Deficit
	With Seizures or Convulsions
	With Mixed Presentation

adolescents than in preadolescents and rarely occurs in children younger than age 5 years. Females tend to outnumber males across all age groups (Spierings et al. 1990; Steinhausen et al. 1989). This disorder is more common in rural populations, among those from lower socioeconomic status, and in adolescents who are under pressure to perform in academic or athletic settings. The prevalence is also increased in individuals with histories of physical or sexual abuse.

Clinical Features

Clinical features of conversion disorder are variable but can include motor and sensory symptoms as well as loss of consciousness. In 29%–54% of children with this diagnosis, symptoms begin with mimicry of a relative or person close to the family who has an actual illness (Grattan-Smith et al. 1988; Spierings et al. 1990). *Motor symptoms* include abnormal movements, disturbances in gait, weakness, paralysis, and tremors. *Sensory symptoms* include anesthesia and paresthesia, commonly in one of the extremities, as well as deafness, blindness, and tunnel vision. Patients may also present with symptoms of *seizures,* referred to as conversion seizures, pseudoseizures, or nonepileptic seizures/events. Between 5% and 37% of patients presenting to neurologists for workup of seizures are experiencing nonepileptic events (Salmon et al. 2003).

The onset of conversion symptoms is generally acute. Individual symptoms are generally short-lived, remitting within 2 weeks in most hospitalized patients (American Psychiatric Association 2000). Good prognostic factors include sudden onset, presence of an easily identifiable stressor, good premorbid adjustment, and absence of comorbid medical or psychiatric disorders (Crimlisk et al. 1998; Lazare 1981; Speed 1996). Patients with conversion seizures have a poorer prognosis than those with paralysis or blindness. The recurrence of symptoms is not uncommon, occurring in 20%–25% of cases within 1 year (American Psychiatric Association 2000). Comorbid mood, separation, and other anxiety disorders are common. Stressful family events such as recent divorce, current marital conflict, or death of a close family member (Wyllie et al. 1999), as well as overbearing and conflict-prone parenting style (Salmon et al. 2003), are also frequently associated. Estimates of the presence of concomitant epilepsy in patients with conversion seizures vary widely, although recent data suggest that 10% of patients may have both diagnoses (Kotagal et al. 2002).

Hypochondriasis

Definition

Hypochondriasis is a preoccupation with the idea that one has or may have a serious disease despite medical reassurance. This preoccupation is based on the misinterpretation of physical symptoms or signs and is severe enough to cause clinically significant distress or functional impairment but is not of delusional intensity (American Psychiatric Association 2000). The disorder must last at least 6 months to meet DSM-IV-TR criteria (see Table 8–3). In contrast to other forms of somatization, the significance attached to various symptoms, rather than the physical symptoms themselves, produces the distress.

Epidemiology

Although hypochondriasis is believed to have its onset during adolescence, the onset of symptoms is more common in early to middle adulthood, with men and women equally affected. Therefore, few data are available regarding the incidence or prevalence of hypochondriasis in childhood. This may be due in part to the fact that children express their concerns via their parents, who are likely to be the main reporters of symptoms to medical providers. Adult prevalence rates of 4%–6% have been reported in a general clinic population (Kaplan et al. 1994).

Clinical Features

Patients with hypochondriasis tend to present with a set of core symptoms that include a fear of disease, the conviction of having a disease, and a bodily preoccupation or absorption associated with multiple somatic complaints (Folks et al. 2000). Patients often complain of a poor relationship with their physicians, have feelings of frustration and anger toward their physicians, and are prone to "doctor shopping." Patients with hypochondriasis are particularly prone to somatosensory amplification and may experience significant secondary gain as a result of their ability to adopt the sick role. Complications may arise as a result of exposure to unnecessary treatments and procedures. Adolescents may manifest subclinical forms of the disorder, such as unrealistic concerns about having AIDS or cancer (Fritz et al. 1997).

Hypochondriasis is frequently associated with anxiety disorders (Noyes 1999). Individuals with hypochondriasis have symptoms similar to those seen in obsessive-compulsive disorder (OCD) and

TABLE 8–3. DSM-IV diagnostic criteria for hypochondriasis

A. Preoccupation with fears of having, or the idea that one has, a serious disease based on the person's misinterpretation of bodily symptoms.

B. The preoccupation persists despite appropriate medical evaluation and reassurance.

C. The belief in Criterion A is not of delusional intensity (as in delusional disorder, somatic Type) and is not restricted to a circumscribed concern about appearance (as in body dysmorphic disorder).

D. The preoccupation causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

E. The duration of the disturbance is at least 6 months.

F. The preoccupation is not better accounted for by generalized anxiety disorder, obsessive-compulsive disorder, panic disorder, a major depressive episode, separation anxiety, or another somatoform disorder.

Specify if:

With Poor Insight: if, for most of the time during the current episode, the person does not recognize that the concern about having a serious illness is excessive or unreasonable

often may have a comorbid diagnosis of OCD. The lifetime prevalence of OCD in patients with hypochondriasis is 8%, compared with 2% in the general population (Barsky 1992). OCD is marked by an elevated, overvalued ideation, which in the case of hypochondriasis would be a strong disease conviction (Neziroglu et al. 2000).

Body Dysmorphic Disorder

Definition

Body dysmorphic disorder (BDD) is characterized by an excessive preoccupation with a defect in appearance. This defect either is imagined or is too minor to warrant the degree of concern and distress felt by the individual (see Table 8–4).

Epidemiology

Although childhood epidemiological data on BDD are limited, the adult prevalence of this disorder ranges from 1.9% in a nonclinical sample to 12% in a sample of psychiatric outpatients (A. Allen and Hollander 2000). Onset likely occurs most often during adolescence or early adulthood, although childhood cases have been reported. Unlike many other somatoform disorders, the ratio of men to women is nearly equal. Patients with BDD often wait a mean of 6 years before seeking treatment (Phillips 1991). Many people with the disorder do not seek psychiatric help but instead seek treatment from dermatologists and plastic surgeons, which may influence researchers' efforts to study the psychological aspects of this disorder.

Clinical Features

Although any body part or aspect of physical appearance may be a source of concern and several body parts may be involved simultaneously, concerns generally focus on the patient's face or head (e.g., size or shape of the nose, eyes, lips, teeth, or other facial features; thinning hair; excessive facial hair; acne; wrinkles; scars). Individuals may spend hours per day checking their appearance, engage in excessive grooming or exercising to minimize or erase the defect, and/or become housebound.

BDD has much in common with OCD. Both disorders are characterized by the presence of intrusive thoughts and repetitive behaviors, as well as the perseverative need to seek reassurance. According to DSM-IV-TR, however, the obsessions and compul-

TABLE 8–4. DSM-IV diagnostic criteria for body dysmorphic disorder

A. Preoccupation with an imagined defect in appearance. If a slight physical anomaly is present, the person's concern is markedly excessive.

B. The preoccupation causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

C. The preoccupation is not better accounted for by another mental disorder (e.g., dissatisfaction with body shape and size in anorexia nervosa).

sions of patients with OCD are not restricted to concerns about physical appearance. Those individuals with BDD who are successful in obtaining surgery may continue to be concerned about the perceived defect or may shift the focus of attention to other aspects of their appearance (Phillips 1991).

Substantial comorbidity exists between BDD and depression, OCD, social phobia, delusional disorder, anorexia nervosa, gender identity disorder, and narcissistic personality disorder. Kaplan et al. (1994) reported that 20% of patients with BDD have attempted suicide, whereas 22%–29% of patients with a history of child maltreatment have attempted suicide. Didie et al. (2006) found that nearly 79% of 75 subjects with BDD reported a history of childhood maltreatment, such as physical, sexual, and emotional abuse or physical neglect.

ASSESSMENT

In assessing somatoform disorders, the biological, psychiatric, and social dimensions need to be evaluated both separately and in relation to each other (Richtesmeier and Aschkenasy 1988). Assessing medical symptoms in conjunction with psychosocial factors is important so that the patient feels his or her complaints are being taken seriously (Kreipe 2006). Primary care physicians should begin by obtaining a history from the patient, focusing on the description of symptoms, and then performing a physical examination (Kreipe 2006).

Although patients with suspected somatoform disorders should have a complete and comprehensive medical workup to rule out serious medical illness, physicians should make an effort to avoid unnecessary and potentially harmful tests and procedures. Campo and Fritz (2001) noted that when somatization was presumed, the likelihood of subsequently discovering a previously undiagnosed physical disease was less than 10%. Nevertheless, certain physical illnesses are commonly overlooked and should be carefully considered as part of the diagnostic workup (see Table 8–5). Some medical conditions that may be confused with somatoform disorder include migraine syndromes, temporal lobe epilepsy, and central nervous system tumors (DeMaso and Beasley 1998). Multiple sclerosis, periodic paralysis, fibromyalgia, chronic systemic conditions, lupus, and endocrine disorders such as hypothyroidism may also be the source of symptom reporting (Spratt and DeMaso 2006). In addition, the presence of physical illness does not definitively exclude the possibility of pediatric somatization.

For patients with possible somatoform disorders, the psychiatric differential diagnosis includes mood, generalized anxiety, and panic disorder; separation anxiety; and OCD. In addition, the presence of intentionally produced symptoms is not uncommon in patients with somatization disorder. The majority of symptoms, however, are not consciously produced as in either malingering or factitious disorders.

Although somatoform disorders are not diagnoses of exclusion, they do rely on the exclusion of an organic cause for somatic complaints (De Gucht and Fischler 2002). No single element is conclusive, but psychiatric and social factors may increase the

TABLE 8–5. Selected physical illnesses to consider in the differential diagnosis of somatoform disorders

Acquired myopathies	Lyme disease
Acute intermittent porphyria	Migraine headaches
AIDS	Multiple sclerosis
Angina	Myasthenia gravis
Basal ganglia disease	Narcolepsy
Brain tumors	Optic neuritis
Cardiac arrhythmias	Periodic paralysis
Chronic systemic infections	Polymyositis
Creutzfeldt-Jakob disease	Seizure disorders
Guillian-Barré syndrome	Superior mesenteric artery syndrome
Hyperparathyroidism	Systemic lupus erythematosus
Hyperthyroidism	

likelihood of somatization (Fritz and Campo 2002). Particular factors to consider in the assessment include the presence of psychosocial stressors, comorbid depression or anxiety disorders, a history of somatization in the child or the parents, the presence of a model of illness behavior, and evidence of secondary gain resulting from the symptoms. Symptoms may not follow known physiological principles or anatomical patterns and may respond to suggestion or placebo. Often, depression and anxiety present with somatic complaints that may be mistaken for somatoform disorder (Silber and Pao 2003). The development of posttraumatic stress disorder following a traumatic event has also been associated with somatization, as demonstrated by North et al. (2004), who found that 25% of subjects who were diagnosed with posttraumatic stress disorder as a result of a major flood also developed new somatoform symptoms. Because a history of childhood sexual or physical abuse may hinder treatment for BDD, the possibility of abuse must be carefully investigated so that it may be the target of further treatment (Didie et al. 2006).

Video electroencephalographic monitoring has been increasingly used to investigate seizure disorders. The lack of electrical evidence in the face of a seizure makes pseudoseizure or conversion disorder a likely diagnosis. Drug-assisted interviews (e.g., amytal, Pentothal, methohexital) and hypnosis have been found to be useful during the assessment phase in some children and adolescents (Olson et al. 2008; Weller et al. 1985). Somatic symptoms may disappear transiently or even permanently following a drug-assisted interview.

Standardized Assessment Instruments

Psychometric instruments offer another way to assess somatic symptoms (Abbey 1996). The Minnesota Multiphasic Personality Inventory (Butcher et al. 1989) has been used to detect malingering and characterological problems in adult patients (Abbey 1996). The Children's Somatization Inventory (Walker et al. 1993), a 35-item self-report scale with child and parent versions, provides information about pediatric somatic symptoms over the 2 weeks prior to assessment (Campo and Fritz 2001). It may be used in children as young as age 7 years. Factor analysis performed on the Children's Somatization Inventory yields four factors—pseudoneurological symptoms, cardiovascular symptoms, gastrointestinal symptoms, and pain/weakness—which resemble the diagnostic categories for somatization disorder. This instrument can be complemented with the Functional Disability Inventory (Walker and Greene 1989), a 15-item scale, also with parent and child versions, which assesses functional disability over the past 2 weeks related to the child's physical health problems. The Functional Disability Inventory correlates with both school absences and somatic symptom reports (Campo and Fritz 2001).

Treatment

Although few prospective studies address prognosis, data suggest that certain types of somatization may persist from childhood into adulthood. For example, 25%–50% of adults who had recurrent abdominal pain as children continue to suffer from similar symptoms in adulthood (Campo and Fritsch 1994). BDD and hypochondriasis are thought to be chronic, unremitting illnesses. By contrast, most conversion disorders are thought to resolve within a few months of diagnosis, although symptoms may recur. Many patients will undergo spontaneous remission of their symptoms, although treatment is thought to hasten recovery and is necessary for patients with chronic or more entrenched symptoms.

Pediatric treatment outcome studies on somatoform disorders are few, with the major limitation being difficulties in participant recruitment. Limited data are available from evidence-based treatment studies, and small case series or case reports provide most of the existing data supporting treatment efficacy. Nevertheless, it is generally accepted that effective treatment of somatoform disorders in childhood needs to incorporate a number of different treatment modalities that target the factors that are believed to be associated with the development of somatization (see Figure 8–2).

Steps for effective intervention often include a de-emphasis on a final diagnosis (so as to ensure a thorough medical workup), use of benign remedies, and reinforcement of wellness (L.K. Brown et al. 1997). The identification of comorbid psychiatric disorders, such as depression and anxiety, not only allows for target interventions but also presents an opportunity for clinicians to discuss the impact of the comorbid disorders in the creation and maintenance of somatic symptoms that are more readily accepted by patients and their families (Rief et al. 2004). Comprehensive reviews of individual psychotherapy, family therapy, and psychopharmacological treatments for physically ill children can be found in Chapters 28, 29, and 30, respectively.

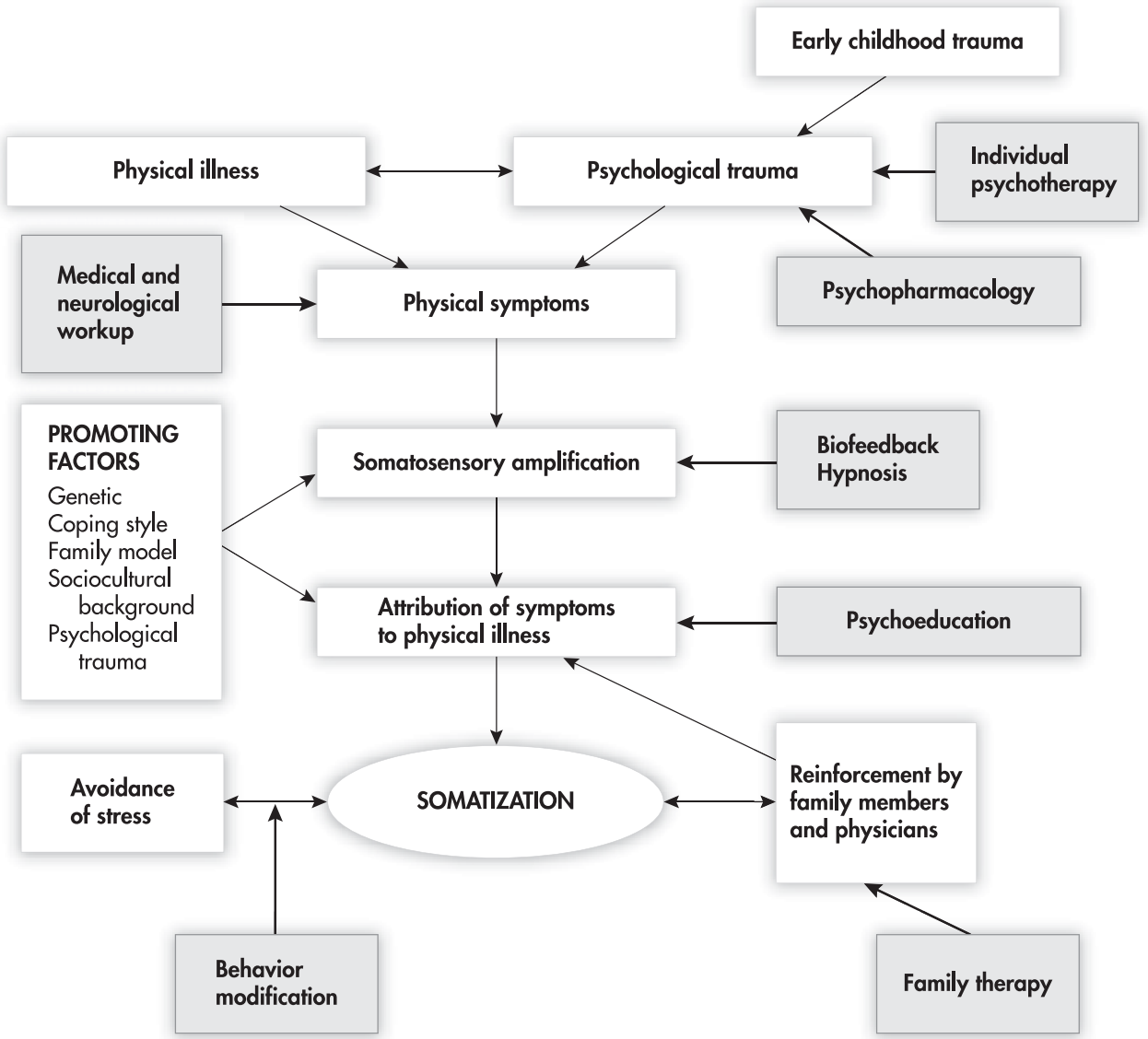

FIGURE 8–2. Treatment approaches to pediatric somatization.

Education of the Family

Education of the patient and the family about the diagnosis of a somatoform disorder begins with an informing conference between the treating physician and the family (DeMaso and Beasley 2005). In this meeting, the physician needs to present the physical and psychosocial findings to the patient and the family in a supportive and nonjudgmental manner as well as acknowledge the child's suffering and the parents' difficulties in dealing with their child's disorder. Education promotes the acceptance of a biopsychosocial treatment regimen that can help to minimize family concerns about continued physical symptoms (Fritz et al. 1997; Spratt and DeMaso 2006). Table 8–6 provides guidelines, which may be modified for other somatoform presentations, on how to inform the family about the diagnosis of pseudoseizures.

Rehabilitation Model

A rehabilitative approach may also be useful in the treatment of patients with somatoform disorders. This perspective shifts the focus away from finding a cure for symptoms and instead emphasizes a return to normal functioning (Campo and Fritz 2001). The patient becomes an active participant in his or her recovery, which means that the sick role must be relinquished. Parents must be encouraged to view their child as capable, strong, and competent rather than passive, helpless, and fragile. Suc-

TABLE 8–6. Suggested guidelines for informing conference with patient and family regarding pseudoseizures presentation

1. Present objective evidence of absence of seizure activity associated with episodes.
2. Explain the common reasons for seizure episodes (e.g., epilepsy, cardiac, and/or emotional).
3. Give the good news that the patient does not have epilepsy.
4. Cite common examples of physical phenomena such as fainting or hand sweating which may be related to emotional arousal.
5. Acknowledge the patient's suffering.
6. Acknowledge the family's concern.
7. Emphasize that the events are not under voluntary control.
8. Explain that remote and recent events may contribute to the episodes, even if the patient is not feeling stressed.
9. Emphasize the *physically* disabling nature of the events and the importance of prompt, intensive, and appropriate treatment.
Source. Chabolla et al. 1996.

cess is measured by the child's ability to return to school and to resume normal social and recreational activities rather than a primary focus on symptom reduction.

Rehabilitative treatment approaches include the use of intensive physical and occupational therapies that emphasize the recovery of function and also offer face-saving remedies for the patient. Physical therapy may be particularly helpful in restoring function in cases of conversion disorder (Abbey 2005). This approach can be combined with a behavioral modification program, with incentives for improvements in functioning while removing secondary gain for illness behavior. For patients with severe disabilities, the preferable action may be to recommend admission to an inpatient treatment or day treatment program that specializes in the treatment of somatoform disorders. Three case study reports have shown that intensive inpatient programs with behavioral modification as well as physical therapy directed by verbal cues can eliminate conversion symptoms in an average of 8 days (Ness 2007).

Individual Psychotherapy

Psychotherapy may have a role in the treatment of children with conversion disorder. Hiller et al. (2003) found that cognitive-behavioral therapy (CBT) reduced depressive symptoms, somatization, hypochondriasis, and inadequate cognitions about body and health in patients with somatoform disorder. The paucity of pediatric studies in the area is readily apparent.

The concept of psychotherapy may be introduced by informing patients that the goal of treatment initially is to help them adjust to the stress of their illness and to learn new coping strategies. In individual psychotherapy, patients are encouraged to express their underlying emotions and to develop alternative ways with which to express their feelings of distress. Individual psychotherapy can play an important role in helping change a child's erroneous cognitions about his or her ability to resume functioning. Encouragement of more adaptive coping strategies can become a focus of the therapy. Patients should benefit from exploring potential sources of stress and gaining understanding into the emotional factors that may perpetuate pain behaviors.

Because no data are available from child studies, one must look at adult studies using CBT. A review of the effectiveness of CBT revealed that 71% of 31 controlled trials in adults showed improvement in the treatment group lasting up to 12 months with as little as five CBT sessions (Kroenke and Swindle 2000). Treatment effects have been reported to last 15 months or longer when therapy is extended to 10 sessions (L.A. Allen et al. 2006).

Psychoeducation, an important component of CBT, is used to teach the individual about his or her symptoms and to help modify dysfunctional perceptions and thoughts (Hiller et al. 2003). Techniques have included efforts to assess patient illness beliefs, explain the role of selective perception in the development of illness fears, and modify misinterpretations of bodily sensations (Looper and Kirmayer 2002). Treatment studies have also incorporated

psychoeducation, progressive muscle relaxation, systematic desensitization, and cognitive strategies to correct automatic thoughts (Looper and Kirmayer 2002). Symptom-focused strategies appear to have greater benefits than general stress management.

Two randomly controlled studies of CBT with patients with hypochondriasis have shown that deliberate focus on physical symptoms, graded exposure to address avoidance behaviors, and response prevention for bodily checking may help to improve global problem severity as well as reduce anxiety and mood symptoms (Clark et al. 1998; Warwick et al. 1996). CBT involving psychoeducation on the roles of attention, attribution, and stress as well as relaxation training has been found to be effective in reducing illness fears and attitudes, somatic symptoms, and dysfunctional beliefs of patients with hypochondriasis (Avia et al. 1996; Barsky et al. 1988a). CBT has been used successfully in the treatment of recurrent abdominal pain (Sanders et al. 1989, 1994) and BDD (Butters and Cash 1987; Grant and Cash 1995; McKay 1999; Rosen and Reiter 1996; Rosen et al. 1989; Sanders et al. 1989, 1994; Veale et al. 1996).

Hypnosis

Patients with conversion disorder appear more susceptible to hypnosis than matched comparison patients with an affective disorder, with some data showing a correlation between susceptibility to hypnosis and number of conversion complaints (Roelofs et al. 2002). In this context, hypnosis has been suggested as a potential treatment intervention for hypochondriasis (Mutter and Coates 1990). Hypnosis may be useful in reducing symptoms of physiological and emotional arousal and may also be used to help distract the individual and divert attention away from physical symptoms. At a minimum, hypnosis may be useful in providing patients with a face-saving method of obtaining control over their symptoms (Maldonado and Spiegel 2000).

In a case series, significant reductions in symptoms and disability were demonstrated immediately following and 6 months after treatment using hypnosis (Moene et al. 1998). Self-hypnosis relaxation techniques such as favorite place imagery and progressive relaxation, in combination with education to increase patients' awareness of symptom origin, have also resulted in immediate improvement in symptoms such as headache, back pain, and nausea (Anbar 2008). In a study of adult outpatients with conversion disorders randomly assigned to hypnosis or a waiting list, significantly greater clinical improvement at 3 months was found with hypnosis (LaFrance and Devinsky 2004). In contrast, Moene et al. (2003) found no added benefit for hypnosis in a comprehensive treatment approach administered with or without hypnosis. Although no rigorous controlled studies support the use of hypnosis in pediatric patients, the successful use of hypnosis has been described in many uncontrolled case studies involving pediatric patients (Bloom 2001; Looper and Kirmayer 2002; Moene et al. 2003; Spinhoven 1990).

Behavior Modification

Behavior modification programs may also play a key role as part of the treatment program for somatoform disorders. Operant conditioning is used to increase the reinforcement the child receives for healthy behavior and to reduce reinforcement received for somatization (Campo and Fritsch 1994). The child should receive reinforcement for reduced complaints about symptoms and for healthy behavior, such as participation in pleasant activities when the child is symptom free. Behavior modification programs with incentives for greater functioning and decreased attention to illness behavior and symptoms may play an important role in helping break cycles of secondary gain and reinforcement. Behavioral techniques such as contingent reinforcement and relaxation appear helpful in reducing secondary gain, alleviating headache pain, and treating conversion disorders (Brugman and Newman 1993; Dickes 1974; Larsson et al. 1987; Manne et al. 1990; Speed 1996; Treischmann et al. 1970).

Family Therapy

Family therapy can be helpful in changing family members' views of a patient's physical impairment and helplessness. As they cease to see the somatizing patient as permanently or severely ill, parents and siblings may stop reinforcing illness behavior. In addition, important family stressors or dysfunctional family dynamics that are relevant in terms of the etiology of the child's symptoms may be revealed. In some cases of conversion disorder, strategic family therapy centered on symptoms such as pseudoseizures may improve symptom reporting (Griffith et al. 1989). Family therapy is designed not only to help the family support healthy functional behaviors and reduce support for pain behaviors but also to address family conflicts that may be causing stress for the child or interfering with efforts to cope with pain.

Psychopharmacology

Literature pertaining to pharmacological treatment of somatoform disorders in childhood is limited. Clinical experience suggests that mood and anxiety disorders will respond to medications even when somatization complicates the picture (Fritz et al. 1997). Although data are not available for pediatric patients, some adult studies suggest that antidepressants may be helpful with certain somatic symptoms, such as functional gastrointestinal disorders (Campo and Fritz 2001). Benzodiazepines may ameliorate distress and anxiety in anxious somatizing patients (Campo and Fritz 2001). In an open-label study of adult patients with somatoform disorders, including somatization disorder, hypochondriasis, and conversion disorder, 61% of patients experienced at least moderate improvement following a 2-week trial of treatment with fluvoxamine (Noyes et al. 1998). Selective serotonin reuptake inhibitors (SSRIs) have also been found to be helpful in the treatment of irritable bowel syndrome (Zeiter and Hyams 2002).

Hypochondriasis

Hypochondriasis is a frequent presenting symptom of other primary psychiatric disorders, such as panic disorder or depression, and in these cases is referred to as secondary hypochondriasis. Treatment of the underlying disorder frequently leads to resolution of the hypochondriacal symptoms. More recently, data have suggested that primary hypochondriasis may also be responsive to pharmacological interventions. Studies have demonstrated the efficacy of amitriptyline, clomipramine, fluvoxamine, fluoxetine, imipramine, nefazodone, paroxetine, and citalopram for adults with hypochondriasis (Fallon 2004; Fallon et al. 1996; Kellner et al. 1986; Kjernisted et al. 2002; Oosterbaan et al. 2001; Wesner and Noyes 1992). These studies have shown efficacy in patients both with and without diagnosed psychiatric comorbidity, such as depression. Data from these studies should be interpreted with some caution, because somatization symptoms frequently fluctuate in severity independent of treatment.

Body Dysmorphic Disorder

The literature includes several case reports and small open clinical trials regarding the treatment of BDD in childhood (el-Khatib and Dickey 1995; Hollander and Phillips 1993; Hollander et al. 1994; Phillips et al. 1993). SSRIs were found to be effective in reducing preoccupation with appearance and improving functioning. SSRIs used in conjunction with CBT for the treatment of BDD in children and adolescents have been helpful for symptom reduction (Albertini et al. 1996).

Concluding Comments

Although the systematic study of pediatric somatoform disorders has grown in recent years, this research remains very much in its infancy. Increasing efforts are being made to address some of the deficits in the area, as evidenced by the initiative to develop a multisite randomized prospective clinical trial of pediatric nonepileptic seizures (LaFrance et al. 2006). Developments in neuroimaging technology hold out the promise of increased understanding of the mechanisms and pathophysiology of clinical phenomena such as conversion symptoms (Ghaffar et al. 2006). Future systems of diagnostic classification may undergo several refinements as the knowledge of these disorders increases (Mayou et al. 2005). Future work will require multisite investigations using manualized treatment interventions that must be applicable to and replicable by clinicians who encounter these patients. Further studies of somatoform disorder are particularly warranted given the enormous emotional disabilities and financial costs of these illnesses (Barsky et al. 2005).

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9

Pediatric Pain

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Pain is defined by the International Association for the Study of Pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (Merskey et al. 1979, p. 249). Pain can be classified in many ways, including by location on the body, duration (acute, recurrent, chronic), intensity (mild, moderate, severe), etiology (malignant, nonmalignant), and presumed physiological mechanism (see Table 9–1). A biopsychosocial model can be used for the evaluation and treatment of all types of pain. Psychiatric consultation is most commonly requested when the pain is difficult to treat, medically unexplained, chronic, associated with unexpected levels of disability or distress, and/or comorbid with obvious psychiatric symptoms.

Epidemiology

Children and adolescents frequently report pain (Goodman and McGrath 1991; Groholt et al. 2003; Huguet and Miró 2008). In addition to injuries, prepubertal children are most likely to report only one symptom, commonly abdominal pain or headaches. As age increases, children report multiple symptoms, such as limb pain, aching muscles, fatigue, and neurological symptoms. The gender ratio for pain reports is equal in early childhood, but females become more symptomatic than males starting around the time of puberty. A higher rate of chronic pain appears to be present among lower socioeconomic groups.

Abdominal pain and headache are the most common types of chronic or recurrent pain, with 10%–30% of school-age children and adolescents reporting these pains as often as weekly (Garber et al. 1991; Tamminen et al. 1991). Prevalence rates of recurrent abdominal pain (three or more episodes of abdominal pain, over at least 3 months, severe enough to interfere with activities) vary due to inconsistent research methods but range from 9% to 25% (Apley and Naish 1958; Oster 1972; Zuckerman et al. 1987). General population-based studies suggest that recurrent abdominal pain is experienced by 10%–15% of school-age children (Apley 1975; Apley and Naish 1958) and about 20% of middle school and high school students (Hyams et al. 1996). Irritable bowel syndrome symptoms were reported by 17% of the high school students and 8% of the middle school students who reported abdominal pain (Hyams et al. 1996). The prevalence of headache in children increases from 8.3% for children under age 10 years to 17%–20% for those ages 10 and older (Groholt et al. 2003).

Symptoms of pain increase significantly in children and adolescents with injuries or medical conditions. Pain may be related to procedures and surgeries, to treatment side effects, and to underlying medical problems or injuries. For example, between 45% and 60% of pediatric cancer patients report pain (Forgeron et al. 2006; Jacob et al. 2007; Ljungman et al. 1999), although one study suggested that only 22% received analgesics (Forgeron et al. 2006). Likewise, between 40% and 86% of children with

TABLE 9–1. Pain classification

Classification system	Types	Description/common features
Duration	Acute	Sudden onset; typically declines over a short time (minutes to days). A discrete episode of pain that normally follows injury or illness and resolves as the body heals. Often associated with physical signs of autonomic nervous system activity, such as tachycardia, hypertension, diaphoresis, pupil dilation, and/or pallor.
	Recurrent	Discrete episodes of pain that are typically brief in duration with complete resolution between episodes.
	Chronic	Pain that persists on a daily basis. May or may not be associated with tissue inflammation or damage. Frequently not associated with physical signs of autonomic nervous system activity.
Presumed physiological mechanism	*Nociceptive pain:* Experienced when an injury or irritation is detected by receptors that respond to heat, cold, vibration, stretch, and chemicals released from damaged cells.	Subtypes: superficial, deep, visceral. Superficial and deep nociceptive pain is usually localized and nonradiating. Visceral pain is more diffuse over the viscera involved, poorly localized, and often referred.
	Neuropathic pain: Experienced when peripheral, autonomic, or central nervous system structures are injured, irritated, or overactive, causing dysfunction in pain signaling.	Pain may be much greater than expected given the associated injury or illness. Pain may radiate along dermatomal or peripheral nerve distributions. Described as burning and/or deep aching. May include episodes of stabbing, sharp pain. May be associated with other unpleasant abnormal sensations (e.g., numbness, tingling, burning), loss of sensory sensitivity or hypersensitivity (including a painful response to stimuli not normally painful), autonomic changes (e.g., sweating, vasomotor abnormalities), motor changes (e.g., weakness, dystonia), and/or trophic changes (e.g., skin or bone atrophy, hair loss, joint contractures).

arthritis report pain, often well after treatment has been initiated (Lovell and Walco 1989; Schanberg et al. 2003; Sherry et al. 1990). Children and adolescents under age 15 who report pain in an emergency room are significantly less likely to receive pain medication than individuals ages 15–65 years (McCaig and Nawar 2006).

Individuals who become highly distressed or disabled may also meet criteria for a somatoform pain disorder due to a preponderance of psychological factors that are thought to be relevant. Lieb et al.'s (2000) study of adolescents and young adults found pain disorder to be the most prevalent somatoform disorder in their sample (lifetime prevalence: 1.7%; 12-month prevalence: 1.3%).

Factors Related to Pain Perception and Pain Disability

Many biopsychosocial factors related to pain and pain disability have been researched. Biological processes related to pain perception include nervous system reactivity and recovery in response to stress and symptoms. Psychological processes include temperamental tendencies, such as attentional biases toward symptom-related stimuli and coping strate-

gies employed. Social factors include environmental stressors, especially chronic stress, and parental responses to children's symptom behavior. For example, children with recurrent abdominal pain exhibit hyperreactive sympathetic nervous system arousal in response to environmental stressors (hypersensitive perception of gastrointestinal stimuli and a lower threshold for pain), disrupted parasympathetic recovery from stressors, and hypervigilance to internal and external pain cues (Compas and Boyer 2001; Di Lorenzo et al. 2001; Duarte et al. 1999; Thomsen et al. 2002). Biochemical changes in the afferent neurons of the central and enteric nervous systems, influenced by cognitive processes and other sensations, are hypothesized to be related to the reduced pain threshold. In the following subsections, I review some of the factors found to influence pain perception and disability.

Past Painful Experiences

Research has provided evidence that newborns are *more* sensitive to pain than are older infants, children, and adults (Anand 1998). Repetitive or prolonged pain in the neonatal period can cause long-term changes in pain processing (including pain sensitivity) and may be related to later childhood neurodevelopmental, behavioral, and cognitive deficits (Lowery et al. 2007). Prior medical illness, physical injury, trauma, and hospitalization have all been found to be related to increased pain sensitivity. The adverse nature of prior pain experiences appears to be a more important variable than the number of past pain episodes.

Temperament

Temperament refers to inborn personality traits or the tendency to respond to and cope with stimuli in predictable ways. Examples include the inclination to approach or avoid novel stimuli and the degree of attentional focus (e.g., hypervigilance, obsessiveness, perseverative interest) given to somatic symptoms. Temperament as it relates to pain perception and disability has been examined in many different ways. A behaviorally inhibited temperament during childhood has been associated with variability in stress reactivity, a tendency to activate neural circuits that trigger distress responses to threatening stimuli, anxiety disorders, and somatic complaints (Boyce et al. 1992; Degnan and Fox 2007). Based on their research results with a group of children age 6 years with recurrent abdominal pain compared with a control group, Davison et al. (1986) hypothesized that abdominal pain represents an interaction between a vulnerable temperamental style and environmental stresses. Subsequent research has supported this hypothesis.

Campo et al. (2004) found that, compared with controls, pediatric patients with abdominal pain, ages 8–15 years, were significantly more likely to receive a diagnosis of anxiety disorders (79%) and depressive disorders (43%) and had higher levels of anxiety and depressive symptoms, temperamental harm avoidance, and functional impairment. Hyman et al. (2002) found that 50% of adolescents disabled by functional gastrointestinal disorders were described by their parents as highly organized, neat, and perfectionistic in personality. Pain sensitivity and disability have been linked with a tendency to fixate on pain and pain-related distress (Bennett-Branson and Craig 1993; Gil et al. 1991). Catastrophizing, characterized by rumination, magnification, and helplessness, has been significantly correlated with increased laboratory pain in healthy child and pediatric pain samples (Keefe et al. 2000; Piira et al. 2002; Sullivan et al. 2001; Thastum et al. 1997, 2001). In adults, anxiety sensitivity (i.e., the tendency to interpret anxiety-related bodily sensations, such as rapid heart beat, as dangerous) has been associated with anxiety disorders (Taylor 1999) and chronic pain (Asmundson et al. 1999). In one pediatric pain laboratory study, measures of anxiety sensitivity, anxiety symptoms, and anticipatory anxiety combined explained 62% of the variance in pain intensity (Tsao et al. 2007).

Perceived coping inefficacy is associated with distress, autonomic arousal, and plasma catecholamine secretion (Bandura et al. 1985). Research on children with recurrent abdominal pain reveals that accommodative coping strategies (distraction, acceptance, positive thinking, cognitive restructuring) are correlated with less pain, whereas passive coping strategies (denial, cognitive avoidance, behavioral avoidance, wishful thinking) are correlated with increased levels of pain (Thomsen et al. 2002; Walker et al. 1997). Active coping strategies (problem solving, emotional expression, emotional modulation, decision making) are inconsistent in their relationship to pain (Thomsen et al. 2002; Walker et al. 1997). Claar et al. (1999) studied self-perceived academic, social, and athletic competence as moderators between symptoms of irritable bowel syndrome and functional disability in youth with a history of recurrent abdominal pain. The relationship between

symptoms and disability was stronger at lower levels of perceived *academic* competence. The same relationship was found for females at lower levels of perceived *social* competence and for males at lower levels of perceived *athletic* competence.

Stress

Persistent stressors are thought to result in illness and symptoms due to a disturbance in the internal response systems (McEwen and Seeman 1999). Daily stress appears to be more important than major stressors in triggering episodes of abdominal pain (Walker et al. 2001). School, family, social, and illness stressors can all contribute to the development and/or exacerbation of pain. Potentially stressful common comorbid findings include anxiety disorders, alexithymia, depression, unsuspected learning disorders (even in high-achieving children), developmental or communication disorders, social problems (e.g., bullying, social perception deficits), physical or emotional trauma, family illness, and/or prominent family distress (Bursch et al. 2004; Campo et al. 1999; Egger et al. 1998; Fritz et al. 1997; Hodges et al. 1985a, 1885b; Hyman et al. 2002; Schanberg et al. 1998). Children with chronic pain experience frequent school absence (Huguet and Miró 2008; Logan et al. 2008).

Family Variables

Children look to their parents in order to assess the dangerousness of a situation and to learn how to cope with adverse situations. Parents directly impact their children's pain experiences and behavior through modeling responses to painful stimuli (Goodman and McGrath 1999). Parental behaviors of nonprocedural talk, encouragement to use coping strategies, and humor are related to decreases in child distress (Blount et al. 1989, 1990). On the other hand, parental reassurance, empathy, apologies, giving of control, and criticism are related to increases in children's distress during painful medical procedures. Some parental behaviors (discouraging children's coping efforts, providing special attention) are related to long-term distress, difficulties coping with pain, and the likelihood of developing chronic pain (e.g., Walker and Zeman 1992; Walker et al. 1993). Parental behavior has been found to account for up to 55% of variance in child distress behavior (Frank et al. 1995). Parental substance abuse, antisocial behaviors, anxiety, depression, pain-related distress, and somatization have also been shown to correlate with child symptoms.

Assessment of Pain

Measurement of Pain

Pain is measured by self-report, observational, and/or physiological measures. When possible, pain is best assessed by asking the child in pain about the location, quality, duration, frequency, and intensity of the pain. Some children, however, do not have the cognitive capacity to engage in such an assessment. In such cases, clinicians or parents can have difficulty differentiating between distress related to pain and distress related to fear or some other discomfort. Some children become adept at using distraction or withdrawal/dissociation to cope with pain and therefore might appear comfortable when they truly are not comfortable. This can present a confusing picture for clinicians who might see a child exhibiting extreme pain behaviors alternating with normal play, television viewing, or sleep. Finally, some individuals may be reluctant to report pain due to anxiety related to talking to doctors, getting an injection of pain medication, being viewed as weak or demanding, distressing others, becoming addicted to pain medication, not being able to stay awake or think clearly, or finding out they are sick or in need of going to the hospital.

Structured pain assessment tools have been developed for use with children and adolescents (see reviews by Cohen et al. 2008; Stinson et al. 2006; von Baeyer and Spagrud 2007). Table 9–2 lists examples of commonly used pain assessment tools that have good to excellent psychometric properties. The clinician should use measures that are developmentally appropriate and rate pain prospectively (in the moment) whenever possible. Because asking children or adolescents to focus on pain can exacerbate the pain, the clinician should ask them to rate pain only when necessary. For hospitalized chronic pain patients, it is acceptable to the Joint Commission on Accreditation of Health Care Organizations to refrain from pain assessment as the fifth vital sign if this instruction is incorporated into the treatment plan.

Clinical Interview

In addition to soliciting a careful description of the patient's pain, the clinical interview should review factors that are related to pain perception and disability. The Piagetian stages of cognitive development provide a helpful context for understanding a child's or adolescent's experience of pain (Gaffney et al. 2003) (see Table 9–3).

TABLE 9–2. Pain assessment tools

Type of measure	Name of measure	Description of measure
Child/adolescent self-report measures	Poker Chip Tool (Hester 1979; Hester et al. 1990)	For children ages 3–7 years. This tool, scored from 0 to 4, consists of a set of four red plastic poker chips, each reflecting a "piece of hurt." The child is asked to use the poker chips to show "how many pieces of hurt" he or she has right now.
	Faces Pain Scale–Revised (Hicks et al. 2001)	For children ages 4–16 years. This scale consists of six gender-neutral line drawings of faces depicting different intensities of pain. The child points to the face that shows how much he or she hurts.
	Visual analog scale	For ages 3 years to adulthood. A visual analog scale is a line with descriptive or numerical anchors on a continuum of pain intensity, anchored at one end by no pain (0) and at the other by worst pain imaginable (10). The child rates his or her current pain by making a mark across the line.
	Pain diaries	For children ages 6 years and older (ideal age range unknown). Pain diaries are typically used to assess recurrent or chronic pain, correlates of pain symptoms, and/or response to treatment. They might include rating scales and questions related to pain intensity, disability, perceived triggers, coping strategies used, consequences, medications used, and medication efficacy.
Parent observational (behavioral) measures	Parents' Postoperative Pain Measure (Chambers et al. 1996)	For children in acute pain who are age 1 year and older. Using the 15-item scale, parents observe and report changes from their children's usual behavior.
Clinician observational (behavioral) measures	FLACC (Merkel et al. 1997)	For children in the hospital with procedural or postoperative pain who are ages 1 year and older. Similar to the APGAR, FLACC is a 5-item scale with scores from 0 to 2 for each item—**F**ace, **L**egs, **A**ctivity, **C**ry, and **C**onsolability; item scores are combined for a total score ranging from 0 to 10.
	Children's Hospital of Eastern Ontario Pain Scale (McGrath et al. 1985)	For children in the hospital with procedural or postoperative pain who are age 1 year and older. Using the 6-item scale, raters choose a score anchored by a behavioral description of the following: crying, facial expression, verbal expression, torso position, touch, and leg position.
	COMFORT Scale (Ambuel et al. 1992)	For children in critical care who are ages 1 year and older. Distress is assessed based on the child's alertness, calmness/agitation, respiration, physical movement, blood pressure change, heart rate change, muscle tone, and facial tension.

TABLE 9–3. Piagetian stages of cognitive development and the experience of pain

Developmental stage	Typical implications related to pain
Sensorimotor (birth to about 2 years old)	Children at this stage are mostly preverbal, without capacity to create narratives to explain their experiences. They are most likely to demonstrate pain by social withdrawal or changes in patterns of sleep, eating, and level of activity. By age 18 months, most typically developing children make efforts to localize pain and seek reassurance from adults. By age 2 years, children are often able to use specific words to indicate the presence of pain.
Preoperational (about 2–7 years old)	Children at this stage use words and understand basic concepts of cause and effect. However, they tend to erroneously see events that are temporally related as causally related. They may view pain as a punishment for the real or imagined transgression of rules. They are not able to use self-generated coping strategies and tend to rely on their environment (e.g., the support of adults). They have difficulty using rating scales. They also have difficulty differentiating pain from anxiety or fear.
Concrete operational (about 7–11 years old)	Children at this stage can apply logic to their perceptions in a more integrative manner. However, the logic is literal (concrete) and allows for only one cause for an effect. Interventions that are concrete make more sense to children at this stage. For example, applying a topical anesthetic to a painful part makes more sense to them than pain relief via oral or intravenous medication. They are likely to be able to use a rating scale for pain assessment, and they have an increased ability to use self-initiated coping strategies such as distraction or guided imagery.
Formal operational (11+ years old)	Children at this stage can use abstract reasoning to discuss body systems and can conceptualize multiple causes of pain. They are potentially more aware of the psychological aspects of pain and better able to understand a biopsychosocial model. Their greater ability to focus on future events may lead to greater worries and concerns about the pain. Not all adolescents (or parents) can use abstract reasoning. Most adults engage in abstract reasoning only in areas of their own expertise, if at all. In addition, many children tend to regress in stressful situations.

For pain treatment recommendations to make sense, the clinician often needs to provide biopsychosocial pain education before, during, and/or after the assessment. The clinician should avoid the dichotomy between a medical and a psychiatric etiology for the pain, explain that all pain has biological and psychological aspects to it, and present the goal of optimal pain management by addressing all contributing factors. Providing examples of the biopsychosocial model applied to other medical conditions is sometimes helpful. To reinforce the biopsychosocial approach, medical and psychiatric evaluations should be conducted concurrently when feasible, regardless of presumed etiology for the pain.

Individuals experiencing pain have significant variations in pain sensitivity and the consequent need for analgesics. Distress and pain severity are not always linearly related among those with either acute or chronic pain. Also, pain-related disability is related to many factors in addition to pain severity and distress. Regardless of the type of pain, the following domains are helpful to assess: current pain and pain history, other physical symptoms, pain beliefs, coping strategies and consequences, physical functioning, emotional and cognitive functioning, and family functioning. For children with recurrent, uncontrolled, or chronic pain, the clinician should also carefully assess behaviors outside the hospital setting, such as social functioning and academic

functioning. Table 9–4 provides a summary of topics to cover in these domains.

Treatment of Pain and Pain Disability

Ideally, pain management recommendations follow logically from the biopsychosocial assessment and therefore address biological, psychological, and social influences on pain perception and disability. Because current pain experiences influence future pain experiences, clinicians benefit patients by making recommendations with a long-term perspective. Effective pain management can reduce anticipatory anxiety, improve future coping with pain, and reduce the likelihood of the development of pain-related traumatic stress symptoms. Therefore, approaches that will assist the child through the current pain as well as increase his or her efficacy to cope with future pain are ideal. For example, a child with cancer who learns how to effectively use visual imagery as part of a comprehensive plan to cope with lumbar punctures may successfully use this skill during future lumbar punctures as well as in other painful or distressing situations.

Many clinicians are unaware of the evidence base other than for commonly used medications. For example, some clinicians erroneously believe that a comorbid psychiatric disorder must be present for a cognitive-behavioral approach to be helpful or that medications should always be the first-line treatment. Consequently, both the consulting clinician and families may need to be educated about the evidence related to medications and other approaches. For example, meta-analyses reveal that hypnotherapy and cognitive-behavioral therapy can be more effective than medications in treating symptoms in adults with functional gastrointestinal disorders (Lackner et al. 2004; Whitehead 2006). Although less research has been done with pediatric samples, available evidence is consistent with this finding (Bursch 2008; Huertas-Ceballos et al. 2008).

Appropriate feedback is always the first intervention. Children (and their family members) should receive developmentally and situationally appropriate explanations of what to expect related to their medical condition, procedures, and treatments. Clinicians should include patients and their families in the decision making for pain control to ensure that the pain control options chosen are the most appropriate for the situation and to optimize adherence to treatment protocols. Basic comfort measures should be recommended for every patient (e.g., making alterations to the environment, considering optimal positioning, providing physical comforts, giving choice/control). Parents may require education about the evidence base and about the appropriate use of analgesia, as well as clarification regarding the risk of dependence and addiction.

Chronic pain can result in a sensitization of the nervous system, producing physiological and neuroanatomical changes. Likewise, disuse or inactivity can lead to further pain and disability. Some patients with chronic pain develop severe impairment in their level of functioning. The term *pain-associated disability syndrome* has been used to describe a downward spiral of increasing disability and pain for which acute symptom-focused treatment is not sufficient to reverse the pain and disability trajectory (Bursch et al. 2003). For such patients, a rehabilitation model of treatment is important. In some ways, this model is parallel to the rehabilitation required after orthopedic surgery. For example, progress is initially measured by changes in functioning rather than by improvements in pain. For most, pain and/or pain-related distress decreases once normal functioning is recovered. For children with pain-associated disability syndrome, normal functioning includes physical functioning as well as return to school and normal social and recreational activities. Adoption of a rehabilitation model frequently requires a large paradigm shift on the part of the patient and family, who may be fruitlessly searching for a single not-yet-discovered cause of the pain. Most have not previously heard of a fundamental disorder in pain signaling (causing pain in the absence of damaged or inflamed tissue) or think of medical problems as having multiple causes. Additionally, many believe that medications are the only legitimate treatment for pain and have not previously learned how to alter physiological functioning to impact pain and distress. Consequently, these patients and their families often require much education before treatment recommendations will make sense.

Cognitive-Behavioral Approaches

Cognitive-behavioral techniques not only have direct effects on symptoms but also promote self-efficacy by increasing the child's ability to self-manage symptoms. Although parents may need an initial explanation so as to understand how the techniques can alter physiological function to provide symptom relief, parents are often pleased to have their children learn skills that can work synergistically with

TABLE 9–4. Clinical interview topics

Pain
Description of pain: Location, quality, intensity, duration, variability, predictability, exacerbating and alleviating factors, types of pain under differing circumstances
Impact of pain: School attendance, school performance, homework, social activities, family, parents, siblings, chores, physical ability, eating, sleep
Pain beliefs: Etiology, prognosis, dangerousness, treatment approaches that will be helpful or unhelpful
Pain coping: Child's response to pain, child's ability to self-manage pain, parents' responses to child's pain, others' responses to child's pain, child's typical coping strategies and temperament
Pain history: Past hospitalizations (including premature birth), medical procedures, injuries, trauma, other significant illnesses, sensory overload, opioid use, other past treatments for pain (home remedies, alternative/complementary therapies)
Comorbid symptoms and stressors
Other physical symptoms: Other pain, sensory sensitivity, fatigue, nausea, tachycardia, sweating, shaking, shortness of breath, choking, lump in throat, chest pain, dizziness, numbness or tingling, chills, hot flashes
Psychopathology: Anxiety disorders (including separation, generalized anxiety, panic, obsessive-compulsive, phobias, posttraumatic stress), depression, complicated grief, pervasive developmental disorders
Family functioning: Parental or sibling illness, disability, psychopathology, substance abuse, chronic pain, poor coping, conflict, discipline styles
Other stressors: Academic, social, athletic, extracurricular, developmental milestones, familial, health of self or others

medications. Sometimes such techniques allow children to avoid medications and their possible side effects completely. Strategies include parent training, family interventions, psychotherapy, cognitive-behavioral therapy, relaxation, distraction, guided imagery and hypnotherapy, and biofeedback. Expertise with the techniques requires training and practice. Randomized trials provide evidence of efficacy for children and adolescents with functional abdominal pain, irritable bowel syndrome, headaches, procedural pain, and burn pain (Damen et al. 2006; Duarte et al. 2006; Hicks et al. 2006; Hoffman et al. 2008; Humphreys and Gevirtz 2000; Robins et al. 2005; Sanders et al. 1994; Stinson et al. 2008; Trautmann et al. 2006; Uman et al. 2006; Vlieger et al. 2007; Weydert et al. 2006). Preliminary research results are promising for children and adolescents with pain related to cancer, sickle cell anemia, complex regional pain syndrome, and arthritis (Lee et al. 2002; Walco et al. 1999; Wilder 2006). Following are brief descriptions of these somewhat overlapping interventions.

Parent Training and Family Therapy

Parent training and family therapy are used to facilitate acceptance of treatment recommendations, alter family patterns that exacerbate symptoms or maintain disability, instruct parents how to better tolerate distress, and develop behavioral modification plans that support the child's self-management of symptoms and independent functioning. For example, parental attention to the child's pain symptoms, such as by asking the child to rate pain, inadvertently reinforces the child's attentional focus on symptoms by encouraging him or her to scan for somatic cues. Parents need to learn how to acknowledge their child's pain but at the same time encourage the use of distraction and other active coping strategies. They must also learn how to differentiate symptoms that require rest and further medical workup from expected pain episodes (or other symptoms) that are potentially exacerbated by rest and further medical workup. Most parents require practice with these complicated instructions.

Individual Psychotherapy

Psychotherapy approaches are used to reduce somatic and psychological symptoms, improve coping and functioning, improve communication and problem solving, and reduce stress load. Cognitive-behavioral therapy is focused on achieving these goals by modifying unhelpful cognitions, assumptions, beliefs, and behaviors. Techniques might include developing a biopsychosocial view of symp-

toms; keeping a diary of symptoms and associated events, feelings, thoughts, and behaviors (to identify triggers and outcomes that could be targeted for intervention); learning relaxation and distraction techniques; questioning cognitions, assumptions, and beliefs that might be unhelpful or unrealistic and trying new ones; and gradually facing activities that previously have been avoided.

Relaxation Techniques

Relaxation techniques, such as progressive muscle relaxation and controlled breathing, alter pain perception by triggering a relaxation response (muscle relaxation, reduced heart rate and blood pressure, and improved mood). Several methods of progressive muscle relaxation are used to distract patients from their pain and to reduce pain intensity. Paradoxical reactions can occur in individuals who experience increased distress when attending to bodily sensations. For this subset of patients, distraction or imagery without body scanning is typically more effective.

Distraction Techniques

Distraction can be used to shift attention away from pain and has been shown to increase pain tolerance and decrease pain perception. Distraction techniques vary widely but include formal interventions, such as hypnotherapy, guided imagery, and use of virtual reality devices, as well as everyday distracters, such as games, TV, and school. Some distracters, including school, also improve functioning and decrease distress by helping the child gain mastery over difficult situations.

Guided Imagery and Hypnotherapy

Imagery can focus attention away from symptoms, alter sensory experiences, reduce distress, induce relaxation, reframe symptom experiences, facilitate dissociation from pain, and enhance feelings of mastery and self-control. These techniques can also be used to problem-solve (e.g., to imagine being calm during a test) and to feel a sense of accomplishment. This intervention is best for children of school age or older. "Gut-directed" hypnotherapy, which includes gut-specific treatments and suggestions, was developed for individuals with irritable bowel syndrome and digestive disorders (Vlieger et al. 2007).

Biofeedback

In biofeedback, a computer is paired with controlled breathing, relaxation, or hypnotic techniques. The computer generates a visual or auditory indicator of the child's muscle tension, peripheral skin temperature, or anal control, allowing the child to have external validation of the physiological changes he or she has produced using the techniques. Biofeedback also enhances the child's sense of mastery and control. It has been successfully used with children as young as age 6 years.

Physical/Body-Based Approaches

Although body-based approaches are typically easy for patients and families to understand as potentially beneficial, these techniques are often difficult to implement due to pain or pain-related fears (e.g., fear of causing more pain). Some body-based approaches promote self-efficacy by increasing the child's ability to self-manage symptoms and serve to prevent further pain and disability. Body-based approaches include physical therapy, transcutaneous electrical nerve stimulation (TENS), acupuncture, yoga, and massage therapy. Expertise with the techniques requires training and practice with the specific type of pain being addressed. Following are brief descriptions of these somewhat overlapping interventions.

Physical Therapy

Physical therapy focuses on improving gross and fine motor skills; balance and coordination; strength, flexibility, and endurance; posture; and cognitive and sensory processing and integration. Physical manipulations, exercise, heat, cold, electricity, and massage are used to achieve these goals. Exercise also produces generalized benefits related to improved body image, body mechanics, sleep, and mood. One randomized, controlled trial provided evidence of efficacy for youth with chronic musculoskeletal pain (Jones et al. 2007), and one yielded support for those with fibromyalgia (Stephens et al. 2008). Results from case series are promising for the use of physical therapy for complex regional pain syndrome (Sherry et al. 1999). Preliminary research has not yet consistently yielded support for youth with arthritis (Takken et al. 2008). Further research with children and adolescents is needed.

Transcutaneous Electrical Nerve Stimulation

TENS involves application of electrical current through the skin using electrodes that stimulate large afferent A nerve fibers. The technique is believed to inhibit pain transmission to the spinal cord

that ordinarily occurs via the smaller-diameter nerve fibers. TENS has been demonstrated via meta-analysis to be an effective treatment for adult chronic musculoskeletal pain (Johnson and Martinson 2007). A placebo-controlled trial provided support for TENS for children experiencing procedural pain (Lander and Fowler-Kerry 1993). Research also supports the effectiveness of TENS for pediatric dental pain (Baghdadi 1999; Modaresi et al. 1996). Published case reports (e.g., Kesler et al. 1988; Van Epps et al. 2007) have described its efficacy, including for neuropathic pain.

Acupuncture

Acupuncture involves the stimulation of anatomical points on the body using a variety of techniques, most commonly with very thin needles. This modality has generated some controversy due to questions regarding mechanisms of action and suboptimal research. One potential mechanism is the release of endogenous opioids. Preliminary research suggests efficacy for adults with postoperative pain (Sun et al. 2008). Controlled trials with childhood pain are needed. One study demonstrated feasibility and acceptability for the use of acupuncture with pediatric chronic pain patients (Zeltzer et al. 2002).

Yoga

Yoga typically combines physical postures, breathing techniques, and meditation or relaxation. It can promote relaxation, strength, balance, flexibility, and a sense of energy. Kuttner et al. (2006) performed a waitlist-controlled trial with adolescents with irritable bowel syndrome. Although this study demonstrated that yoga was beneficial for gastrointestinal symptoms and functioning, yoga did not have a significant impact on pain. Given the face validity of the intervention, as well as the observations of clinicians who recommend this modality, further research is warranted.

Massage Therapy

Massage involves manipulating the muscles and other soft tissues of the body. A meta-analysis of massage therapy research revealed that one session can reduce state anxiety, blood pressure, and heart rate but not immediate pain perception; however, multiple sessions reduced delayed pain ratings (Moyer et al. 2004). Compared to control groups, Field et al. (1997) demonstrated pain reduction in children with juvenile rheumatoid arthritis who were massaged by their parents 15 minutes a day for 30 days, and Hernandez-Reif et al. (2007) demonstrated reduced stress behaviors in infants who received three 15-minute massages each day for 5 consecutive days. Further controlled research of massage therapy with pediatric pain patients is needed.

Medication Approaches

Although some patients and families prefer to avoid medication approaches, many expect medications to manage pain. Families need to have correct information regarding the expected benefits and risks associated with medication options. The mental health consultant is in a position to provide this education within the larger context of cognitive-behavioral and body-based pain management approaches.

Mental health consultants are most frequently asked for pain medication recommendations when standard medication approaches are ineffective, when pain is considered unexplained or "psychological" by the primary team, or when pain is associated with high levels of distress or obvious psychiatric symptoms. Consequently, mental health consultants are most likely to recommend adjuvant medications and/or target comorbidities. The reader is referred to Chapter 30 for a more thorough review of psychopharmacology. Depending on the sophistication of the primary team treating an individual's pain, the mental health consultant may need to determine if first-line medications have been used appropriately.

Nociceptive Pain

Nociceptive pain is triggered when receptors detect injury or irritation. Acetaminophen, local anesthetics, nonsteroidal anti-inflammatory drugs (NSAIDs), opioids, and/or steroids are indicated for *somatic pain* (i.e., sharp localized pain caused by activation of A-delta fibers located in peripheral nerves), such as lacerations, burns, needle procedures, abrasions, and ear or skin infections. Cold packs and tactile stimulation can also be helpful. For neonates, breast milk and/or oral sucrose can be helpful for one-time injection pain (Shah et al. 2007). Intraspinal local anesthetics, NSAIDs, opioids, and/or steroids are indicated for *visceral pain* (i.e., generalized pain that can be dull or sharp, caused by activation of C fibers with deeper innervation), such as joint pain, muscle pain, kidney stones, appendicitis, or sickle cell pain. Surgical pain is typically related to activation of both A-delta and C fibers and is responsive to NSAIDs and opioids.

Antispasmodics, NSAIDs, and baclofen are used for colic or muscle spasms. Dorsal penile nerve blocks are recommended for newborn circumcision (Brady-Fryer et al. 2004).

Neuropathic Pain

For neuropathic pain, tricyclic antidepressants and anticonvulsants are first-line medications (Saarto and Wiffen 2007; Wiffen et al. 2005a, 2005b). Opioids are not well established as being useful for neuropathic pain, although some support exists for intermediate-term use (Eisenberg et al. 2006). Some individuals with neuropathic pain benefit from corticosteroids, neural blockade, or NSAIDs.

Concluding Comments

Pain can be highly distressing to children, their families, and their health care providers, particularly if the pain is of unclear etiology or if standard treatment approaches are ineffective. A biopsychosocial model can be used for the evaluation and treatment of all types of pain. Mental health clinicians are in an ideal position to conduct such evaluations, provide education related to the nature of pain and treatment options, make recommendations for pain management and comorbid symptoms, and deliver interventions to address pain and related symptoms, distress, and disability.

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10

Eating Disorders

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Pediatric psychosomatic medicine consultants often receive requests for mental health consultation with patients who have eating disorders. These are serious illnesses that present with both medical and psychiatric symptoms. Given the associated disabling morbidity and potential mortality, anorexia nervosa and bulimia nervosa cause troubling and significant distress to patients, their families, and their health care providers. Treatment requires a multidisciplinary approach with an experienced care team. In this chapter, we address the range of clinical issues typically faced by the mental health consultant when trying to assist with the assessment and management of anorexia nervosa and bulimia nervosa in the pediatric setting.

Diagnosis

In the *Diagnostic and Statistical Manual of Mental Disorders,* 4th Edition, Text Revision (DSM-IV-TR; American Psychiatric Association 2000), eating disorders are divided into three categories: anorexia nervosa, bulimia nervosa, and eating disorder not otherwise specified (see Table 10–1). In children and adolescents, the application of DSM-IV-TR anorexia nervosa diagnostic criteria is challenging for a number of reasons, including the fact that age affects the ideal body weight calculations and the ability of youngsters to verbally express their psychological symptoms. As a result, many older children and young adolescents receive a diagnosis of eating disorder not otherwise specified even though they are clinically similar to older patients meeting full anorexia nervosa diagnostic criteria. In addition, binge eating disorder is a research diagnosis included in the appendix to DSM-IV-TR (American Psychiatric Association 2000).

The diagnosis of an eating disorder can be complicated in the pediatric setting. Patients are often unable or unwilling to fully disclose their symptoms, and some patients, especially younger patients, may not have the level of abstract thinking needed to articulate the reasons they are unable to eat (Bravender et al. 2007). Even patients who are aware of the psychological processes underlying their behaviors may choose to conceal their symptoms. For those with anorexia nervosa, this strategy generally reflects the intent to protect and maintain their eating disorders, whereas for those with bulimia nervosa, it represents a profound sense of shame about their symptoms and lack of control. Eating disorders also can be confused with other psychological and physical problems that interfere with eating and weight gain or maintenance (see Table 10–2). For example, patients with a major depressive episode may present with decreased appetite and weight loss, whereas patients with obsessive-compulsive disorder may develop food preoccupations and eating rituals similar to those of patients with anorexia nervosa. To complicate the

TABLE 10–1. DSM-IV-TR diagnostic criteria for eating disorders

Anorexia nervosa	A. Refusal to maintain body weight at or above a minimally normal weight for age and height (e.g., weight loss leading to maintenance of body weight less than 85% of that expected; or failure to make expected weight gain during period of growth, leading to body weight less than 85% of that expected). B. Intense fear of gaining weight or becoming fat, even though underweight. C. Disturbance in the way in which one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight. D. In postmenarcheal females, amenorrhea, i.e., the absence of at least three consecutive menstrual cycles. (A woman is considered to have amenorrhea if her periods occur only following hormone, e.g., estrogen, administration.) *Specify* type: **Restricting Type:** during the current episode of anorexia nervosa, the person has not regularly engaged in binge-eating or purging behavior (i.e., self-induced vomiting or the misuse of laxatives, diuretics, or enemas) **Binge-Eating/Purging Type:** during the current episode of anorexia nervosa, the person has regularly engaged in binge-eating or purging behavior (i.e., self-induced vomiting or the misuse of laxatives, diuretics, or enemas)
Bulimia nervosa	A. Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following: (1) eating, in a discrete period of time (e.g., within any 2-hour period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances (2) a sense of lack of control over eating during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating) B. Recurrent inappropriate compensatory behavior in order to prevent weight gain, such as self-induced vomiting; misuse of laxatives, diuretics, enemas, or other medications; fasting; or excessive exercise. C. The binge eating and inappropriate compensatory behaviors both occur, on average, at least twice a week for 3 months. D. Self-evaluation is unduly influenced by body shape and weight. E. The disturbance does not occur exclusively during episodes of anorexia nervosa. *Specify* type: **Purging Type:** during the current episode of bulimia nervosa, the person has regularly engaged in self-induced vomiting or the misuse of laxatives, diuretics, or enemas **Nonpurging Type:** during the current episode of bulimia nervosa, the person has used other inappropriate compensatory behaviors, such as fasting or excessive exercise, but has not regularly engaged in self-induced vomiting or the misuse of laxatives, diuretics, or enemas
Eating disorder not otherwise specified	The eating disorder not otherwise specified category is for disorders of eating that do not meet the criteria for any specific eating disorder. Examples include 1. For females, all of the criteria for anorexia nervosa are met except that the individual has regular menses. 2. All of the criteria for anorexia nervosa are met except that, despite significant weight loss, the individual's current weight is in the normal range. 3. All of the criteria for bulimia nervosa are met except that the binge eating and inappropriate compensatory mechanisms occur at a frequency of less than twice a week or for a duration of less than 3 months. 4. The regular use of inappropriate compensatory behavior by an individual of normal body weight after eating small amounts of food (e.g., self-induced vomiting after the consumption of two cookies). 5. Repeatedly chewing and spitting out, but not swallowing, large amounts of food. 6. Binge-eating disorder: recurrent episodes of binge eating in the absence of the regular use of inappropriate compensatory behaviors characteristic of bulimia nervosa (see Appendix B in DSM-IV-TR for suggested research criteria).

TABLE 10–2. Differential diagnosis of the eating disorders

	Causes of weight loss or decreased intake	Causes of vomiting	Causes of bingeing
Medical causes	Gastrointestinal disorder (inflammatory bowel disease, celiac sprue, gastroesophageal reflux disease, food allergies or intolerance) Malignancy Endocrine disorder (diabetes mellitus, hyperthyroid, adrenal insufficiency) Infectious disease (tuberculosis, parasites, AIDS) Medication (stimulants)	Abdominal migraines Abdominal mass Central nervous system lesion Superior mesenteric artery syndrome Pregnancy	Hypothalamic tumor Kleine-Levin syndrome Prader-Willi syndrome Medication (e.g., corticosteroids, atypical antipsychotics)
Psychological causes	Depression Dementia Psychotic delusions about food Somatoform disorder (abdominal pain, factitious disorder) Phobia of choking or swallowing Obsessive-compulsive disorder (contamination fears) Food avoidance emotional disorder (Higgs et al. 1989) Selective eating Substance abuse	Anxiety (leading to spontaneous vomiting) Factitious disorder	Substance abuse

diagnosis further, many patients with anorexia nervosa and bulimia nervosa present with co-occurring mood and anxiety disorders.

EPIDEMIOLOGY AND CLINICAL PRESENTATION

Anorexia Nervosa

Anorexia nervosa occurs in individuals of all ethnicities and socioeconomic statuses, although the incidence is higher in industrialized Westernized countries and increases with exposure to Western culture and media. The peak age of anorexia nervosa onset is about 15 years, although some studies suggest that the onset may have a bimodal distribution with peaks at ages 14 and 18 years. With a point prevalence of 0.48%–0.7%, anorexia nervosa is a relatively common disorder in adolescent females. Although it is uncertain if the overall incidence of anorexia nervosa is increasing, the rate is definitely on the rise among adolescents (Lucas et al. 1991; van Son et al. 2006). Only 5%–10% of patients with anorexia nervosa are male, but the true incidence may be higher because males are often less likely to come to clinical attention and the current diagnostic criteria emphasize female body concerns.

The restrictive eating pattern in anorexia nervosa results in severe weight loss (or lack of appropriate weight gain during periods of growth), distorted body weight and shape perceptions, denial or minimization of the health risks of malnutrition, and loss of regular menstruation in postmenarcheal females. Anorexia nervosa may also be associated with binge eating or purging, although the restrictive eating pattern predominates, particularly in younger patients (Peebles et al. 2006). Comorbid psychiatric disorders, including anxiety disorders (especially obsessive-compulsive disorder), mood disorders, social withdrawal, and interpersonal/familial difficulties, are common. Approximately 60% of patients with anorexia nervosa have a lifetime mood disorder, whereas 35% suffer from obsessive-compulsive disorder (Kaye et al. 2004). A moderate overlap appears to exist between anorexia nervosa and symptoms of avoidant personality disorder (Casper et al. 1992).

A range of short- and long-term medical complications are related to severe malnutrition (see Table 10–3). Bradycardia, cardiac arrhythmia, hypothermia, hypotension, and orthostasis are significant

acute health issues. A life-threatening refeeding syndrome can occur if a severely malnourished patient is provided nutrition replacement too quickly. In this syndrome, the total body phosphate levels that are already depleted due to malnutrition can become dangerously low when phosphate enters the cells during refeeding, leading to possible cardiac arrhythmias and even cardiac arrest. The most worrisome long-term medical complications include growth retardation, pubertal delay/interruption, and peak bone mass reduction hypophosphatemia (Katzman 2005). Mortality rates are higher in anorexia nervosa than for any other psychiatric disorders, with the possible exception of substance abuse disorders. The aggregate mortality rate is approximately 5.6% per decade (Sullivan 1995), and the crude mortality rate is 5.1% (Herzog et al. 2000). About half of the deaths are due to physical causes (e.g., cardiac arrest), and the remainder are due to completed suicides (Zipfel et al. 2000).

Bulimia Nervosa and Binge-Eating Disorder

Bulimia nervosa has a prevalence of between 1% and 2% in adolescent and young adult women, with clinically significant bulimic binge eating behaviors (eating disorder not otherwise specified or binge-eating disorder) in an additional 2%–3% (Fairburn and Beglin 1990; Fairburn et al. 2000; Flament et al. 1995; Hoek and van Hoeken 2003). The two primary features of bulimia nervosa are 1) overvaluation of body weight and shape and 2) a pattern of eating consisting of extreme dieting punctuated by episodes of binge eating and compensatory behaviors (e.g., vomiting, laxative use) (American Psychiatric Association 2000; Fairburn and Cooper 1984; Fairburn et al. 1986a, 2000; Welch and Fairburn 1996).

Like those with anorexia nervosa, many adolescents who present with disabling binge eating symptoms do not meet full DSM-IV-TR diagnostic criteria. Nevertheless, bulimia nervosa and eating disorder not otherwise specified (or partial bulimia nervosa) are similar except in the frequency of binge and purge episodes (Crow et al. 2002). Binge-eating disorder, wherein the pattern of eating consists only of binge eating without compensatory behaviors, has been proposed as a separate class of disorders (American Psychiatric Association 2000).

Common co-occurring psychiatric diagnoses include anxiety, mood, and substance abuse disorders, as well as Cluster B personality traits or disorders (Herzog et al. 1991, 1992, 1996). Common bulimia nervosa medical complications are described in Table 10–3 (Fisher et al. 1995; Mitchell et al. 1991; Rome and Ammerman 2003; Rome et al. 2003). Although body weight is generally in the normal range, obesity is the main health risk factor associated with bulimia nervosa. Other less common consequences of bulimia nervosa include constipation, electrolyte abnormalities (particularly low potassium), and esophageal tears (Rome and Ammerman 2003).

Genetic, Neurobiological, and Neurocognitive Contributions

Genetic Factors

Genetic factors increase the risk of eating disorders. Family aggregate studies demonstrate that anorexia nervosa is familial (Lilenfeld et al. 1998; Strober et al. 2000), with genetic contributions accounting for greater than 50% of the heritable risk (Bulik 2004; Bulik et al. 2006). The basis for increased heritability risk in anorexia nervosa appears related to a harm-avoidant temperament and anxiety (Wagner et al. 2006). Familial aggregation of dietary disinhibition has demonstrated that mothers' dietary disinhibition predicted their daughters' disinhibition as well as being overweight (Cutting et al. 1999). Bouchard et al. (2004), using a genome-wide scan of 471 marks spanning 22 autosomes in a study of 660 adults, identified four quantitative trait loci for disinhibition and susceptibility to hunger. Future genetic studies may help to specify genetic risks, although the role of findings from such studies in informing treatment remains unclear.

Neurobiological Factors

A number of neurotransmitters and appetite-related neuropeptides have been identified as being abnormal in patients with eating disorders. Serotonin has been the neurotransmitter most commonly targeted for investigation, because the 5-hydroxytryptamine (5-HT) systems are known to be involved in disorders of mood, obsessiveness, appetite regulation, and impulse control. Although patients with anorexia nervosa have been found to have low levels of 5-HT metabolites in their cerebrospinal fluid and abnormal hormonal response to 5-HT–specific challenges (Kaye et al. 1991), studies of patients with bulimia nervosa suggest the inverse profile (Jimerson et al. 1992). The efficacy of selective serotonin

TABLE 10–3. Medical complications of eating disorders

	Anorexia	Bulimia
Cardiovascular	Bradycardia, hypotension, orthostasis, mitral valve prolapse, decreased left ventricular mass, poor myocardial contractility, pericardial effusion, prolonged QTc, congestive heart failure or arrhythmia due to refeeding syndrome	Bradycardia, hypotension, prolonged QTc, orthostasis, arrhythmia due to hypokalemia, cardiomyopathy due to ipecac
Endocrine/metabolic	Delayed puberty, amenorrhea, ovarian or testicular atrophy, osteoporosis, hypothermia, euthyroid sick syndrome, growth retardation, elevated cholesterol	Oligomenorrhea, amenorrhea, osteoporosis
Gastrointestinal	Delayed gastric emptying, constipation, superior mesenteric artery syndrome, pancreatitis and elevated hepatic enzymes with refeeding	Parotid and salivary gland enlargement, delayed gastric emptying, esophagitis, Mallory-Weiss tear, esophageal rupture, constipation, laxative dependence, gastric dilatation or rupture due to bingeing
Hematological	Decreased marrow production of all cell types, especially neutrophils	Anemia due to gastrointestinal bleeding
Neurological	Cerebral atrophy, cerebral edema (due to water loading), seizures, muscle weakness (due to low phosphorus), peripheral neuropathy, organic brain syndrome	
Pulmonary	Spontaneous pneumothorax due to poor tissue integrity, respiratory failure due to severe inanition or hypophosphatemia	Aspiration pneumonia, pneumomediastinum, subcutaneous emphysema
Renal/electrolytes	Hypokalemia, hypophosphatemia (due to refeeding or vomiting), hypomagnesemia, hyponatremia (due to water loading)	Hypokalemia, hypochloremic metabolic alkalosis, dehydration, fluid retention and peripheral edema on resumption of normal intake
Other	Lanugo, dry skin, brittle hair and nails, impaired thermoregulation	Dental enamel erosion, Russell's sign (abrasions on knuckles)

Source. Katzman 2005; Pomeroy 2004.

reuptake inhibitors (SSRIs) for patients with bulimia nervosa is likely related to this latter finding.

Neuroimaging studies have been conducted in patients with anorexia nervosa using positron emission tomography, single photon emission computed tomography (SPECT), and structural magnetic resonance imaging (MRI). Although findings have not been consistently replicated, several abnormal patterns appear to be related to low weight and normalize following weight gain, and some patterns persist following weight recovery. In patients with anorexia nervosa who are at low weight, SPECT studies demonstrate abnormalities in perfusion of the temporal, parietal, and frontal lobes (Rastam et al. 2001; Takano et al. 2001); the striatum (Rastam et al. 2001); and the anterior cingulate cortex (ACC) (Naruo et al. 2001). In weight-recovered patients with anorexia nervosa, hypoperfusion is seen in the parietal lobe and orbitofrontal cortex (Rastam et al. 2001). SPECT studies performed both before and after treatment suggest that hypoperfusion of the temporal lobe (I. Gordon et al. 1997) and ACC (Chowdhury et al. 2003) persists after weight restoration. Volumetric MRI studies show a correlation between decreasing ACC volume and increasing lifetime severity of anorexia nervosa in weight-recovered patients (Mühlau et al. 2007).

Functional MRI (fMRI) tasks have also been used to activate brain circuits relevant to anorexia nervosa symptoms. Neuroimaging studies using food-

relevant paradigms, such as responses to high- and low-calorie food pictures, show elevated temporal lobe activation (C.M. Gordon et al. 2001), while elevated medial prefrontal and ACC activation is found in both underweight and recovered patients with anorexia nervosa (Kurosaki et al. 2006). Tasting sucrose solution versus water decreased activation in the insula and striatum of weight-restored subjects with anorexia nervosa (Kurosaki et al. 2006). Increased striatum activation was found during a non-food-related reward processing task (Wagner et al. 2007). During tasks related to body image distortion, increased activation has been observed in the frontal and parietal lobes (Uher et al. 2005); the ACC (Audenaert et al. 2003); and the brainstem, amygdala, and fusiform gyrus (Wagner et al. 2003). In another study using body image distortion tasks, Uher et al. (2004) found decreased parietal lobe activation. Taken as a group, these studies suggest that patients with anorexia nervosa have differential brain activation in areas related to multiple cognitive functions, including visual-spatial processing, reward processing, and neural responses to food stimuli.

In fMRI studies of patients with bulimia nervosa, food craving–related signal changes have been identified in the hippocampus, insula, and caudate nucleus. These areas are believed to be involved in drug craving (Pelchat et al. 2004). In studies in which images of food are presented, fMRI scans have shown activation in the areas related to mood processing and the control and planning of behavior (i.e., the limbic system, ACC, and prefrontal cortex) in patients with bulimia nervosa, whereas activation occurs in the inferior parietal lobule and left cerebellum in healthy control subjects (Ellison et al. 1998; Uher et al. 2004, 2005). In patients with bulimia nervosa, less activation occurs in the dorsolateral region of the prefrontal cortex, an area that has been linked to inhibition. The finding that the lateral prefrontal cortex is involved in suppressing undesirable behaviors (Aron et al. 2003) suggests that diminished activity in this region may account for the loss of eating behavior control in patients with bulimia nervosa.

Neurocognitive Factors

Historically, neurocognitive impairment has been viewed as directly or indirectly related to the malnutrition of anorexia nervosa (Katzman et al. 2001) and is reversible following weight restoration. This perspective has been increasingly challenged by research that has shown impairments in cognition, emotion, and personality in both malnourished and weight-restored patients (Deep et al. 1995; Gillberg et al. 2007; Godart et al. 2002; Srinivasagam et al. 1995). Neuropsychological research has established that anorexia nervosa is associated with cognitive inflexibility (set shifting), an excessively detailed information processing style (weak central coherence), and neglect of the overall picture (gestalt) (Holliday et al. 2005; Roberts et al. 2005; Southgate et al. 2007; Steinglass et al. 2006; Tchanturia et al. 2002, 2004; Tokley and Kemps 2007). These deficits are manifest in the core anorexia nervosa psychopathology (Southgate 2005; Tchanturia et al. 2007).

Study of neurocognitive deficits in patients with bulimia nervosa has been limited. Available data suggest that central coherence, a measure of the ability to see the "big picture" and not get lost in details, displays a pattern similar for both anorexia nervosa and bulimia nervosa, but that patients with bulimia nervosa seem to have weaker central coherence (Lopez et al. 2008). Other studies suggest that compared with expected performance in a normed population, patients with bulimia nervosa have more impulsiveness and inattentiveness (Jones et al. 1991).

Psychosocial and Cultural Contributions

Sociocultural factors appear to play an important role in triggering problematic eating behaviors. People influenced by Western culture often feel considerable social pressure to be thin (Anderson-Fye and Becker 2004; Levine and Harrison 2004). This pressure is often enhanced by media, in which "thinness" is presented as the ideal representation of beauty. In contrast, cultures that value "plumpness" tend to have lower rates of eating disorders. However, after these groups have been exposed to Western ideals and media, they have been found to have increasing rates of eating disorders. For example, rates of eating disorders increased in ethnic Fijian adolescent girls following novel exposure to the Western aesthetic ideal via television after it was first introduced in the mid-1990s (Becker et al. 2002). Although males historically have experienced less pressure to be thin, stereotypes of the ideal male body have also changed in recent years, with male action figures becoming increasingly lean and muscular, with shapes that are as unattainable a model for males as the Barbie doll shape is for females (Pope et al. 1999).

Psychosocial stressors may trigger the onset of anorexia nervosa symptoms. The stressor may be a significant loss (e.g., death of a much-loved grandparent, parental divorce) or a major change (e.g., moving to a new home, starting high school or college). A history of sexual or physical abuse has been found to be a nonspecific risk factor (Neumark-Sztainer et al. 2000). However, apparently less significant stressors (e.g., being teased, being called fat by a sibling or peer, being told by a well-intentioned and obesity-conscious pediatrician to lose weight) also can precede the development of anorexia nervosa. Although much emphasis is often placed on identifying these stressors, their specific relationship to the onset and resolution of anorexia nervosa remains unclear and often idiosyncratic to the individual patient.

Researchers have long suggested that family relationships, processes, and attitudes may contribute to the development of both anorexia nervosa and bulimia nervosa. Families of patients with anorexia nervosa have been commonly described as inhibited, conflict avoidant, and overly controlling. In contrast, families dealing with bulimia nervosa have been characterized as chaotic, conflictual, and undercontrolled. Data supporting these claims are largely correlational in nature, making it difficult to determine whether what is described is a result of the disorder or a precipitant. Nevertheless, familial attitudes about food, dieting, and appearance have been shown to affect the development of anorexia nervosa (Woodside et al. 2002).

Psychological and Developmental Contributions

Eating disorders emerge most commonly during adolescence. Whereas anorexia nervosa tends to present earlier in adolescence, bulimia nervosa generally occurs in late adolescence. Some studies have suggested a trend over time for both disorders to occur at earlier ages (van Son et al. 2006). Adolescence is a vulnerable time in terms of physical, cognitive, and social development, and pubertal changes may trigger heightened anxiety that may contribute to anorexia nervosa.

Crisp (1997) speculated that anorexia nervosa is an attempt to avoid the developmental challenges of adolescence, because anorexia nervosa symptoms can at least temporarily circumvent the necessity of facing these challenges. For example, extreme weight loss can prevent the onset of puberty or in physically mature adolescents return the body to a preadolescent state. Similarly, preoccupations about weight and dieting to a large extent preclude social relations and are accompanied by a retreat into the family. The onset of puberty brings additional body weight and body fat composition changes. In vulnerable adolescents, concerns about being physically thin to be attractive are significantly accentuated. In general, the adolescent with bulimia nervosa desires to be thin and attractive for others, whereas the adolescent with anorexia nervosa desires to be thin as an end unto itself.

Perfectionism is a common characteristic of patients with anorexia nervosa (Halmi et al. 2000). These individuals tend to be school overachievers even though they are no more intelligent on average than their peers (Bryant-Waugh and Lask 1995). Unfortunately, the drive to an unattainable state of perfection may result in feelings of poor self-esteem and decreased self-efficacy (Forsberg and Lock 2006). Obsessionality, a sense of ineffectiveness, rigidity, and harm avoidance are other personality features that are common in patients with anorexia nervosa (Klump et al. 2000). In contrast, adolescents with bulimia nervosa are frequently noted to have interpersonal instability, Cluster B personality traits, and impulsiveness.

Assessment

The patient with a suspected eating disorder requires comprehensive psychiatric and medical assessments. These evaluations are frequently best performed in the context of a multidisciplinary treatment approach.

Psychiatric Assessment

The psychiatric assessment must include particular attention to symptoms of restricting, purging, binge eating, and exercising, as well as feelings about shape and weight. Anxiety and compulsive behavior around food and weight require investigation. The presence of depressed mood, anhedonia, insomnia, decreased energy, and flattened affect must be explored given their associations with malnutrition (Franklin et al. 1948; Keys et al. 1950). Noting the time of onset of depression symptoms relative to disordered eating symptoms is important to help differentiate a primary depressive disorder from an eating disorder.

Because patients frequently minimize or deny their symptoms, the consultant needs to obtain in-

formation from the family as well as the patient. Caretakers should be questioned about the patient's eating behavior and about any adverse or distorted comments about weight or body that the patient may have made in the past. The types of food the patient avoids can be a useful clue; those who avoid high-calorie or high-fat foods are more likely to have an eating disorder. Although the diagnosis of an eating disorder cannot always be definitively ruled in or out based on a single evaluation, direct observation of the patient's eating behavior over the course of an inpatient medical admission or during outpatient treatment will generally clarify the diagnosis.

Multiple standardized assessment instruments for eating disorders are available. They include the Eating Disorder Examination (Z. Cooper and Fairburn 1987), Eating Disorder Inventory–2 (Garner 1991), and Eating Attitudes Test (Garner and Garfield 1979; Garner et al. 1982).

Medical Assessment

A medical evaluation is necessary to examine the physical effects of the patient's food restriction and to rule out alternative or contributory causes of vomiting or weight loss (Rome et al. 2003). In the hospital, the patient should be weighed after voiding and while wearing a hospital gown. In addition to routine vital signs, orthostatic blood pressure and pulse should be obtained. The assessment should include baseline electrocardiogram and laboratory studies (see Table 10–4). Bone densitometry should be obtained in patients at high risk for bone loss (i.e., those with 6 months or more of amenorrhea or significant eating disorder symptoms) (American Psychiatric Association 2006; Rome and Ammerman 2003). Evaluation by a dietician is important in determining the patient's caloric and nutritional needs while identifying specific nutritional deficiencies and developing an individualized nutritional rehabilitation plan.

Assessment of Level of Care

During the assessment process, the consultant needs to determine the appropriate level or intensity of care, which may include routine outpatient care, intensive outpatient care, day treatment, partial hospitalization, residential treatment, inpatient psychiatric hospitalization, and/or medical hospitalization. Although evidence about the effectiveness of inpatient and residential care is limited, existing studies have failed to demonstrate long-term benefits despite the increased intensity of treatment and costs (Crisp et al. 1991; Gowers et al. 2007). Nonetheless, patients who are physically and emotionally unstable generally require intensive psychiatric intervention for stabilization. Suggested criteria for medical and psychiatric hospitalizations are listed in Table 10–5.

Inpatient Treatment

Medical Stabilization

Inpatient hospitalization is indicated for patients who have signs of medical instability. Because few specialized eating disorder units exist in the United States, most medically unstable patients are hospitalized on general medical or pediatric units. Specialized eating disorder units have the advantage of staff experienced in treating these illnesses, accompanied by a milieu structured to help patients eat and gain weight. However, one disadvantage of specialized units is that patients may learn new maladaptive eating behaviors from other patients or become identified with having an eating disorder (Honig and Sharman 2000). Although the current clinical opinion is that specialized inpatient treatment is superior to treatment on a general medical or pediatric unit, no convincing research data support this contention (Gowers et al. 2007).

Refeeding and Nutrition

Managing meals and eating behaviors during an inpatient medical admission presents many challenges. Unlike specialized units, general medical or psychiatric units often do not have an established treatment program for patients with eating disorders. To complicate matters further, patients admitted for medical complications of their malnutrition may be at significant risk for refeeding syndrome (Katzman 2005).

To effectively minimize such risks, staff need to closely monitor the patient's fluids and electrolytes. A dietician should provide input on the meal content and structure, which are usually divided into three meals and two or three snacks each day. Although the patient's regular food preferences should be considered, meals should be well balanced and varied. Liquid nutritional supplements such as Boost or Ensure can be used if the risk of refeeding syndrome is high. However, because the goal is for the patient to return to normal eating, regular food is preferred. Patients are expected to eat all pre-

TABLE 10–4. Screening laboratory studies for patients with eating disorders

Amylase	Fatty acid ratio
Blood chemistry panel	Luteinizing hormone, follicle-stimulating hormone, prolactin, estradiol
Bilirubin, aspartate aminotransferase:alanine aminotransferase ratio, alkaline phosphatase, gamma-glutamyl transpeptidase, lactate dehydrogenase	Thyroid-stimulating hormone, free thyroxine (T_4), total triiodothyronine (T_3)
Calcium, magnesium, phosphate	Urinalysis
Complete blood count with differential	Urine pregnancy test
Erythrocyte sedimentation rate	Urine toxicity screen
	Vitamin D

scribed food portions, although liquid nutrition may be substituted if portions are refused. Patients should be supervised during all meals to ensure that food is consumed and for 1–2 hours after meals if purging is suspected. Families can be used to supervise meals if they understand the above guidelines. Staff and families need to be empathetic with the patient's anxiety around food while being firm and consistent about the need to eat (Honig and Sharman 2000).

Nasogastric (NG) tube feeding can be used for patients who are unable to take in the required minimum amount of nutrition. NG tube feeding should be a last resort, not only because it may be traumatic for patients but also because it does not allow patients to practice confronting the anxiety associated with eating. In addition, some patients become dependent on NG tube feeding. In such cases, the weight gain achieved with NG feeding is generally quickly lost following discharge from the hospital. Total parenteral nutrition is not usually required in the treatment of an eating disorder unless the patient has an accompanying general medical condition requiring treatment (American Psychiatric Association 2006).

Malnutrition can cause delayed gastrointestinal transit, leading patients to experience abdominal pain, bloating, and constipation during the refeeding process. A warm pack to the abdomen can be helpful, as can relaxation techniques such as deep breathing, guided imagery, biofeedback, or hypnosis. If necessary, stool softeners, promotility agents, and/or mild laxatives can also be used (American Psychiatric Association 2006).

TABLE 10–5. Suggested indications for medical and psychiatric hospitalization

Medical hospitalization	Psychiatric hospitalization
Severe malnutrition (i.e., weight ≤75% average body weight for age, sex, and height)	Failure of outpatient treatment
Dehydration	Uncontrollable bingeing and purging
Electrolyte disturbance (e.g., hypokalemia, hyponatremia, hypophosphatemia)	Acute psychiatric emergencies (e.g., suicidal ideation, acute psychosis)
Cardiac dysrhythmia	Comorbid diagnosis interfering with the treatment of the eating disorder
Acute food refusal	
Vital sign instability: Heart rate <50 bpm daytime; <45 bpm at night Hypotension <80/50 mm Hg Hypothermia <96°F Orthostatic change in pulse >20 bpm or blood pressure >10 mm Hg	
Acute medical complications of malnutrition (e.g., syncope, seizures, cardiac failure, pancreatitis)	

Source. Reprinted from Golden NH, Katzman DK, Kreipe RE, et al: "Eating Disorders in Adolescents: Position Paper of the Society for Adolescent Medicine." *Journal of Adolescent Health* 33:496–503, 2003. Copyright 2003, The Society for Adolescent Medicine. Used with permission.

Inpatient Management

Patients who have been restricting food usually experience anxiety at being made to eat and gain weight. They may have distorted ideas about how much weight they have gained in the hospital. Informing patients about their weight may be helpful for some patients but anxiety provoking for others. Although allowing patients to express their distress to the treatment team may be helpful, permitting patients to perseverate about the details of food intake and weight is generally not useful (Honig and Sharman 2000). The treatment team should make efforts to avoid power struggles with patients while clearly communicating that the team will not give up or allow any patient to die (American Psychiatric Association 2006). As noted before, denial or minimization of the seriousness of the illness is a classic feature in anorexia nervosa. Although attempts can be made during the hospitalization to challenge the patient's denial, overcoming this defense is usually a long-term process that is not accomplished in the acute inpatient hospital setting. Therefore, the treatment team needs to educate the family about the critical importance of an integrated outpatient psychiatry and medical follow-up program after discharge.

Residential Treatment

Residential treatment programs may be useful when caretakers are exhausted from fighting the eating disorder, when patients are unable to break the cycle of maladaptive eating behaviors, or when the home environment significantly impedes recovery. However, no systematic studies to date have demonstrated the effectiveness of these programs. Problems associated with residential treatment in the United States include the cost and difficulties with insurance reimbursement (Frisch et al. 2006).

Outpatient Treatment

Patients with eating disorders require collaborative and integrated outpatient treatment programs that include, at a minimum, a mental health clinician and a primary care clinician. Ideally, both clinicians will be experienced in management of eating disorders. Identifying an appropriate mental health clinician with expertise in the treatment of pediatric patients with eating disorders may be challenging.[1] The primary care clinician is needed to monitor patients for medical complications. A psychiatrist may also be needed if patients require treatment with psychotropic medications. A dietician experienced in eating disorders may be helpful in determining nutritional needs, although giving dietary advice alone has been found to be an inadequate treatment option (Hall and Crisp 1987; Pike et al. 2004).

In some areas of the country, more intensive outpatient treatment options (e.g., intensive outpatient, day treatment, or partial hospital programs) are available as a transition between inpatient hospitalization and outpatient treatment. Although no current empirical data are available to support the benefits of these programs, they appear useful for patients whose families are unable to provide support and monitoring of meals in the home.

Psychotherapy and Family Treatment Approaches for Adolescent Anorexia Nervosa

Psychodynamic and family-based therapies are the two main approaches proposed for treatment of adolescent anorexia nervosa. Psychodynamic individual therapies focus on changing the individual by increasing self-esteem, self-efficacy, and self-worth. Family-based therapy aims to promote parental control of eating and weight while supporting adolescent development in the family context (Lock 2001; Steiner and Lock 1998).

Individual Psychodynamic Therapy

As formulated by Crisp et al. (1991), individual psychodynamic therapy aims at maturational issues associated with puberty and adolescence. In two trials of this modality, substantial improvements in patient groups (including adolescents and adults) were found in both medical/nutritional recovery and psychological functioning (Crisp et al. 1991; Hall and Crisp 1987). In 1999, Robin et al. used ego-oriented individual therapy, a manualized form of individual psychodynamic therapy, in a small randomized clinical trial (RCT) comparing individual therapy and family therapy (described in the following section). Ego-oriented individual therapy devised for adolescents posits that individuals with anorexia nervosa

[1] The following Web sites provide therapist directories as well as information about more intensive treatment centers: http://www.EDReferral.com and http://www.gurze.com.

manifest ego deficits and confuse control with biological needs. Anorexia nervosa represents a disruption in normal ego development. To recover, patients must develop sufficient self-efficacy to successfully separate and individuate from their family of origin. To develop better self-efficacy, patients must first learn to identify and define their emotions, and later to tolerate negative emotions.

Family-Based Therapy

Family therapy has been a treatment mainstay for adolescents, but only one model of family treatment has been systematically studied. Maudsley Hospital's family-based treatment (FBT) has been the subject of five RCTs (Eisler et al. 2000; Le Grange et al. 1992; Lock et al. 2005; Robin et al. 1999; Russell et al. 1987). Although these trials are relatively small, they represent the entire evidence-based literature available to date for psychosocial treatments of adolescents with anorexia nervosa (see Table 10–6). Designed to empower parents to help restore their child's weight outside of the hospital, FBT has consistently demonstrated short- and long-term positive outcomes. Britain's National Institute for Health and Clinical Excellence (2004) considers FBT the treatment of choice for adolescents suffering from anorexia nervosa.

Psychotherapy and Family Treatment Approaches for Bulimia Nervosa

To date, systematic research in the treatment of bulimia nervosa has focused on adults. Significant progress has been made in understanding a range of efficacious treatments for adults with bulimia nervosa, including cognitive-behavioral therapy (CBT), interpersonal therapy, and antidepressant medications. In the largest clinical trial of psychological treatments for bulimia nervosa to date (N=220), the mean age of participants was 28.1 (SD=7.2) years (Agras et al. 2000). In research studies of these treatment approaches, the average age of participants was 28.4 years, the duration of the disorder was approximately 10 years (Agras et al. 1992, 2000; Fairburn et al. 1986b; Wilson et al. 1991), and the cutoff age for entry was 18 years. Hence, the existing studies do not provide evidence about the effectiveness of CBT for adolescents with bulimia nervosa. Despite the fact that binge eating, purging, and many cases of bulimia nervosa begin during adolescence (Herzog et al. 1991; Lock et al. 2001b; Mussell et al. 1995; Stice and Agras 1998), the treatment of bulimia nervosa in adolescents has not been studied other than for CBT case series (Lock 2005; Schapman-Williams et al. 2006) and two recent RCTs (Le Grange et al. 2007; Schmidt et al. 2007).

Cognitive-Behavioral Therapy

The cognitive-behavioral model of bulimia nervosa assumes that the main factors involved in illness maintenance are dysfunctional attitudes toward body shape and weight. Such attitudes lead to an overvaluation of thinness, bodily dissatisfaction, and attempts to control shape and weight by excessive dieting. This restrictive pattern results in both psychological and physiological deprivation, often

TABLE 10–6. Outpatient family psychotherapy treatment trials for anorexia nervosa

Study	Treatment type	*N*	Age (mean)	Outcomes[a]
Russell et al. 1987	Family therapy or individual therapy	21	15.3	Family therapy = 90% Individual therapy = 18% $P<0.02$
Le Grange et al. 1992	Conjoint family therapy or separated family therapy	18	15.3	68% overall; no differences between groups
Robin et al. 1999	Family therapy or individual therapy	37	13.9	Family therapy = 94% Individual therapy = 65% $P<0.05$
Eisler et al. 2000	Conjoint family therapy or separated family therapy	40	15.5	63% overall; no differences between groups
Lock et al. 2005	Low-dose (short-term) or high-dose (long-term) family therapy	86	15.1	No differences overall: 95%

[a]A rating of *good* or *intermediate* on Morgan-Russell Outcome Scale (Morgan and Russell 1988) (>85% ideal body weight and/or menstrual return).

associated with negative mood. As a result of the dietary restriction, hunger is increased, leading to an increased probability of binge eating, particularly in the presence of negative mood. Because binge eating raises concerns about weight and shape, it is eventually followed by purging as an attempt to compensate for calories consumed during the binge (Apple and Agras 1997; Fairburn 1981).

CBT has been tested in numerous controlled adult studies and has been found to be the most effective psychotherapeutic approach to bulimia nervosa. CBT has been found more effective than other interventions, including no therapy, nondirective therapy, pill placebo, manualized psychodynamic therapy (supportive-expressive), stress management, and antidepressant treatment (Agras et al. 1989, 1992, 1994, 1997, 2000; Barlow et al. 1988; P.J. Cooper and Steere 1995; Fairburn et al. 1993; Leitenberg et al. 1994; Mitchell 1991; Pope et al. 1983; Walsh and Devlin 1995; Wilfley et al. 1993). Among adults with bulimia nervosa completing CBT, between 30% and 40% were abstinent, and another 20% were much improved (Fairburn et al. 2000). Fairburn et al. (1995) followed patients with bulimia nervosa treated with CBT for 5 years posttreatment. After 5 years, nearly 60% had no eating disorder, and another 20% had a subclinical disorder; the remainder were unrecovered, with a small percentage diagnosed as having anorexia nervosa. Hence, relapse rates for the successfully treated patients appear to be low and the benefits long lasting.

Two case series of adolescents with bulimia nervosa treated with CBT have been published (Lock 2005; Schapman-Williams et al. 2006). The following CBT modifications were made for adolescents: 1) increased contact between the therapist and the adolescent in early treatment to promote therapeutic alliance, 2) involvement of parents in supporting treatment, 3) use of concrete examples to illustrate points, and 4) exploration of adolescent developmental issues (e.g., autonomy concerns) in the context of bulimia nervosa. These studies provide preliminary evidence that CBT is acceptable and feasible as a treatment for adolescents with bulimia nervosa. The abstinence rates were about 56%, and the improvement in binge-purge rates was 78%. Lock (2005) also noted major declines in reports of eating-related psychopathology on the Eating Disorder Examination.

In one RCT, Schmidt et al. (2007) compared cognitive-behavioral guided self-care with family therapy. Results suggest that the guided self-care is an acceptable and feasible treatment for adolescents. The authors reported a 29% treatment dropout rate and a 36% abstinence rate (from both binge eating and purging) at the end of the 12-month treatment period. These findings are similar to rates found in adult studies of CBT (Mitchell et al. 2007).

Family-Based Treatment for Adolescent Bulimia Nervosa

The family-based treatment model for adolescent bulimia nervosa (FBT-BN) is derived from the Maudsley Hospital's family-based treatment for adolescents with anorexia nervosa (Eisler et al. 1997; Lock et al. 2001a, 2005; Russell et al. 1987). FBT-BN assumes that the secrecy, shame, and dysfunctional bulimia nervosa eating patterns have negatively affected an adolescent's development and confused and disempowered parents and other family members. Further disabling the family is parental guilt related to having possibly caused the illness and anxiety about how best to proceed. Le Grange et al. (2007) completed an RCT wherein 80 adolescents with bulimia nervosa, ages 12–19 years (M=16.1, SD=1.6), were allocated either to manualized FBT-BN or to manualized individual supportive psychotherapy. The authors found a statistically significant difference favoring FBT-BN over supportive psychotherapy in terms of abstinence at the end of treatment and at 6-month follow-up.

Psychopharmacological Treatment Approaches for Eating Disorders

Anorexia Nervosa

No RCTs have been done comparing psychopharmacological agents for the treatment of adolescents with anorexia nervosa. In fact, few substantive trials of medications used to treat anorexia nervosa for any age group have been reported, because preliminary pilot data have not been promising enough to warrant further larger studies (Attia et al. 2001).

Antipsychotics have been examined in treating anorexia nervosa, and of these, the newer atypical types appear more promising. Olanzapine has led to significant reductions in anxiety, difficulty eating, and other maladaptive eating-related symptoms, as well as greater weight gain in some case series data (La Via et al. 2000; Malina et al. 2003; McConaha et al. 2004; Powers et al. 2002). One small pilot RCT

found that olanzapine reduced ruminative anorectic cognitions (Mondraty et al. 2005). Similar improvements with risperidone have been reported in case studies and case series data (Beato Fernández and Rodríquez Cano 2005; Newman-Toker 2000). The reports regarding the use of atypical antipsychotics in adolescents suggest that these medications are well tolerated and contribute positively to weight gain and reduced agitation (Boachie et al. 2003; Ercan et al. 2003; Fisman et al. 1996; Mehler et al. 2001).

Although Kaye (1991) suggested that fluoxetine may help with anorexia nervosa relapse prevention in adults, more recent work has not confirmed this finding (Walsh et al. 2006a). The SSRIs may be useful for co-occurring emotional disorders, including anxiety and mood disorders, which occur in 25%–35% of patients. The SSRIs may also be useful for treating obsessive and compulsive features related to eating and weight concerns, which were identified as a moderator in a recent anorexia nervosa treatment study (Lock et al. 2005).

Bulimia Nervosa

A series of double-blind, placebo-controlled trials of antidepressants has been conducted in adults with bulimia nervosa (Agras and McCann 1987; Agras et al. 1992; Walsh 1991; Walsh et al. 1991, 1997). In almost all of these trials, most types of antidepressants have proven superior to placebo in reducing binge frequency. Mood disturbance and preoccupation with body shape and weight have also shown greater improvement with medication than with placebo (Mitchell et al. 1993b). In several controlled studies, the relative and combined effectiveness of CBT and antidepressant drug treatment have been directly evaluated (Agras et al. 1992; Leitenberg et al. 1994; Mitchell et al. 1993a, 1993b; Walsh et al. 1997). Although antidepressant medications have been shown to be more effective than placebo in reducing bulimia nervosa symptoms, when added to psychological treatments (e.g., CBT or interpersonal therapy), medications did not improve the outcomes of core eating-related symptoms (Pope et al. 1983; Walsh et al. 1997, 2006b). Based on one small case series (10 subjects), Kotler et al. (2003) reported that fluoxetine was well tolerated in adolescents in the context of psychotherapy; however, its effectiveness is unknown in this age group. Overall, the data suggest that the use of antidepressants in adults with bulimia nervosa, although useful, offers only marginal advantage over psychosocial treatments alone.

Concluding Comments

Eating disorders and their commonly associated medical problems frequently bring patients to the attention of pediatric psychosomatic medicine services. Brief mental health consultations should focus on clarifying the diagnosis, identifying relevant psychiatric comorbidity, assisting with management in the acute medical or psychiatric setting, and referring patients to specialized centers for follow-up care. For adolescents, family therapy is currently the best-studied treatment, although data support the use of individual approaches, in particular that of CBT for bulimia nervosa. Medications studied to date appear to be of limited utility for the primary symptoms of eating disorders, especially for adolescents. Mental health consultants should be particularly aware of the relative medical fragility of underweight adolescents with eating disorders and be knowledgeable of the behavioral and mental health interventions that are useful during inpatient admissions.

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11

Pediatric Feeding Disorders

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Feeding is an essential and complex behavior involving biological and social processes (American Academy of Pediatrics 1988). When this process is disrupted, serious consequences can result and intervention may be necessary (Manikam and Perman 2000). Pediatric feeding disorders are common, occurring in 25%–45% of healthy children and up to 80% of children with developmental disabilities (Linscheid et al. 2003). The category of feeding disorders encompasses a heterogeneous group of presenting problems ranging from problematic picky eating (Dovey et al. 2008) to complete refusal or inability to take in food by mouth. Severe feeding disorders, which typically require intensive medical and behavioral treatment, are estimated to occur in 3%–10% of children (Kerwin 1999).

A number of specific medical populations are at increased risk of developing feeding disorders. For example, between 40% and 70% of infants born prematurely develop significant feeding problems (Hawdon et al. 2000). Children who require extended tube feeding, interrupting normal oral feeding patterns, are also at risk of feeding difficulties (Linscheid et al. 2003), as are children with gastrointestinal problems, including abdominal pain, reflux, and vomiting. Treatment for childhood cancer, which often results in nausea and vomiting, can precipitate the development of a feeding disorder in children who had previously normal eating patterns (Bernstein 1978). Other conditions, including autism (Schreck et al. 2004), Down syndrome (Cooper-Brown et al. 2008), cystic fibrosis (Linscheid et al. 2003), and craniofacial anomalies (Cooper-Brown et al. 2008), have been associated with high levels of feeding disturbances. This list is not meant to be exhaustive but rather provides just a sampling of the myriad medical and developmental issues that can contribute to feeding problems. For a more comprehensive list of causes of feeding disorders in children, see Rudolph and Link (2002).

Given the high prevalence of pediatric feeding disorders, particularly among those with medical and developmental issues, a thorough understanding of their etiology, classification, assessment, and treatment is essential for mental health clinicians who provide consultation in pediatric settings. Feeding problems are a common referral issue in both inpatient and outpatient settings. Within the hospital setting, estimates suggest that up to 85% of feeding problems present with at least some behavioral component (Burklow et al. 1998), highlighting the opportunity and need for collaboration between medical and mental health specialists in caring for this population. Furthermore, psychologists and psychiatrists have long been acknowledged as important members of multidisciplinary feeding teams, and behavioral intervention techniques have considerable empirical evidence to support their efficacy (Kerwin 1999).

Normal Development and Feeding

Conceptualization of feeding problems requires an understanding of normal feeding development and of how problems can arise. The complex and dynamic process of feeding involves a sequence of hierarchical steps (e.g., accepting, chewing, propelling, swallowing). Feeding difficulties can occur at any point along this continuum, and the complexity involved during the earliest stages of feeding development may serve as the root of feeding issues (Drewett and Young 1998; Patel et al. 2002). For example, the transition from milk to solid foods represents a period of rapid developmental adaptation for infants and toddlers, and feeding-related difficulties may arise around this time (Drewett and Young 1998). Although the stages involved in feeding remain fairly consistent, parenting practices and a family's cultural beliefs may result in some variations.

In accordance with the recommendations of the American Academy of Pediatrics (1988), Satter (1999) and Kleinman (2000) outlined recommendations for feedings of infants and young children, and these recommendations have remained fairly consistent over the past 40 years. The transitions in types and textures of foods have been shown to relate closely with motor and oral feeding development (Carruth and Skinner 2002). Specifically, these guidelines recommend breast feeding or formula feedings for the first 4–6 months of life and up to at least the first year of life. Smooth foods and pureed textures are usually introduced at about age 6 months, and easily dissolvable foods between 6 and 9 months. By age 12 months, most children are introduced to table foods, and by age 24 months, most children are eating a diet consisting primarily of solid foods similar to those eaten by the entire family (Satter 1999). These guidelines caution against introducing small, hard foods during the first 2–3 years of life and recommend that single-ingredient foods be introduced separately in repeated presentations over several days. A detailed table identifying normal feeding development is provided in Figure 11–1.

Important considerations with regard to feeding development are critical and sensitive periods. According to Stevenson and Allaire (1991), a *critical period* is a well-defined period in which a stimulus must be applied for the individual to learn a behavior pattern, whereas a *sensitive period* refers to the optimal time to apply a stimulus. After the window of a sensitive period has expired, the individual has more difficulty learning a specific behavior. After a critical period has passed, however, those particular behaviors can no longer be learned (Illingsworth and Lister 1964). For example, the period between 4 and 6 months represents a sensitive period for acceptance of new food tastes, and the critical period for chewing should occur around age 6 months, following the disappearance of the tongue protrusion reflex (see Figure 11–1). Delays during critical and sensitive periods of feeding may have serious negative consequences and may contribute to feeding issues. For example, Skuse (1993) found that infants who had not experienced chewing firm solid foods beyond 1 year often had immature and restricted tongue movements, which then often caused difficulty swallowing solid foods, leading to gagging behavior. This, in turn, led these infants to experience the swallowing of solid foods as an aversive stimulus (Skuse 1993).

Medical Overview

As discussed previously, pediatric feeding disorders often accompany general medical conditions. For example, feeding disorders are often associated with digestive problems and may suggest a gastrointestinal disorder (Manikam and Perman 2000). Gastrointestinal difficulties can impact feeding on a number of levels, including the intake, retention, digestion, absorption, and elimination of food (Manikam and Perman 2000). Ultimately, discomfort and decreased appetite related to digestive problems can lead to food refusal and escape behaviors, which in turn may lead to more severe feeding issues. For example, children with gastroesophageal reflux disease may experience pain or discomfort during or after feedings as a result of esophagitis. This discomfort, coupled with an interruption of normal oral feeding as a result of surgical treatment to address related reflux, increases the likelihood of feeding problems (Linscheid et al. 2003; Mathisen et al. 1999).

Prolonged difficulty in feeding may have significant negative developmental and behavioral outcomes. More specifically, these disorders can lead to growth retardation and may have a negative impact on the body at the organ level, depending on the child's caloric and nutrient intake. Furthermore, infants with feeding problems may be at increased risk of difficulties with language development, reading skills, social maturity, and behavioral issues and may

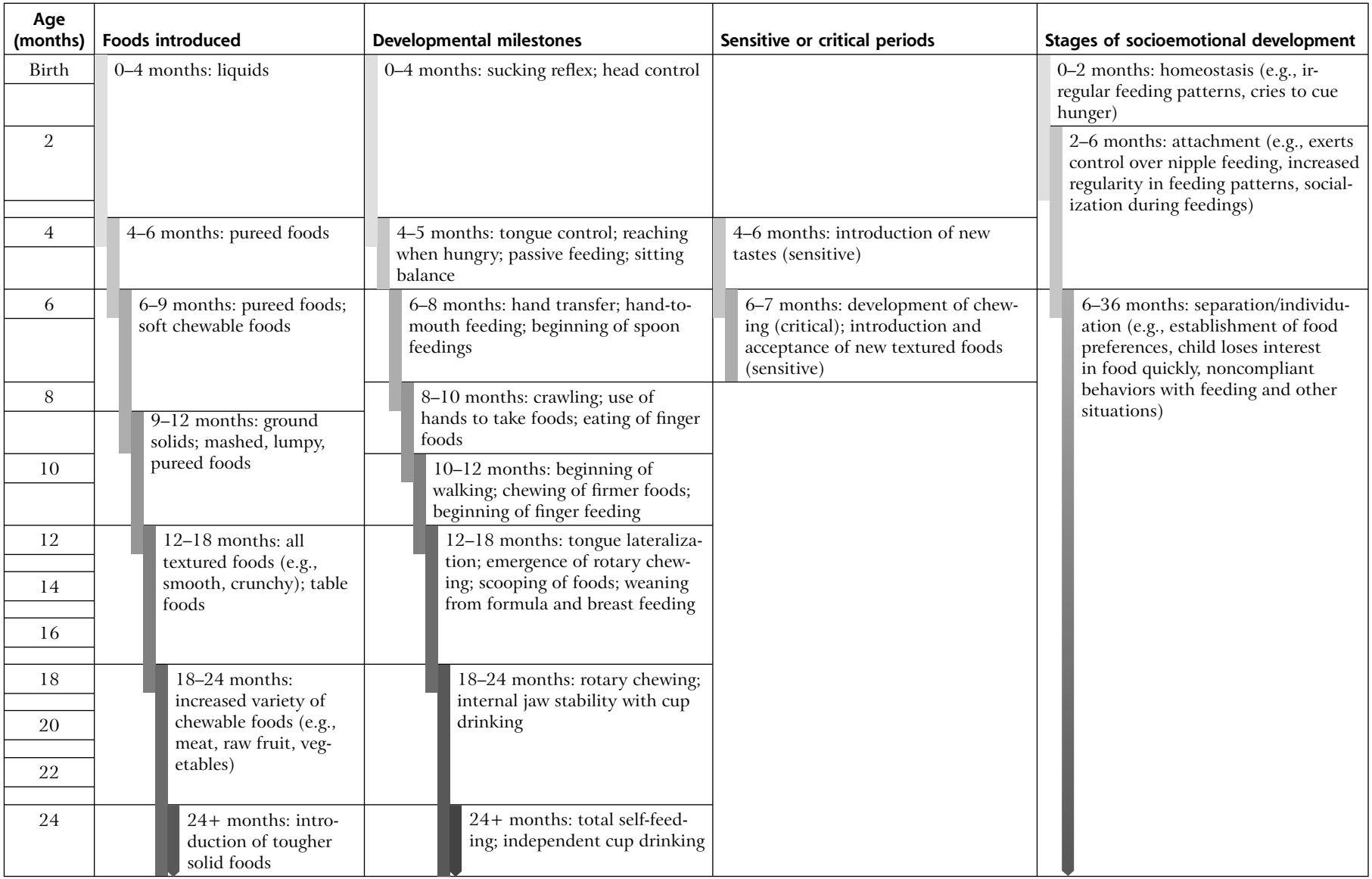

FIGURE 11–1. Development of normal feeding

Source. Adapted from Arvedson 1997; Delaney and Arvedson 2008; Stevenson and Allaire 1991.

have lower cognitive abilities later in life (Heffer and Kelly 1994). For example, some early studies suggested that children with severe feeding problems have cognitive delays compared with their healthy counterparts and are more likely to require special education services (Dowdney et al. 1987; Drotar and Sturm 1988). More recent studies, however, found no significant impact on cognitive outcomes of children with failure to thrive after controlling for socioeconomic status (Rudolf and Logan 2005). Moreover, in their systematic review of failure to thrive, Rudolf and Logan (2005) argued that the identified IQ differences found between children with a history of failure to thrive and their healthy counterparts (i.e., ~3 points) are of questionable clinical significance. Given the heterogeneity of pediatric feeding difficulties, these outcomes may be dependent on the classification schemes used to categorize infants and toddlers with feeding issues.

Etiology of Feeding Disorders

The etiology of feeding disorders is often multifactorial, and cases in which a single cause operates in isolation are rare (Burklow et al. 1998; Manikam and Perman 2000). In fact, almost two-thirds of children with feeding disorders present with mixed etiologies, with behavioral, physiological, and developmental factors contributing to the difficulties (Budd et al. 1992). At a simple level, the feeding process requires the child to accept food into his or her mouth and then chew, swallow, and digest the food. Medical and behavioral issues can arise at various points along this process, contributing to the diversity of causes and presentations of feeding problems. For organizational purposes, the discussion of the potential causes of feeding problems in this chapter is divided into structural, neurological and physiological, and behavioral causes. Although presented separately, these contributing factors often interact and require multicomponent intervention strategies.

Structural Factors

A wide range of structural problems can contribute to the development of a feeding disorder. Anatomical abnormalities of any of the structures involved in chewing, swallowing, and digesting can disrupt the process and cause significant problems. Abnormalities of the oral cavity such as cleft lip and palate, anomalies of the tongue (e.g., macroglossia, ankyloglossia), and dental caries can increase the likelihood of feeding problems (Rudolph and Link 2002). Obstructions or abnormalities of the pharynx or esophagus can result in swallowing difficulties, impairing the normal feeding process. The structural conditions that can precipitate feeding problems in children are too numerous to list here; Rudolph and Link (2002) provide more comprehensive coverage of anatomical causes of pediatric feeding disorders.

Neurological and Physiological Factors

A variety of neurological and physiological factors can cause feeding difficulties. Neuromuscular conditions, such as cerebral palsy and paralysis, can result in severe feeding problems (Burklow et al. 1998). Likewise, conditions affecting the coordination of the complex process of chewing and swallowing, such as brain stem gliomas and Chiari malformations, represent other potential neurological causes of some feeding disorders. Disorders that affect the peristaltic movement of food can also bring about feeding problems (Rudolph and Link 2002). Inflammation of the digestive pathway (e.g., esophagitis, Crohn's disease) and severe reflux (e.g., gastroesophageal reflux) can produce considerable discomfort that interferes with normal feeding (Burklow et al. 1998). Finally, medications that suppress appetite can negatively impact feeding behavior (Manikam and Perman 2000).

Behavioral Factors

Behavioral factors can be the initial cause of feeding problems or can develop secondary to medical issues. For discussion purposes, these factors can be grouped into three categories: 1) problems related to the child's oppositional or anxious behavior, 2) problems related to the caregiver and the caregiver-child relationship, and 3) problems related to the broader environment as it impacts child feeding behaviors. Often, several of these factors are present and interacting at the time of referral, creating complex systems of influence on a child's feeding.

Perhaps the most obvious behavioral factors related to pediatric feeding problems are child oppositionality and anxiety. Oppositional behaviors around feeding can include refusal to sit for meals, refusal to take in any food, resistance to nonpreferred foods, spitting out food, and tantrums at mealtime (Kerwin 1999). Mealtime oppositionality is often observed within the context of a more pervasive oppositional temperament, characterized by struggles for control not only during meals but in a

variety of settings. Such children may meet diagnostic criteria for a disruptive behavior disorder, such as oppositional defiant disorder or attention-deficit/hyperactivity disorder, and parents of these children may benefit from parent training approaches to manage problem behaviors across settings (McMahon and Kotler 2008). For many children, however, oppositional behavior may be largely limited to feeding times, requiring a more focused approach on effectively managing and modifying feeding behaviors. For some children, oppositional behaviors develop due to medical conditions that can make eating difficult or painful (Manikam and Perman 2000). These children can develop anticipatory anxiety related to feeding, leading to refusal of food.

The causes of feeding-related anxiety are varied. Some children develop food neophobia (Dovey et al. 2008)—that is, a resistance to trying new foods—which may represent a manifestation of anxiety. Aversions to specific foods can be conditioned when the foods are eaten at the time of an unpleasant experience (Bernstein 1978), and children can learn negative emotional responses to these foods. Traumatic events while eating can trigger a fear of eating even in children with previously normal feeding behaviors (Chatoor et al. 2001). For example, an episode of choking might be extremely traumatic for a child and result in a choking phobia that manifests as food refusal, refusal of foods with certain textures, or excessive chewing before swallowing. Similarly, pain and trauma to a child's face and mouth can be a trigger for sensory defensiveness during feeding. Regardless of the nature of the event, a traumatic experience can interact with a child's predisposition toward anxiety to result in the development of a serious feeding problem; children who are especially vulnerable to anxiety may develop feeding problems following traumatic events, whereas children without this predisposition do not.

In addition to behavioral factors associated with the child, factors related to the caregiver and the caregiver-child relationship can be important contributors to feeding problems. From a developmental perspective, a caregiver's understanding of the stages of a child's socioemotional development during infancy and toddlerhood can affect the development of the child's feeding behaviors (see Arvedson 1997). Problems in the caregiver-child relationship, including poor attachment or negative interaction patterns, can lead to or exacerbate feeding difficulties (Linscheid et al. 2003). In fact, some researchers have conceptualized behavioral feeding problems as a primarily relational disorder (Davies et al. 2006), highlighting the role of the caregiver in feeding development. In this conceptualization, the caregiver's parenting skills interact with the child's temperament to affect the pattern of interactions around feeding. For example, a child with a difficult temperament and a caregiver with limited skills for managing difficult behaviors might combine to produce negative interactions, caregiver frustration, and increased child oppositionality (Manikam and Perman 2000). Caregiver response to food refusal has been associated with infant weight gain, with higher levels of caregiver response to refusal associated with increased risk of weight faltering (Wright et al. 2006). Furthermore, caregiver mental health and distress (Garro et al. 2005; Powers et al. 2002) can affect caregiver-child interactions and, in turn, child feeding behavior. Research on maternal psychopathology and child feeding has had somewhat inconsistent results, although some evidence indicates a link between maternal depression and child feeding problems (McDermott et al. 2008). Similarly, high maternal feeding anxiety has been associated with weight faltering in infants (Wright et al. 2006).

In addition to child- and caregiver-level influences on feeding problems, the environment surrounding child feeding can be important. Chaotic mealtime environments can contribute to problem eating behaviors (Janicke et al. 2005), and high levels of family conflict may be particularly anxiety provoking for children who are sensitive to these stressors. Beyond the home environment, children's eating can be affected by the environment of eating at school, with strict time constraints and problems with peer relations posing potential barriers to eating outside of the home.

The complex and varied causes of pediatric feeding disorders require a dynamic and interactive approach to understanding their etiology. Child feeding problems can begin with a primarily medical or behavioral cause but quickly develop into more severe problems with multiple contributing factors (Burklow et al. 1998). In fact, feeding problems that appear similar at the time of referral may have developed from very different initial causes. One way of thinking about the diverse events that can lead to a feeding disorder is to consider various pathways that involve the interaction of both medical and behavioral issues. For example, one possible pathway could begin with a structural issue that makes swallowing painful, leading to anticipatory anxiety and food refusal. Over time, the pattern of food refusal

is negatively reinforced and becomes resistant to change, even if the underlying structural issue is resolved. A second possible pathway could begin with an oppositional child who refuses nonpreferred foods as a part of a struggle for power at mealtimes. The caregiver could become frustrated with this behavior and attempt to force-feed the child, leading to gagging and a traumatic feeding experience. A third alternative could begin with a traumatic choking incident in a child with normal feeding behaviors but a predisposition toward anxiety. The child may develop a choking phobia, resulting in a pattern of chronic food avoidance. Numerous alternative pathways to developing a severe feeding problem, involving both medical and behavioral issues, are possible and should be considered in treating a child presenting with food refusal.

CLASSIFICATION

The heterogeneous nature of pediatric feeding disorders makes attempts at classification important. As suggested earlier, simply classifying feeding problems as *organic* (i.e., those with a clear medical etiology) or *nonorganic* (i.e., those for which no clear medical cause has been identified or behavioral issues are considered primary) is insufficient and even inappropriate in many cases (Manikam and Perman 2000). According to Manikam and Perman (2000), this dichotomy, which has dominated classification schemes until recently, not only is an oversimplification but may even interfere with optimal management.

The *Diagnostic and Statistical Manual of Mental Disorders,* Fourth Edition, Text Revision (DSM-IV-TR; American Psychiatric Association 2000), provides little differentiation among child feeding disorders, grouping heterogeneous feeding problems under the classification of feeding disorder of infancy and early childhood. Perhaps of greater clinical and research utility is the classification system created by Chatoor et al. (1984, 1997), who included several subclassifications under the broader DSM-IV-TR diagnostic category: 1) *feeding disorder of homeostasis,* which is characterized by inadequate child food intake related to problems establishing regular and effective feedings; 2) *feeding disorder of attachment,* which results from poor engagement between caregiver and child, leading to failure to adequately gain weight; and 3) *infantile anorexia* (feeding disorder of separation), which is characterized by high levels of conflict and infant food refusal. Chatoor et al. (1997) identified important child and parent symptoms that contribute to each of these disorders, highlighting the relational nature of these feeding problems. Chatoor et al. (2001) also proposed *posttraumatic feeding disorder* as a diagnostic category for feeding problems characterized by distress and resistance to feeding following a traumatic event (e.g., choking, gagging, force-feeding).

In classifying feeding disorders, one important distinction should be noted. The terms *feeding disorder* and *failure to thrive* are often used interchangeably to describe infants and young children who exhibit impaired growth (Chatoor 2002). However, failure to thrive is a purely descriptive term and may not adequately capture the causes of growth failure, because multiple pathways can lead to growth failure (Goldbloom 1987). Similarly, failure to thrive may result from multiple etiologies (e.g., oral-motor dysfunction, choking, gastroesophageal reflux); however, as Chatoor (2002) argued, not all feeding disorders lead to growth failure, and not every child with growth failure has a feeding disorder. Ultimately, the use of different nomenclature can have a significant impact on both clinical decisions (e.g., identifying evidence-based treatments for feeding problems) and research (e.g., comparing results across studies).

ASSESSMENT

In light of the often complex and multifactorial etiology of pediatric feeding disorders, a thorough assessment of the presenting problem is essential. Optimal assessment is multidisciplinary and employs multiple methods for identifying the current problem and relevant history. Effective assessment requires attention to both medical and behavioral issues, as well as the interaction between these factors. Attributing feeding problems entirely to either structural or physiological processes would ignore important behavioral components that are present in most cases. Conversely, viewing all feeding problems as behavioral would miss crucial medical issues that need to be addressed so that behavioral treatment is effective. By assessing a combination of medical and behavioral factors and their interaction, treatment teams can better tailor treatments to the unique needs of each child.

Medical Assessment

The multidisciplinary assessment of pediatric feeding disorders must include a thorough physical examination of the child. This examination is needed

to rule out structural and functional problems related to chewing, swallowing, and digesting food (Rudolph and Link 2002). However, as Rudolph and Link (2002) noted, the absence of apparent physical signs of dysfunction does not exclude the possibility of a physical cause. In addition to the basic physical examination, a variety of more invasive procedures may be helpful in identifying underlying medical causes of feeding problems. A full review of these studies is beyond the scope of this chapter; however, the reader is referred to Rudolph and Link (2002) for a more detailed discussion of the endoscopic and imaging studies that are indicated for children presenting with a variety of feeding problems. Also, tests that allow for observation of the feeding process in action (e.g., videofluoroscopic swallowing studies) can help identify problems involved in moving food through the digestive pathway. For discussion of indications for videofluoroscopic swallowing studies and fiber-optic endoscopic evaluations of swallowing, see Miller et al. (2001).

Clinical Interview

The clinical interview provides the clinician with an opportunity to obtain information related to the child's current feeding difficulties, feeding history, and other relevant psychosocial and developmental factors. This information is typically obtained from the child's caregiver(s) and provides an important perspective on the onset, development, and presentation of the child's feeding disorder (Linscheid et al. 2003). Given the diversity of pediatric feeding disorders, as well as the numerous potential contributors to the presenting problem, the clinical interview should focus not only on current behaviors but also on the historical course of the child's feeding problems. Developing a timeline of the child's feeding behaviors, including periods of normal feeding as well as the onset of problems, is essential. The clinician should attempt to identify any events that may have triggered the feeding problem (e.g., traumatic choking, onset of abdominal pain) or exacerbated existing problems (e.g., force-feeding). Information regarding the child's medical history can be obtained from the referring physician; however, the caregiver's perspective on this information can also be helpful.

In addition to information related to the child's feeding presentation and history, an assessment of the child's psychosocial and developmental history is important. The child's mental health history, including disruptive behaviors, mood problems, or anxiety, can be relevant to both the development and the treatment of a feeding problem. The child's developmental history, including timing of major milestones and any significant delays in development, should be assessed. Other relevant areas for assessment include the caregiver-child relationship, as well as caregiver stress and psychosocial functioning (Davies et al. 2006; Linscheid et al. 2003). Finally, pediatric feeding behaviors occur within the context of caregiver expectations regarding food and eating (Birch 1990). Such expectations, which can be influenced by personal and cultural factors, can impact the child's eating behavior and should be considered in the clinical interview. Table 11–1 lists some broad and specific areas that might be useful in conducting a clinical interview with caregivers of a child with feeding problems.

Feeding Observations

The information received from caregivers in the clinical interview is essential; however, caregiver reports can be subject to biases and inaccuracies (Linscheid 2006). Therefore, to supplement caregiver reports, observational methods can be useful in providing insights regarding child feeding behaviors. Typically, a feeding observation includes a simulated meal with the child and caregiver (Silverman and Tarbell 2009), providing the clinician an opportunity to observe mealtime interactions. During the simulated meal, both preferred and nonpreferred foods can be introduced to elicit a full range of child responses. Both the child's behavior (e.g., acceptance or refusal of food, communication of preferences, signs of distress) and the caregiver's behavior (e.g., presentation of food, response to food refusal, attention to appropriate and inappropriate behaviors) can be observed in this interaction, and targets for behavioral intervention can be identified (Manikam and Perman 2000).

Rating Instruments and Feeding Scales

In addition to information obtained through clinical interview and observation, rating scales can be helpful in assessing the severity of feeding difficulties. The Children's Eating Behavior Inventory (Archer et al. 1991) and the Behavioral Pediatric Feeding Assessment Scale (Crist and Napier-Phillips 2001) have both demonstrated adequate psychometric properties and been highlighted as potentially useful in clinical practice (Linscheid 2006).

TABLE 11–1. Areas for assessment in clinical interview with caregiver

Food intake history
Current oral and nonoral intake (including calories, variety, textures)
Preferred and nonpreferred foods
Frequency of meals; intake between meals
Appetite
Feeding history; onset of any changes in feeding
Medical history
Current weight status and trajectory of weight gain or loss
Overall health history, including illnesses, surgeries, hospitalizations
Medical tests to assess feeding problems and results
History of painful swallowing, abdominal pain, painful defecation
Current medications (especially those that might suppress appetite)
Developmental history
Timing of developmental milestones
Developmental delays or disabilities
Feeding development, including any interruption of normal oral feeding (e.g., tube feeding)
Behavioral and emotional history
History of behavioral and emotional problems, including oppositionality and anxiety
Psychiatric assessment and diagnoses
History of psychiatric treatment (for feeding problems or other psychiatric conditions)
Psychiatric medications
Family history and context
Family history of feeding problems or eating disorders
Caregiver psychopathology and stress
Current or recent family stressors
Caregiver expectations regarding feeding, including cultural beliefs about eating and weight
Behavior during meals
Duration of meals
Behavior problems during meals, including tantrums or oppositional behavior
Excessive chewing or excessive liquid intake with food
Fear of swallowing, choking, gagging, vomiting
Differences in feeding at home versus outside of home
Parental role in feeding
Parental attempts to manage feeding problems
History of feeding-related trauma
History of choking, gagging, vomiting
History of force-feeding
History of trauma to face or mouth, including oral or facial surgery
Witnessing of food-related trauma (e.g., witnessing a family member choking)
Timing of trauma in relation to onset of feeding problems
Feeding environment
Location of feeding
Noise and activity level in the feeding environment
Presence of conflict in the feeding environment
Predictability of feeding schedule

For infants and children up to age 3 years, Chatoor et al. (1997) have developed and validated a rating scale for infant and mother interactions during feeding. More general child behavior measures can also be helpful in determining whether behavior problems are specific to feeding or more generalized (Linscheid et al. 2003).

Food Diaries

Another useful tool in the assessment of pediatric feeding problems is the food diary. Parents are often asked to monitor and record their child's solid and liquid intake over a period of time (e.g., 1 week) and provide this information for analysis at the beginning of treatment. A variety of information can be recorded in food diaries, including the type and amount of food or drink consumed, the time of the intake, the behavior during feeding, the duration of the meal, and the immediate environment at the time of consumption (e.g., presence of other family members, location of the meal). These records can be helpful in examining patterns of eating over time and determining the nutritional value of foods that are consumed (Stark et al. 1993; Wolper et al. 1995).

TREATMENT

A review of the treatment literature on pediatric feeding disorders yields two clear overarching conclusions. First, a range of behavioral techniques have been shown to be effective in treating feeding problems. Second, a multidisciplinary team approach to

treatment is often necessary to produce optimal outcomes, particularly in severe and complex cases. The following subsections include a discussion of some of the most effective treatment techniques and their place within the context of broader multidisciplinary team treatment for pediatric feeding disorders.

Appetite Manipulation

The first component of successful behavioral treatment of feeding problems is often appetite manipulation. For behavioral modification techniques to be effective, the child must be motivated to eat, and such motivation typically comes from the need to consume calories from food (Linscheid 2006). Therefore, the child's appetite must be controlled so that hunger is induced at the time of meals. Typically, appetite manipulation involves limiting the child's intake of calories between meals and from sources other than oral intake of targeted foods. For example, appetite manipulation might include eliminating snacking between meals and limiting intake of preferred foods that decrease the child's motivation to eat target foods (e.g., restricting junk food to encourage intake of healthier foods). For children who receive tube feedings, the calories taken in by tube may need to be limited because these feedings can decrease appetite and motivation to take food by mouth. Of course, appetite manipulation requires balancing the desire to increase the child's appetite and ensuring that the child receives adequate levels of daily calories.

Programs targeting appetite manipulation, whether conducted in inpatient or outpatient settings, should be closely monitored by physicians and should include frequent weight and caloric intake checks (Linscheid 2006). Maintaining adequate levels of hydration is also crucial, and regular water intake should be emphasized. The aggressiveness of the appetite manipulation component of treatment is an area of debate; however, some evidence suggests that aggressive protocols may produce effective results in shorter periods of time (Linscheid 2006). In addition to manipulating appetite by restricting intake between meals, appetite-stimulant medications can be used to promote hunger at mealtime (Homnick et al. 2005). Cyproheptadine (Periactin), for example, has shown some effectiveness in promoting weight gain among children with cystic fibrosis, with only mild side effects (Homnick et al. 2005). Overall, the failure to adequately induce appetite through either restriction of intake between meals or appetite-stimulant medication may impede progress by decreasing the child's motivation to eat at meals.

Behavioral Modification

Once the child's appetite has been manipulated to encourage eating at mealtime, a variety of behavioral modification techniques can be applied. At a basic level, the concept of differential attention is crucial in shaping a child's feeding behaviors. Simply stated, differential attention involves giving the child positive attention when engaging in appropriate behaviors and withdrawing attention for inappropriate behaviors (Kerwin 1999). For example, when the child takes in a target food, the caregiver attends to this behavior and may offer social praise. In contrast, when the child engages in an inappropriate feeding behavior, such as pushing food away, the caregiver ignores this behavior. Differential attention approaches can be supplemented with reward systems that provide the child with more tangible reinforcers for desired behavior and mild punishments for negative behavior. For children with restricted food preferences, ingesting an amount of a nonpreferred food can be rewarded with a bite of a more preferred food (Linscheid et al. 2003). Mild punishments, such as time-out from reinforcement, can be used for disruptive behaviors during feeding (Werle et al. 1993). The behavioral principle of shaping can also be employed by rewarding successive approximations of the desired feeding behavior (e.g., reinforcing the child opening his or her mouth at first) (de Moor et al. 2007).

Escape extinction techniques have also been demonstrated to be useful in treating pediatric feeding disorders (Kahng et al. 2003; Patel et al. 2002, 2006; Piazza et al. 2003). Because children with feeding disorders are negatively reinforced when they avoid eating (e.g., when they reject food and food is then taken away), escape extinction procedures involve continual presentation of food until it is consumed. For example, the caregiver might present food to the child's mouth and then hold the spoon at the mouth until the food is consumed (Patel et al. 2006). These procedures may be most effective in addressing feeding problems when presented in conjunction with positive reinforcement (Piazza et al. 2003). In fact, programs that combine behavioral techniques have been most studied in the feeding disorders literature and generally have strong support (Kerwin 1999).

Team-Based Treatment of Feeding Disorders

As mentioned earlier, successful treatment of pediatric feeding disorders often requires a team approach (Miller et al. 2001). In addition to physicians and the behavioral psychologist or psychiatrist, other important team members may include a nutritionist to monitor calorie intake and set calorie goals, an occupational or speech therapist to address motor and sensory issues related to feeding, and a social worker to assist the family in obtaining necessary resources (Manikam and Perman 2000; Miller et al. 2001). Interdisciplinary team-based treatment has been found to be effective in treating pediatric feeding disorders in general (Greer et al. 2008) and feeding problems associated with specific medical conditions (e.g., Shaw et al. 2003). Furthermore, team-based treatment has been shown to result in significant cost savings in many cases (Lucas et al. 1999). One important consideration in treatment for pediatric feeding disorders is whether the treatment should be conducted on an inpatient or outpatient basis. In general, inpatient treatment is indicated when a child's weight and nutrition status require more intensive monitoring or when outpatient treatment has been unsuccessful (Linscheid et al. 2003). For families that do not have access to specialty inpatient or outpatient feeding services in their communities, technology such as teleconferencing may provide an option for obtaining appropriate services remotely (Clawson et al. 2008).

Concluding Comments

Pediatric feeding disorders are prevalent conditions with complex and diverse etiologies. Medical and behavioral factors may contribute to the development and maintenance of these problems, and intensive intervention is often necessary. A variety of behavioral techniques are effective in treating pediatric feeding disorders within the context of interdisciplinary team assessment and treatment.

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12

Munchausen by Proxy

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In 1977, Roy Meadow, a British pediatrician, coined the term *Munchausen by proxy* (MBP) to describe illness-producing behavior in a child that is exaggerated, fabricated, or induced by a parent or guardian. Meadow adapted the term from a disorder identified as Munchausen syndrome by Dr. Richard Asher in 1951, who noted similarities between several of his patients and the exaggerated storytelling propensity of the infamous eighteenth-century military mercenary Baron Karl Friedrich Hieronymus, Freiherr von Münchausen. Asher applied the term to patients who were exaggerating, fabricating, or inducing illness in themselves to get attention.

Over the last 30 years, a significant body of literature describing MBP has accumulated that includes perspectives from pediatrics, psychology, social work, psychiatry, education, law, and ethics (see Shaw et al. 2008 for a review).[1] MBP has been widely recognized as a legitimate and quite dangerous form of child abuse in the pediatric literature; an Axis I disorder of deception in the *Diagnostic and Statistical Manual for Mental Disorders,* Fourth Edition, Text Revision (DSM-IV-TR; American Psychiatric Association 2000); a crime to be investigated by child protection and law enforcement agencies; and a serious juvenile justice issue in courts around the country (Kinscherff and Ayoub 2000). Over 1,200 papers and more than a dozen books have appeared in the medical and psychological literature on MBP. Major pediatric and child psychiatric texts now contain descriptions of MBP. The synthesis of definitional constructs presented below exemplifies the current multidisciplinary consensus in the field.

MBP experts focus on both the child's victimization and the parent's psychiatric disorder; many authors expand the discussion to include not only the interaction between the parent and the child but also the relationships between the parent and the child's various health care providers. MBP is also characterized as a disorder of family and marital dysfunction, all aimed at perpetuating abuse of the child.

MBP is both a pediatric and a psychiatric disorder that belongs to a group of maladies called "disorders of deception." This form of victimization involves the intentional production or feigning of physical or psychological signs or symptoms in another person who is under the individual's care. Specifically, it is the exaggeration, fabrication, and/or inducement of an illness, a series of symptoms, or a

[1] A number of alternative terms have been used to describe MBP. These have included *Munchausen syndrome by proxy, factitious disorder by proxy, Polle syndrome,* and *medical child abuse,* to name the most common. Because this disorder has been described across multiple disciplines, a unifying diagnostic nomenclature has been sorely needed to allow for discussion of the presentations of both the child and the parent, as well as the dynamic between them.

condition in another person, most often a child. The interaction between parent and child leads to abuse of the child by a mentally ill parent or caregiving perpetrator. Definitional guidelines proposed by a multidisciplinary task force of the American Professional Society on the Abuse of Children (APSAC; Ayoub et al. 2002a) address the inconsistencies across definitions that have arisen for this disorder over time. The goal of providing clear and representative multidisciplinary definitions is met in the definition above (see Figure 12–1).

MBP is a disorder that involves two components: 1) the diagnosis of abuse in the child and 2) the identification of psychiatric difficulties in the adult perpetrator. Specifically, the component related to the child's victimization is a form of child abuse called *abuse by pediatric illness or condition falsification* (Ayoub et al. 2002a). A child who is subjected to this behavior is a victim of pediatric condition (illness, impairment, or symptom) falsification and should be coded as such (995.5 when focus is on the victim and V61.21 when focus is on the perpetrator; see DSM-IV-TR, p. 738).

The second component of the disorder refers to the perpetrator's behaviors and motivations; the psychiatric diagnosis for the perpetrator is called *factitious disorder by proxy.* Factitious disorder is described in DSM-IV-TR as intentional behavior to assume the sick role by proxy (most often a child). Diagnostic coding for the adult perpetrator is factitious disorder by proxy or factitious disorder not otherwise specified. Terms used to describe the perpetrator's behavior include "imposturing" (Schreier and Libow 1993), "disorders of simulation" (Feldman 2004), and "disorders of deception" (Ayoub 2006).

The APSAC task force (Ayoub et al. 2002a) suggested dropping the word *syndrome* from "Munchausen by proxy syndrome" because of the different meanings of the word across professions. This change avoids the legal use of "syndrome," which implies a concrete checklist of characteristics always present or absent in each case. Because illness is feigned in many different ways, a simple symptom checklist is difficult to construct. However, for pediatric disorders in which a proliferation of MPB cases have occurred, such as suffocatory abuse (Truman and Ayoub 2002) and intestinal pseudo-obstruction (Hyman et al. 2002), algorithms have been developed based on research findings to offer red flags for differentiation of feigned presentations from legitimate ones.

Epidemiology

The prevalence of MBP is difficult to assess given the convincing deception that is central to the disorder. However, one careful, conservative British study estimated that the combined annual incidence of MBP in the form of nonaccidental poisoning and nonaccidental suffocation was at least 2.8 cases per 100,000 in children under age 1 year (Kinscherff and Ayoub 2000). Based on these estimates, approximately 200 new cases develop in the United States every year, with poisoning and suffocatory abuse as the primary forms of abuse. Additionally, the literature suggests that as many as 1% of asthma clinic attendees (Godding and Kruth 1991) and 5% of allergy clinic patients (Warner and Hathaway 1984) are victims of falsification.

Repeated false allegations of sexual abuse and psychiatric presentations (Schreier 1997a, 1997b), as well as educational MBP cases presenting in school settings (Ayoub et al. 2002b), have also been described. In his book *Playing Sick?* Marc Feldman (2004) estimated that 1,200 new cases of MBP are reported in the United States every year. Documented cases have been described from over 30 countries around the world. Given the wide spectrum of pediatric conditions that have been known to be feigned, the problem is far from rare. Furthermore, experts now agree that many MBP cases are likely to go undetected because of the covert nature of their presentation and the striking ability of the perpetrators to fool those around them.

Permanent injury or death has been documented in over 13% of MBP cases reported in the literature (Ayoub 2006; Sheridan 2003). Among those children who died due to this form of abuse, 25% of their siblings had also died, with over one-half of them having had similar and/or suspicious symptoms (Sheridan 2003).

Clinical Features

Pediatric Illness Falsification in the Child

Children are victimized by a variety of means, limited only by the perpetrator's imagination. They are subjected to unnecessary hospitalizations, tests, procedures, and treatments for disabilities that are physical, psychological, or educational (attention-deficit/hyperactivity disorder [ADHD] and learning problems). Disease falsification includes symptom exaggeration and distortion; false reports; manipu-

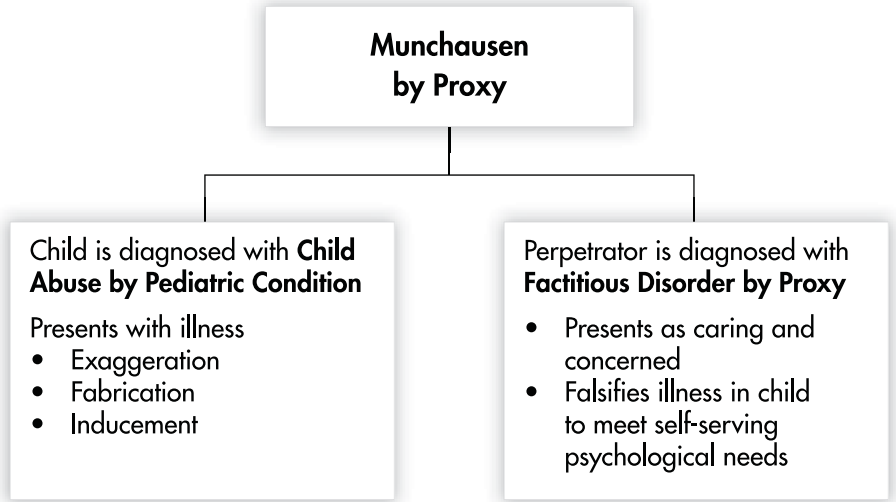

FIGURE 12–1. The diagnoses that jointly constitute Munchausen by proxy.

lation of medication, food, and activity; and inducement of symptoms by any number of means. Cases documented in the literature include a variety of overt and sadistic injuries, such as repeated pounding with a hammer described in an autobiographical article (Byrk and Siegel 1997); administration of substances, such as ipecac or salt water, that cause vomiting; injection of feces, pine tree fungus, rat poisoning, or menstrual blood; administration of insulin; and suffocation.

In Ayoub's (2006) study of 30 children with MBP, 23% had gastrointestinal symptoms including vomiting, failure to thrive or grow, reflux, esophagitis, chronic secretory diarrhea, neurological intestinal pseudo-obstruction, and chronic abdominal pain; 30% were reported to have recurrent seizures; 20% had repeated episodes of apnea; 13% experienced abnormal serum insulin levels either as uncontrolled diabetes or as unexplained hypoglycemia; 10% were diagnosed with rare autoimmune or genetic disorders; and 10% had unexplained exacerbations of asthma (Ayoub 2006). In addition, 7% were poisoned and had feigned bleeding difficulties. A final group of children in Ayoub's (2006) prospective study had psychiatric or learning disabilities that were exaggerated, fabricated, or induced (10%); their problems included ADHD, bipolar disorder, and psychosis.

According to Sheridan's (2003) meta-analysis of 451 cases of MBP, children had multiple symptoms in at least three and as many as seven different organ systems; victims averaged 3.25 medical problems (range 0–19). Perpetrators actively induced symptoms in 57.2% of the cases reviewed by Sheridan, and at least half induced symptoms while the victims were in the hospital. The most common symptom induction methods were suffocation and poisoning with prescribed medications or other agents. A typical medical history included many office visits, often to a variety of specialists, and a number of major and minor surgical procedures to relieve symptoms that were exaggerated, fabricated, and/or induced. On average, the time from onset of symptoms to diagnosis was 2 years (Sheridan 2003).

Sheridan (2003) found that 6% of the child victims and 25% of their siblings died. The children most likely to die were those presenting with suffocatory abuse or apnea (Alexander et al. 1990; Ayoub 2006; Sheridan 2003). Although the majority of victims of MBP are younger than age 6 years, cases of serious MBP also occur with older children and adolescents (Awadallah et al. 2005). Boys and girls are equally affected.

The child's medical care occurs in the context of a caregiving relationship, and perpetration often occurs in forms difficult for a child to detect or understand as victimization, such as misadministration of medication or misrepresentation of medical history; as a result, the child's failure to detect or appreciate the perpetration supports continuing trauma in the child victim. These children often learn that the way to get attention is to be sick. The parent's deception also makes it easier for a child to misapprehend, deny, or compartmentalize his or her victimization. These children seldom recognize their abuse or identify it to others.

In the face of persistent fabrication, children not only risk potentially serious physical injury due to exposure to unnecessary procedures but also almost universally have serious and long-lasting psychological trauma. The psychological impact of victimization through MBP is significant and chronic. Basic problems with attachment, relationship building, and social interaction, as well as attention and concentration, are common in these children (Ayoub 2006; McGuire and Feldman 1989). The presence of oppositional disorders in these victims is significant, as are patterns of reality distortion, poor self-esteem, lying, and attachment difficulties with adults and peers. Although these children can present as socially skilled and superficially well adjusted, they often struggle with basic relationships.

Libow (1995) found that adult survivors of MBP frequently reported that abuse not only continued throughout childhood but also extended well into adulthood. Schreier and Libow (1993) noted that children often are at serious physical risk even while in state protective custody, because some parents may attempt to increase their harm to the child or attempt abduction as they are confronted.

Factitious Disorder by Proxy in the Caregiver

The psychiatric condition of the perpetrator, as indicated by motivation, willfulness, and clinical presentation, is an important component of MBP and is called factitious disorder by proxy (FDP). Caregivers with FDP intentionally falsify history, signs, and/or symptoms in their children to meet their own self-serving psychological needs to maintain the caregiving role. (See Table 12–1 for a summary of common characteristics.) According to the current literature, between 93% and 98% of perpetrators are women; the vast majority of them are the children's biological mothers (Rosenberg 1987; Sheridan 2003).

FDP is a disorder of women and a misuse of "mothering." The psychological motivation for the women's actions is to receive status-enhancing praise and acknowledgment for their self-sacrificing, "competent" care of their children. Although mothers are typically extremely convincing in their roles, discovery often illustrates the deliberate and planful nature of the deception. Many mothers work to subtly manipulate people whom they perceive as powerful—usually physicians, but also their children's nurses, therapists, educators, consultants, or attorneys. A number of mothers use their children's illness to seek notoriety for themselves by requesting special support and by contacting celebrities to publicize their child's plight. In each case, the child is used as the object or vehicle to direct admiring attention to the mother's parenting. The child's needs as perceived by the mother often change as her status-seeking behavior varies.

Mothers are typically quite knowledgeable about their children's conditions; some engage in formal careers as health care or educational professionals, whereas others are more informally schooled in their children's illness history and care. Many mothers show some evidence of fabricating, exaggerating, or inducing symptoms of their own (factitious disorder), which may not be evident until evaluators ask about maternal medical histories (Schreier et al. 2009). Perpetrators can show anger and resentment when faced with challenges about their child's or their own symptoms.

Although women with FDP do not have a single profile, they have some common characteristics. Many women with FDP are from highly dysfunctional families of origin and experienced significant abuse as children (Ayoub 2006; Gray and Bentovim 1996; Lasher and Sheridan 2004). They typically come from families that value the appearance of propriety, although within the closed family system, the children are not protected from abuse or conflict. Daughters are identified as caregivers of others in their families of origin, even though they are not protected themselves. Women with FDP frequently reported childhood traumas such as a serious illness, physical or sexual abuse, serious conflict, or death of a person close to them (Ayoub 2006).

Many, if not all, of the women with FDP have characterological difficulties, most commonly mixed character disorders (Ayoub 2006; Lasher and Sheridan 2004). These mothers are frequently described in the literature as having borderline traits (Feldman 2004). In Sheridan's (2003) meta-analysis, almost 30% of the perpetrators appeared to have falsified symptoms in themselves (factitious disorder). Ayoub (2006) found that abusing mothers had a higher-than-expected rate of substance use, and all had mixed character disorders.

Collusion or Protection by Father and Extended Family

In two-parent families, husbands most often strongly support their wives in spite of clear evidence

TABLE 12–1. Common features of perpetrating caregivers and nonperpetrating partners in Munchausen by proxy

Most perpetrators are women.
Most situations involve mothers or mothering figures and their children.
Perpetrators cannot be identified by a given age, social class, or ethnicity.
Perpetrators are quite knowledgeable and competent in the care of the target child.
Perpetrators frequently have formal or informal interest in and association with the professional fields of the providers for the child (e.g., medicine, nursing, health management, laboratory technician, social work, holistic healer).
Perpetrators can quite convincingly pose as caring and knowledgeable parents.
Perpetrators often present with mixed character disorders, which require considerable diagnostic assessment to identify.
Many perpetrators have exaggerated, fabricated, or induced their own symptoms of physical or emotional illness or disability.
Nonperpetrating partners, if still in a relationship with the perpetrator, will support the stated values and beliefs of the perpetrator. In these situations, nonperpetrating partners often enable the continuation of the caring parent–sick child relationship.
Nonperpetrating partners who are separated, divorced, or estranged from the perpetrator are more likely to be able to identify the child's victimization and avoid supporting the perpetrator's stated values and beliefs about the child.

and legal findings of MBP abuse of their children. These fathers serve as messengers between their wives and their children and frequently encourage their children to support their mothers. Typically, fathers are involved only sporadically in the lives of their children; they essentially enable the abuse through passivity or collusion. These fathers are most likely to continue to support their perpetrator wives after detection, making them unreliable protectors of their children (Lasher and Sheridan 2004; Parnell and Day 1998; Schreier et al. 2009).

Fathers who are estranged from their children at the time of the mothers' abuse by pediatric condition or illness falsification are more likely to identify their wives' manipulation and acknowledge their children's victimization. They are typically separated or divorced; the wives often claim no knowledge of the fathers' whereabouts. However, with some limited detective work, fathers are usually located; they often have been paying active child support. This group of estranged fathers has been systematically shut out of their children's lives. Fathers are often willing to become reinvolved with their children if they have support from authorities and protection from their wives. Members of the extended family, particularly paternal relatives, are also often estranged and may be positive resources for care of the children (Artingstall 1999; Ayoub 2006).

DIFFERENTIAL DIAGNOSIS

Pediatric Condition Falsification With No Factitious Disorder by Proxy

Several conditions involve parent or caregiver abuse by pediatric condition falsification (PCF) but do not involve FDP. Although the consequences of some of these other conditions may be equally as grave as those of FDP, they should be distinguished from FDP because the interventions needed to protect the child and the course of treatment are quite different. The following are some of the more common situations of PCF that are not FDP:

1. Parents falsely report abuse of their children for the primary purpose of obtaining custody or of harming their spouse or partner.
2. Parents keep children home from school with illness excuses because they need to keep the children dependent and at home, but not necessarily ill. In these situations, the child is not an object to help project the appearance of a nurturing role but rather the primary object of an enmeshed parent-child relationship in which the child is parentified. Parents do not go to lengths to have the child appear ill at home or use the child's condition as a means of attention-getting from other adults.

3. Parents who are overwhelmed and seeking assistance in caring for their children may blatantly falsify symptoms, typically on one or two occasions (Libow and Schreier 1986). These parents are usually not good at deception and are relieved when given support to allay their fears about their children.
4. A very small group of parents are psychotic, and their delusions include beliefs that their children are ill. Identification of overt psychosis is a requirement in this situation.

Malingering

Malingering has been described as intentional "pretending" to be sick, motivated by external incentives, such as financial gain or avoidance of work, school, or other negative situations. In these cases, the discrepancy between claimed distress and actual disability is often transparent, and the motivation is overt and obvious. Although malingering can become a chronic coping strategy used by the individual in a variety of situations, it does not involve imposturing to meet self-serving psychological needs, as is the case in factitious disorder. Children may learn to malinger to avoid tasks or events they consider negative or threatening. These behaviors may be reinforced by parents for multiple reasons. Parents may use their children, claiming they are sick, to avoid situations that they view as negative in some way. Malingering by proxy tends to be transparent, and the secondary gain is tangible and straightforward.

Factitious Disorder

Factitious disorder is the conscious or intentional feigning or production of physical or psychological symptoms in order to assume the sick role. Imposturing or "playing sick" is at the core of the disorder. This disorder is marked by a persistent and repeated fabrication, exaggeration, and/or inducement of one's own illness to continue to be engaged with others in the context of being a patient. Some adults with factitious disorder engage in pathological lying that extends beyond illness, whereas others limit their deceptions to illness-related events.

Individuals with factitious disorder present as continuously ill or may have exacerbations of illness. As is typical of adults with MBP, adults with factitious disorder work very hard to maintain their roles as patients. Acknowledgment often leads to personality disorganization. Most, if not all, adults with factitious disorder have severe personality disorders, most often borderline personality disorder (American Psychiatric Association 2000). According to the literature, 30%–55% of women with FDP also have factitious disorder (Ayoub 2006; Sheridan 2003); the presence of factitious disorder in a mother with FDP signals a poor prognosis for any reunification or contact between the mother and the abused child (Feldman et al. 1997; Jones 1987).

Libow (2002) suggested that factitious disorder may present during adolescence and that some youngsters do independently falsify illness. She proposed that these individuals may have had earlier experiences as victims of MBP or experienced modeling or encouragement of illness falsification by a parent or caregiver. She suggested dynamics that include powerlessness, disappointment, loss, and lack of control as those that lead to illness falsification behavior before adulthood.

Somatoform Disorder

Somatoform disorder is a pattern of multiple, recurring, and clinically significant somatic complaints. Individuals with somatoform disorder tend to describe their symptoms in colorful, exaggerated terms, but with factual information missing. The disorder is characterized by inconsistent histories, with multiple physicians and treatments. Anxiety and depression are also common in individuals with somatoform disorder; the condition tends to be chronic and dissociative, or conversion symptoms are prominent. The somatoform disorder most closely aligned with factitious disorder is *somatization disorder,* which is distinguished by an inordinate number of physical complaints. In contrast to factitious disorder, somatization is an unconscious expression of stress in which taking on the illness role is not a syntonic one; hence, serious anxiety and depression typically accompany this disorder.

Diagnostic Assessment

Assessment Process

Identification of MBP always involves a two-step diagnostic process. First, the child's victimization is documented so that a diagnosis of abuse by pediatric condition or illness falsification can be verified. Second, with information based on the child's diagnosis, the psychiatrist should evaluate the parents to assess the nature of their psychological and relational characteristics in light of the child's illness

falsification. Psychological evaluation should be performed with full awareness of the victimization of the child and access to all medical and other relevant records for both the child and the parents.

Identification of MBP typically entails an extended and comprehensive multidisciplinary evaluation (Sanders and Bursch 2002). Two critical features should guide all evaluations. First, identification of child abuse does not require a psychiatric evaluation of the perpetrator. Second, a standard psychiatric interview or series of interviews with a parent in situations in which MBP has been raised is in no way sufficient to rule out the diagnosis of FDP. Because MBP is a disorder of deception, information from individuals who have had contact with the perpetrator must be a part of the evaluation process. Careful review of medical histories and records of the focus child, siblings, and adults involved is also critical to the diagnostic process.

In a limited number of cases, direct evidence of inducement of illness is available. For instance, covert video surveillance may have been used for direct observation, or laboratory evidence from the child (e.g., the presence of foreign substances or drugs in the bloodstream) may be available (Hall et al. 2000; Southall et al. 1997). In most cases, however, evidence of PCF abuse consists of careful documentation of patterns of exaggeration, fabrication, and inducement in which the child's presentation to health care providers is repeatedly inconsistent with the history provided by the parent, or the symptoms with which the child presents are overtly inconsistent with the expected presentation of a given illness or disorder. In these cases, a wealth of diagnostic information on the child is often accumulated in an attempt to find the cause of the child's difficulty. In addition, proven treatment regimens tend to fail repeatedly with these children when they are left in the care of the perpetrating parent but work well when the children are under alternative care.

Diagnoses based solely on verbal reports from the suspected parent or caregiver should be identified, and the records should be assessed for warning signs, inconsistencies, exaggerations, signs of simulation, episodes of induction, and other patterns of illness falsification. Chronologically summarizing the medical contacts into a table can reveal patterns of health care utilization, trajectories of illness and medical treatment, and behaviors of family members (Sanders and Bursch 2002). If the caregiver is actively inducing illness, the medical record summary can be used to evaluate the logic and likelihood of the medical presentation and to search for signs of induction. If illness falsification is not present, the chronological summary may aid in determining a correct diagnosis.

Schreier et al. (2009) suggested that evaluators should review the summary for the following:

1. *Recurrent illness that appears unusual:* Examples include persistent and severe vomiting or diarrhea with no other signs or symptoms of illness.
2. *Symptom occurrence:* Examples include symptoms occurring only in the presence of specific health care providers or on particular days, and unexpected similar symptoms in multiple family members.
3. *Lack of continuity of care:* Examples include false representation of health care contacts, refusal to release records, or insistence on unnecessary medical treatment while refusing reasonable treatment of the child.
4. *Inconsistencies:* Examples include reported symptoms that do not match objective findings (e.g., a caretaker reports severe anorexia and abdominal pain for 5 days in a child who appears well hydrated with no weight loss); reported medical history that does not match previous medical records (e.g., the parent reports the presence of a diagnosis of a more serious illness that was mentioned to the parent in passing as something to be ruled out, or the parent reports that test results are abnormal just because the test was done); a pattern of frequent diagnoses that do not match objective findings (e.g., a toddler with reported intestinal pseudo-obstruction eats ravenously with no resulting symptoms during lengthy hospitalizations); behavior of a parent that does not match expressed distress or reports of symptoms; other false or disturbing history provided by the parent; or medical record names and numbers that do not match. Collateral records and interviews with others can be helpful to determine the truth of inconsistencies.

Most primary care physicians are extremely hesitant to include MBP in a differential diagnosis unless they have ample evidence. In contrast to the identification of other forms of abuse, raising the question of PCF almost always results in a strong, aggressive, and often litigious response from the perpetrating parent. Mothers tend to be convincingly persistent and bold in their denial and often work relentlessly to engage others in authority in an at-

tempt to vindicate themselves. They are deliberate and persistent in their attacks on those professionals who bring to light their orchestration of their child's abuse. The intensity of such denial is another sign of the contribution of the parent's imposturing role to the maintenance of his or her personality functioning.

Assessment Timing and Location

Assessment is most successful in an inpatient setting. Both suspicion and opportunity tend to arise when the child presents with acute physical or psychiatric illness. Admission is frequently suggested as the best way to distance the parent from the child, provide additional diagnostic assessment of the child's complaints, and protect the child until a differential diagnosis is completed.

Optimally, the MBP protocol pulls together a clinical management team that has access to professional consultation regarding clinical care, child protection, documentation, and legal case management (see Table 12–2). Hospital child maltreatment or psychiatric consultation teams should be specifically trained about MBP and promptly contacted when medical or psychiatric units raise concerns about a case.

Implementing an MBP hospital protocol not only reduces the likelihood that individuals or units will make legal errors in managing suspected cases but also provides documentation of parental informed consent, execution of mandated legal duties, and evidence of a process of thoughtful "professional judgment" that is the best defense in the event of formal complaints against professional licenses or malpractice lawsuits. Use of a protocol reduces the number of false allegations and improves the chances that genuine MBP cases are identified and that the level of clinical risk to a child is accurately assessed. This, in turn, increases the likelihood that when required to respond to a case, state authorities will temporarily place the child out of the home or appoint a guardian to make medical decisions pending the outcome of further investigation.

Psychiatric Evaluation

An evaluation to address issues of parenting capacity and the best interests of the child in light of allegations of exaggeration, fabrication, and/or inducement of illness in a child by a parent is a complex process and ideally should be performed in the context of a forensic evaluation. When courts are involved, such evaluation is strongly recommended to inform and expedite decision making. Evaluations that are limited and attempted without court sanction are often not only unhelpful but also harmful; integration of all of the material about the child,

TABLE 12–2. Munchausen by proxy protocol for hospitals and health care facilities

Obtain individual and group case consultation with relevant medical specialties and a consultant knowledgeable about Munchausen by proxy.
Notify and consult with hospital child protection and legal staff.
Outline conditions under which covert staff or electronic surveillance would be initiated as a routine element of the protocol, as well as specification of who has the authority to initiate covert staff or electronic surveillance.
Describe how the mandated reporting requirement will be accomplished, including designation of a specific person to make the mandated report, content of the report to be made to state child protection authorities, and coordination with child protection.
Implement child safety initiatives such as the following: – Intensively monitor or temporarily suspend parent-child and family-child contact pending more definitive diagnosis and/or the involvement of child protection authorities. – Have in place a procedure by which a preemptive court order bars removal of the child by parents, or initiate a protocol permitted under state law by which a physician might place a "hold" on discharge pending notification of the court. Indicate steps to be followed in the event a parent attempts to remove a child against medical advice, including the role to be played by hospital security.
Designate a single source of information to whom the family or others with an interest in the case can turn for reliable information regarding the situation and the condition of the child.

Source. Adapted from Kinscherff R, Ayoub C: "Legal Issues in Munchausen by Proxy," in *The Treatment of Child Abuse.* Edited by R. Reece. Baltimore, MD, Johns Hopkins University Press, 2000, pp. 242–267. Used with permission.

parent, and family is needed to reach the best-documented independent evaluation.

In carrying out a psychological assessment in a primary care setting, evaluators should be aware of the need for comprehensive integrated evaluation and acknowledge the limitations of evaluations performed during a child's relatively brief stay in the hospital. In a comprehensive integrated evaluation (Sanders and Bursch 2002; Schreier et al. 2009), the focus of the assessment is on the caregiver-child interactional patterns. The details of this evaluation are outlined in Table 12–3. For more details about forensic assessment, see Sanders and Bursch (2002).

Although such an evaluation is extensive, the complexity of the MBP situation usually requires comprehensiveness so that juvenile and family courts can proceed with findings and dispositional issues that focus on the child's best interests. Ideally, a court-ordered evaluation provides the evaluators with the neutrality and the court's authority to work with all parties and to request the court's support in gaining access to individuals and records.

Placement and Visitation Issues

Safety—the first and primary management issue for the MBP child victim—often requires removal of the child from the home with no, or at most closely supervised, contact with the perpetrating parent. Placement with another family member may be appropriate if the relative appreciates the meaning and seriousness of the MBP diagnosis. Long-term management should include monitoring, team-based treatment, and case oversight by the court. Children typically recover dramatically from their physical illnesses when they are separated from their perpetrators.

Visitation should be considered very carefully in cases of alleged MBP because the child's victimization is typically significant and chronic. Victimization is likely to continue to occur with few exceptions, even in light of treatment. Children have been revictimized by perpetrators even during highly structured and well-supervised visits. In addition to the physical danger, visitation can offer enormous potential for psychological harm. Child victims of MBP tend to have long-term and serious sequelae to their abuse that are impacted by contact with their perpetrators. A number of experts (Lasher and Sheridan 2004; Parnell and Day 1998; Schreier et al. 2009) recommend that no direct or indirect contact be permitted between child and mother (or other family members, who might serve as a proxy for the mother) until a forensic evaluation is complete, a treatment plan for the family is in place, and the mother has made significant progress. If visitation is to be instituted, it should always be professionally supervised. In cases in which the child faces considerable danger of physical or emotional distress, visits should be discontinued. Reduction or discontinuation of visits is strongly recommended when, over time, the mother is unable to acknowledge perpetration, unless special circumstances warrant visitation to meet the child's best interests.

Table 12–3. Comprehensive mental health evaluation for Munchausen by proxy

Areas of focus
Child's illness experience and physical and psychological functioning
Parent's psychological functioning, with attention to differentiating factitious disorder by proxy and other possible psychological etiologies of parent's behavior, attitudes, beliefs, and actions toward child
Components of evaluation
Comprehensive record review and contacts with collaterals, including both professionals and laypersons (e.g., other family members)
Emotional and physical functioning of each parent or primary caregiver, past and present, through a series of clinical interviews and through psychological testing
Interviews with maternal grandparents, fathers and their family members, and any other relatives who have or wish to have contact with child
Review of child's past and present physical and emotional functioning, including but not limited to information about past and current daily routines, symptoms, and behaviors, obtained through observations, record review, and interviews with past and current caregivers
Observations of child with family members, with current caregivers, at school, and with perpetrator unless safety prohibits contact

Child placement is challenging when the possibility of family reunification is unclear. Successful family reunification can be achieved in a few cases only if the abuser and family members acknowledge the pattern of illness falsification, benefit from effective treatment, and accept and use a monitoring and support system. Reunification generally requires a prolonged period of time and necessitates an interim placement plan. In high-risk cases and cases with poor prognostic indicators, a long-term placement plan should be considered. Ensuring the victim's continuing safety requires careful planning by professionals knowledgeable of this condition.

Friends or family members may be caregivers if they genuinely believe the child must be protected from the suspected abuser and if they have the ability to protect the child from the suspected abuser. Caregivers who accept care of the child must also accept responsibility to follow all court orders, which may include the need to prohibit parental access to the child or to closely monitor visits. The caregiver must have a realistic expectation regarding any pressure or hostility he or she may need to endure to abide by the court orders. In Ayoub's (2006) study, one-third of the relative placements failed because of extended pressure on family members by mothers and their representatives. In cases of severe abuse that is met with denial by the confirmed abuser and other family members, adoption or placement in foster care without family access to the foster family is warranted. Termination of parental rights of fathers as well as mothers is often recommended.

Child Protective Issues and Reunification

MBP abusers engage in falsification compulsively; identification of the behavior is not an effective intervention to prevent it. Additionally, treatment for the abuser is frequently ineffective. McGuire and Feldman (1989) followed six victims of illness falsification and found that all six were abused during and after the abuser's participation in psychotherapy. Additionally, five of the six children continued to be abused after referral to child protective services. One might expect that parents genuinely interested in the health and safety of their children would agree to ongoing monitoring and support. However, when confronted with evidence of illness falsification, MBP abusers commonly engage in the following behaviors: entrenched denial; hostility; attempts to remove the child from the medical setting; threats of lawsuits; and a search for individuals, personal and professional, who are willing to support and strengthen their position of denial (Kinscherff and Famularo 1991).

Generally, predictors associated with poor outcome among parents seeking reunification include parental history of severe childhood abuse, persistent denial of abusive behavior, refusal to accept help, severe personality disorder, mental disability, and alcohol and/or drug abuse. PCF abuse, including nonaccidental poisoning and illness falsification, is most often associated with poor prognosis and increased child mortality (Jones 1987).

For those who have been victims of MBP abuse, predictors associated with poor psychiatric outcome include victimization that lasted more than 2 years, delayed permanent placement, unsupervised contact with their mothers, contact with mothers who had received insufficient treatment, and contact with fathers who were unable to care for them due to dependency on mothers (Ayoub 2006). Children fare the best psychologically when they are removed from their biological homes at a young age, are placed in permanent safe alternative homes as early as possible, and have little or no contact with the mother (or individuals she significantly influenced). The exception appears to be when abusing mothers fully admit their perpetration early and are sincere, are committed in their work to change their behavior, and complete an extended course of treatment over 5–7 years (Ayoub 2006).

To determine risk, child protection authorities compare the health status and medical care contacts of the child 1) prior to separation from the suspected abuser and 2) after separation and stabilization/rehabilitation. This technique is not reliable if complete separation and stabilization have not occurred. Children who have been victims of symptom induction (e.g., poisoning or suffocation) appear to be at greatest risk for death, although iatrogenic deaths as well as significant physical and psychological morbidity also occur as a result of procedures and treatments provided to children based on exaggeration and fabrication alone. Assessing risk may be challenging when the victim has a legitimate chronic illness that has been manipulated by the parent to create excessive symptoms or disability.

The persistence of denial of MBP by the parent perpetrator in the face of a finding by the court is justification for denial of contact and for placement of the child outside the home. If denial continues, then termination of parental rights with the father as well as the mother is often recommended.

Treatment Overview

The very nature of the credible deception that is part of MBP makes the use of multidisciplinary teams critical for assisting in the identification and treatment management of MBP. The MBP team serves not only as a means to improve the accuracy of the diagnosis and the progress of treatment but also as a clinical and legal risk management mechanism to protect the child. After identification of MBP, all professionals providing services to the child and family (child protection professionals, caregivers, physicians, and therapists) form a team and work together to share information and coordinate treatment goals at least monthly. This team must be familiar with the details of the case and have open and regular communication. The suspected abuser should never serve as the primary source of observations and information regarding the child's medical history and health.

The treatment team is most effective when organized under the consultation and coordination of a court-appointed MBP expert and court involvement; this consultant can also serve as liaison to the juvenile or family court. Continued court oversight is a central requirement for the success of this treatment process (Ayoub 2006; Ayoub et al. 2000; Parnell and Day 1998; Sanders 1996; Schreier et al. 2009). Treating therapists, who are also vulnerable to being misled by someone with factitious disorder, should demonstrate full knowledge of the condition of MBP and its challenges in therapeutic situations or be willing to accept supervision from a consultant with such experience. The best outcomes have been reported among those parents who fully admit their abusive behavior, engage in meaningful integrated therapy (Ayoub 2006; Lasher and Sheridan 2004; Parnell and Day 1998), are committed to changing their behavior, and demonstrate altered behavior and empathy for the victims over time. Treatment often occurs in three phases (Ayoub 2006), as described in the following subsection.

Integrative Treatment of Maternal Perpetrators and Their Partners

Phase I: Identifying and Exploring Perpetrators' Own Childhood Victimization

Treatment for perpetrators is based on three prerequisites: genuine acknowledgment of perpetration, psychiatric stability in daily life, and successful treatment for substance abuse (Ayoub 2006; Lasher and Sheridan 2004; Parnell and Day 1998; Schreier et al. 2009). The first phase of treatment for maternal perpetrators following acknowledgment is typically identification and exploration of their own victimization and its relationship to their attitudes and actions toward their children. Victimization during childhood has been a focal component of the treatment of mothers. Central to progress in treatment of a mother is helping her to understand her own victimization in the context of the patterns of victimization of her child and to bring these two traumatic series of events into consciousness so that they can become connected. This integrative process also serves to reduce isolation and to diminish the cognitive distortions that these mothers tend to develop about others. Mothers learn to trust others with whom they can check their impressions about others. This integration of emotion, cognition, and action and the reduction of cognitive distortion not only are the basis for treatment of MBP perpetrators but also are critical to general trauma treatment (for additional details related to treatment, see Ayoub 2006; Ayoub et al. 2000; Parnell and Day 1998).

Another critical component of the first phase of treatment is exploring how the marital relationship contributed to and perpetuated the child's abuse. Couples who stay together must rework marital relationships to establish a more active system of checks and balances in relation to their communication and the safety of their children. Each parent is accountable to the other for this process. This requires that partners actively acknowledge their enabling roles in the victimization of their children. Acknowledgment is made easier if family members support the need for the child's safety and are not taken in by minimization of the child's abuse.

Phase II: Reworking of the Child-Family Relationship

The second phase of the therapeutic process is the reworking of the relationship of the child to the family, with the mother-child relationship as a central component of this process. The elements to be addressed during this part of the process include maternal identification of the child as a unique individual rather than the object of maternal need gratification, followed by a significant period of redefinition of the attachment relationships within the family and a reframing of the child's identity from that encompassing illness to one embracing wellness. Safety issues for parent and child should be addressed continually along the way. Some mothers, for example, do not

want to assume any responsibility for a child when he or she is legitimately ill. Fathers and other relatives may have specific roles as active participants in these situations.

Communication between perpetrator and victim about the MBP abuse is another critical part of the healing process. Mothers in a small treatment group were able to tell their children about their abuse and were responsive to questions from their children about the factual basis of the children's recollections (Ayoub 2006). This process greatly enhances the children's ability to differentiate reality from perceptions that were distorted for them with self-blame or denial.

Finally, marital communication, which was reframed in the first phase, is actively supported and reinforced through both marital and family therapy during the second phase.

Phase III: Stabilization and Normalization of the Child-Perpetrator Relationship

The last phase of treatment for mothers emphasizes the stabilization and normalization of healthy relationships over time. During this phase, contact between the maternal perpetrator and the child increases in important ways, and the mother is given gradually extended responsibility for being with and caring for the child, at first with supervision. Often, supervision shifts from being the responsibility of the professional to the responsibility of family members, especially the father. The child can fully transition home if the father or another live-in relative can take responsibility for monitoring the interaction between the child and the perpetrating mother on an ongoing basis.

One of the perpetrator's critical tasks is to monitor her own behavior and reflect on her interaction with her child in the context of their daily activities together. The goals of therapy are to support the mother in solidifying her view of her child as a unique and changing healthy human being and to continue to reconstruct the attachments to the child and immediate family in the context of health. The maintenance of this wellness focus is a critical goal, which each therapist and the team as a whole should evaluate in an effort to enforce the maintenance of a safe and nurturing environment. This reinforcement should continue to extend open communication and honesty in the family relationships and continue to reduce isolation and illogical thinking in the perpetrator. By the end of this phase, the child should be at home and the mother should have increased unsupervised contact. In many cases, mothers do not ever return to taking responsibility for a child who is ill or in need of a health-related appointment; most mothers appreciate this safeguard for both themselves and their children.

Treatment for Custodial Fathers or Family Members

Fathers who are able to separate both physically and emotionally from the mothers' belief systems, restructure the family system to acknowledge MBP, and actively work to protect their children have been able to safely parent following a lengthy intervention period. Safe and secure parenting is contingent on the father's ability to function as the primary caregiver, a role for which many fathers in MBP cases are poorly equipped; as a result, an assessment of their parenting capacity is recommended.

Treatment for fathers is also a central component to the success of intervention with mothers, especially if the couple is intact. Fathers who continue to support the denial of MBP significantly reduce the odds for successful treatment of mothers. In addition, treatment requires that fathers maintain an active presence in their families, a role that they have often abdicated. Through treatment, they are given the extended role of being an active parent with clear responsibility for protecting and nurturing the children. Some fathers have difficulty considering participation in therapy. They may avoid or deny that they had a role in their spouse's actions, even when they are able to acknowledge the abuse of their children. While in treatment, fathers also explore the meaning of anger and control issues; growth in developing a more psychological mode of thinking is one sign of progress in treatment. A number of fathers need help with basic parenting skills. All of these strategies are aimed at reducing paternal rigidity, the propensity for denial, and the active enabling that fueled the MBP abuse. If fathers have issues with drugs, alcohol, or domestic violence or if they have been seen by their partners as ill, these issues also must be addressed before they are given primary responsibility for the children. In several cases, fathers initially took custody of their children but were unable to cope with the responsibility in the long term (Ayoub 2006).

Family members who take custody of the child victim also may need supportive intervention. Placement of a child with relatives who acknowledge the child's victimization tends to be stressed by the intense and often unrelenting pressure by the mother

and her advocates. The mother's active attempts to increase contact with the child and to manipulate any approved contact tend to disrupt placements and make the child's ongoing care difficult. Whether out-of-home placement is with relatives or professional foster parents, the mother's ongoing criticism of their care of the child is frequently relentless.

Treatment for Child Victims

Mental health treatment for the child typically includes first developing safety and social skills and then reducing self-blame, embracing a wellness script while releasing an illness script, improving attachment relationships and reducing oppositionality, developing autonomy, reducing dissociation and compartmentalization of thinking and feeling, maintaining appropriate boundaries, understanding and managing family conflicts and loyalties, and reframing positive peer relationships. By early adolescence, most of the children are encouraged to consider and rework their understanding of MBP victimization. Young teens who are unable to work through their victimization have more difficulty negotiating adolescence than those who are able to reorganize their experiences in such a way as to reduce their sense of blame and confusion. Children who receive little or no treatment directed at their victimization are more likely to struggle with acting out and oppositionality, as well as depression and self-harm issues.

Efforts should be made to normalize and optimize the child's functioning as much as possible. Psychotherapy is indicated unless the victim is an infant or preverbal toddler. Victims of illness falsification may deny it; have intense anger at the medical team, abuser, or other collusive family members; have residual sick-role beliefs and behavior; and/or have posttraumatic stress disorder (especially in medical settings), self-esteem problems, difficulty defining family relationships, and immense grief (Ayoub 2006; Bools et al. 1993; Bursch 1999). The psychological impact of MBP victimization appears to be significant and chronic. Ongoing problems with social interaction, attention and concentration, oppositional disorders, patterns of reality distortion, poor self-esteem, and attachment difficulties with adults and peers are documented in the literature (Libow 1995). Although children can present as socially skilled and superficially well adjusted, they often struggle with the basic relationships. Lying is a common finding, as is some sadistic behavior toward other children.

Children in stable long-term placements in which they were protected from their mothers and supported in their move toward health had fewer long-term difficulties than children who had more exposure to their mothers and less stable placements (Ayoub 2006). Even after an extended recovery, many children remained trauma reactive and were vulnerable to cyclical anger, depression, and oppositionality (Libow 1995). Ayoub (2006) found that despite maternal legal rights being restricted or terminated due to MBP, the mothers contacted all of the children in her study who had reached adulthood (n=8) around the time the children turned age 18 years. In spite of up to 10 years of no contact, the mothers presented themselves to their children and typically expressed that they loved their children and that they were not guilty of the MBP victimization. Therefore, professionals who treat these children may need to include a plan for the experience of reconnection and possible continued victimization after legal contact restrictions end when the children become adults.

Concluding Comments

MBP is a disorder that includes the significant and repeated abuse of a child, most often by the child's mother, who exaggerates, fabricates, and/or induces illness in the child. The physical danger to the child is considerable, and the psychological consequences to the child based on the violation of trust by the parent are tremendously powerful and enduring. Because perpetrators are so skilled at portraying good and caring mothers, they are often convincing, even if the underlying evidence of abuse is apparent. Understanding the parent with FDP is extremely important in addressing safety and mental health issues for the child. Only with this knowledge are protection and support of the child possible. In addition, with careful diagnosis and multidisciplinary treatment collaboration, a chance at treatment is possible in a small number of cases.

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13

Treatment Adherence

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Treatment adherence is frequently imperfect in children and adolescents and is a common reason for referral in the pediatric setting (Bender 2006; Bender et al. 2006; Johnson et al. 1986; Lurie et al. 2000; Molmenti et al. 1999; Rapoff 2006; Rianthavorn et al. 2004; Smith and Shuchman 2005). Nonadherence with treatment is one of the leading causes of hospital admissions, emergency room visits, and mortality (Berquist et al. 2006; Butler et al. 2004; Sublett et al. 1979). However, despite its clear clinical importance, medical nonadherence is rarely managed in a systematic way (Shemesh 2004a). In this chapter, we outline empirically based approaches to the assessment and treatment of this critical public health problem.

Definition

The World Health Organization (2003) has endorsed the following definition of adherence: "the extent to which a person's behavior—taking medication, following a diet, and/or executing lifestyle changes—corresponds with agreed recommendations from a health care provider." This definition highlights three critical points: 1) that patient agreement to the recommendation is essential, 2) that adherence is a behavior, and 3) that the degree of adherence is important.

The definition posits that the treatment recommendations have to be agreed upon by the patient, the parent, or both. In some cases, the child's agreement may not be required, and seeking agreement only from the caretaker may be adequate. Accordingly, without such agreement, the patient's behavior should *not* be described as nonadherence but rather as a disagreement with medical recommendations. Implicit is the notion that the patient and/or caretaker receives accurate and complete treatment information. If this does not occur, then deviations from the desired treatment should similarly not be attributed to a lack of adherence. Another important aspect of the definition is that nonadherence is considered a behavior and should not be defined as a mental health disorder. Finally, an emphasis is placed on assessing not only *whether* the patient follows a treatment recommendation but also *to what extent* it is followed. In certain situations, a patient might still be considered to be sufficiently adherent even if recommendations are not followed fully. The point at which nonadherence becomes clinically significant (i.e., when the degree of nonadherence results in the patient being unable to achieve the anticipated improvement in medical outcome) has been termed the *adherence threshold.*

The adherence threshold is related to patient and disease characteristics. Researchers frequently either ignore this issue or assume an adherence threshold that may or may not be valid (e.g., "the likelihood that a patient has taken the medication within 2 hours of the prescribed dose," or "adherence to 70%

or more of the regimen was considered adequate"). The lack of a defined adherence threshold or use of an arbitrary definition makes it difficult to interpret the results or compare studies. Furthermore, without data concerning the precise threshold for the degree of nonadherence that is clinically significant, providers have difficulty identifying the "highest risk" nonadherent patients. Although an effort is currently under way to better determine adherence thresholds in specific populations (Stuber et al. 2008), further work is needed in this area.

EPIDEMIOLOGY

Treatment adherence rates vary widely depending on the nature of the specific physical condition, the type of treatment prescribed, and the criteria used to define adherence (La Greca 1990). No accepted gold standard exists to assess adherence. Many studies rely on self-report, a technique that has been identified as unreliable in adherence research (Bender et al. 2003; Chesney 2006). The use of diverse methods of assessment across studies makes it problematic to compare results from the different studies or to reliably arrive at single estimates of adherence prevalence. Given these limitations, reviews suggest that 33% of patients with acute physical conditions and that 50%–55% of those with chronic physical illnesses fail to adhere to their treatment regimens (Shaw et al. 2003). Similarly, the World Health Organization (2003) reported a nonadherence rate of about 50% in industrialized nations.

Studies of physical and quality-of-life outcomes have shown a direct relationship between nonadherence and rates of morbidity and mortality in, for example, patients with asthma (Bender et al. 1997), HIV (Munakata et al. 2006), diabetes mellitus (Ellis et al. 2008), and cardiovascular illness (Bramlage et al. 2007), as well as transplant recipients (Dobbels et al. 2005; Fredericks et al. 2008; Molmenti et al. 1999; Morrissey et al. 2007; Shemesh 2004a, 2004b, 2007; Shemesh et al. 2000, 2004, 2007; Venkat et al. 2008; Vlaminck et al. 2004). Treatment nonadherence is considered the single most important determinant of organ rejection and poor medical outcomes (Shemesh et al. 2007; Venkat et al. 2008). The increased morbidity associated with nonadherence has been related to higher health care costs, with an estimated cost to the U.S. health care system of as much as $100 billion per year (Berg et al. 1993; Lee et al. 2006; Muszbek et al. 2008).

ASSESSMENT

The management of nonadherence depends on reliable observation and measurement. Because direct observation is rarely possible, various methods of assessment have been proposed, each of which has its own shortcomings (Johnson 1992; Shemesh et al. 2004). Nonadherence, like most behaviors, is dynamic in nature such that a patient may present as nonadherent at one point in time and adherent at another (Johnson 1992). Therefore, any method used to measure adherence must be applied over time.

Subjective Methods

Self-Report Measures

Self-report is not a reliable way to assess adherence. The consensus is that self-report measures should not be used in isolation to assess adherence (Bender et al. 2000, 2003; Brener et al. 2003; Chapman 2004; Choo et al. 1999; De Geest and Vanhaecke 1999; De Geest et al. 1996; Farley et al. 2003; Freund et al. 1991; Goverover et al. 2005; Inui et al. 1981; Newell et al. 1999; Osterberg and Blaschke 2005; Shemesh et al. 2004; Waterhouse et al. 1993). Patients are more likely to acknowledge nonadherence if they are approached in a nonjudgmental way and believe that adherence is an important part of their disease management (Penkower et al. 2003). However, although patient reports of adherence are unreliable, self-reports by patients who do admit to nonadherence are considered reliable (Gehi et al. 2007).

Clinician Reports

Clinician reports also are not considered a reliable method to assess patients' treatment adherence (Shemesh et al. 2004). This lack of reliability may be due to the tendency of clinicians to correlate medical outcome with adherence, despite a lack of evidence to show that poor outcome is always a result of nonadherence.

Objective Methods

Pill Counts

Although commonly used, pill counts are not a reliable method to assess treatment adherence. For example, patients may remove pills from their medication containers but not take them or may take the correct number of pills but at incorrect times (Johnson 1992). In addition, the routine use of pill counts is time-con-

suming. Nevertheless, pill counts are currently used as a first-line "crude" measure of adherence.

Prescription Refill Rates

Prescription refill rates have been successfully used to assess treatment adherence in a variety of clinical and pharmacy settings (Bender et al. 2006; Choo et al. 1999; Grymonpre et al. 2006; Hess et al. 2006; Kindmalm et al. 2007; Krigsman et al. 2007; Nilsson et al. 2006; Pedan et al. 2007; Stroupe et al. 2006). This method requires effective communication between the patient's clinician and the pharmacy. Requesting a prescription refill, however, does not mean that the patient has taken the previous medication, as discussed in the previous subsection on pill counts.

Electronic Monitoring Devices

Electronic monitoring devices, such as electronic caps (e.g., Medication Event Monitoring System [MEMS] caps), can be used to register the date and time a pillbox is opened. Computerized software is used to record the number and timing of openings. Although sometimes described as state-of-the-art measures of adherence, these devices are not always reliable. For example, patients may open the pillbox but not remove a pill, or they may discard the pill after removing it. In addition, data are lacking about the importance of the precise information obtained. For example, taking doses of a medication 10 hours rather than 12 hours apart may not be clinically significant. Moreover, these devices cannot be used to monitor the intake of liquid medications. Data also suggest that a significant proportion of patients refuse to use or incorrectly use these devices (Shellmer and Zelikovsky 2007). Although electronic monitoring holds promise, it is not currently in routine clinical use.

Medication Blood Levels

Blood levels of medications drawn at a single time point to assess adherence may be misleading because medication level fluctuations are common and expected. The fluctuation of medication blood levels over time can provide a much more accurate assessment of adherence (Shemesh et al. 2004). The standard deviation of medication blood levels, which represents the fluctuation between individual blood levels, has been suggested as an adherence measure (Shemesh 2007; Shemesh et al. 2004, 2007; Venkat et al. 2008). This method assumes that medication blood levels are closely related to intake, which is not always the case. Individual medication blood levels may vary from one patient to another because of individual differences in metabolism or absorption that are unrelated to adherence. However, looking at the degree of fluctuation of medication blood levels over time within the same subject is less prone to be influenced by these factors. Unfortunately, many medications do not have an assay that is readily available for routine clinical use. When such information is available, information about the degree of fluctuation of medication blood levels over time appears to be a promising direct measure of adherence.

Metabolic Medication By-Products

By-products of medication metabolism have been used to measure adherence (Rumbo et al. 2002). One significant benefit of this method is that metabolites accumulate over time, and hence their level reflects the level of medication intake over time rather than recent use. This method may be less sensitive than others in that only a significant deviation from the prescribed regimen will be detected. Furthermore, drug metabolism may be affected by factors other than intake (e.g., level of activity of an enzyme that is responsible for the metabolite that is being measured) and may therefore differ across patients. This method is applicable to only a minority of cases in which metabolic by-products of a medication can be detected.

Response to Treatment

As noted earlier, clinicians have used treatment response as an adherence measure. Examples of such outcomes include hemoglobin A1C levels in diabetes mellitus and rejection episodes in transplant recipients. Patients whose illness is not well controlled are more likely to raise suspicions in their clinicians that they are nonadherent than are patients who are doing well. This approach has several shortcomings. First, medical outcomes are related to many factors other than adherence, and as a result this method is nonspecific. Second, when outcomes are used, nonadherent patients are identified only after the medical outcome has been compromised. Reliance on this method may therefore lead to delays in nonadherence identification and consequent failure to prevent adverse medical consequences.

Clinic Attendance

Rates of clinic attendance have been used as a measure of adherence (Fredericks et al. 2007). Whether this measure is correlated with adherence to other treatment recommendations (e.g., medications) is unclear. When adherence to clinic visits is measured, care must be taken to discount instances in which the patient either rescheduled an appointment or was unable to attend for logistical reasons (e.g., inpatient admission).

Risk Factors

Risk factors for treatment nonadherence include a myriad of issues and barriers related to patients and their environments. Several attempts have been made to model risk categories as a part of a single conceptual framework (e.g., the health-belief and self-efficacy models) (Chao et al. 2005; DiMatteo et al. 2007; Drotar 2000; Graham et al. 2007; Härkäpää et al. 1991). Although these models have merit, a biopsychosocial model is particularly helpful in understanding and delineating specific nonadherence risk factors (Novack et al. 2007) (see Table 13–1).

Research on nonadherence risk factors has been cross-sectional and, as such, does not allow a determination of potential causal relationships. In addition, the influence of outcome mediators or moderators has not been well studied. Meta-analyses of existing studies have been used to stratify risk factors and treatment effects (DiMatteo et al. 2000, 2002; Fischbach et al. 2004; Iskedjian et al. 2002; Kothawala et al. 2007; Mills et al. 2006; Nieuwkerk and Oort 2005; Nosé et al. 2003; Peterson et al. 2003a, 2003b; Simpson et al. 2006; Sofi et al. 2008; Takiya et al. 2004; Voils et al. 2007; Wu and Roberts 2008). Problematic issues in these meta-analyses are that the assessment methods vary across studies, often do not correlate with each other, and may not even examine the same behavior (Kikkert et al. 2008). Attempts to lump different studies together using the same analytic strategy may lead to results that cannot be replicated and do not truly capture the clinical realities.

These problems may explain the significant discrepancy in the results reported in different meta-analyses. For example, one meta-analysis of 17 studies of pediatric transplant recipients found that psychosocial factors were significantly related to nonadherence (Kahana et al. 2008), and the authors concluded that psychosocial factors are the most important risk factors in this field. By contrast, another meta-analysis of 147 studies of adult transplant recipients found little evidence for a relationship between psychosocial factors and nonadherence, and these authors' recommendation was that psychosocial factors should *not* be the sole focus of research and intervention (Dew et al. 2007). Until the measurement of adherence becomes more uniform, results of such analyses should be interpreted with caution. Although one can reasonably assume that psychosocial factors do play a role in determining pediatric nonadherence, one must keep in mind the potential influence of provider-related and health system factors.

Developmental Influences

Every developmental stage has its own unique challenges. Knowledge of these issues may be helpful in understanding and responding to nonadherence.

Preschool- and School-Age Children

Young children (typically ages 0–3 years) are dependent on their parents for administering medications and for following medical recommendations. For these children, nonadherence is related to the caretaker's inability to follow recommendations. As children grow older, it is increasingly important for clinicians to take into account the interaction between caretaker and child, childrearing practices, patient temperament, and the role of any existing disability when responding to nonadherence to treatment regimens (Garrison et al. 1990). As children become increasingly autonomous, child and caretaker conflicts can emerge that lead to nonadherent behaviors. Cognitive-behavioral strategies for children and their caretakers become useful in approaching these difficulties with school-age children.

Adolescents

Treatment nonadherence occurs most commonly during adolescence (; Drotar 2007; Iannotti et al. 2006; La Greca 1990; McAllister et al. 2006; Wray et al. 2006). The treatment demands of chronic physical illness can interfere with the adolescent's normative needs for separation from his or her parents. Adolescents may act out conflicts with their parents through overt or covert refusal to adhere to treatment. In addition, parental guilt related to their child's physical condition may lead parents to compensate for these feelings by failing to set limits on their child's behavior; this can indirectly encourage nonadherence. Additional developmental issues

TABLE 13–1. Biopsychosocial model for risk factors associated with nonadherence

Biopsychosocial correlates	Risk factors
Biological	Factors related to the illness
	Lengthy illness duration
	Illnesses with few symptoms
	Illnesses associated with cognitive decline
	Factors related to the treatment
	Complexity of the treatment regimen
	Unpleasant medication side effects
	Treatments with high financial costs
	Medications that are hard to swallow or have a bad taste
Psychological/psychiatric	Low level of perceived efficacy of treatment
	Adolescence
	Behavioral difficulty history
	Internal locus of control
	Psychiatric disorders, such as posttraumatic stress disorder, depression, psychotic spectrum disorders, substance use disorders
Social	Immediate environment of the patient
	Lack of parental supervision
	History of child abuse
	Parental conflict
	Parental psychopathology
	Low socioeconomic status
	Lack of family cohesion
	Poor pattern of family communication
	Characteristics of the care delivery environment
	Lack of appointment reminders
	Scheduling difficulties
	Barriers to getting treatment (e.g., lack of insurance coverage)
	Characteristics of the provider
	Time spent with provider
	Provider perceived as supportive
	Characteristics of the health care system
	Fragmented vs. cohesive
	Universal vs. private
	Reimbursement model that hinders coordinated care

contribute to adherence difficulties in this age group. Adolescents are prone to misjudging the consequences of nonadherence due to cognitive difficulties in assessing personal risk, lack of experience with the consequences of risk, ignorance, and denial (Brooks-Gunn 1993). The adolescent's desire for acceptance and conformity with his or her peers often conflicts with treatment adherence (Brooks-Gunn 1993). Chronic physical illness can carry a stigma, and the pressures for conformity may result

in resistance to medication treatment recommendations, particularly involving those medications that have cosmetic side effects (Friedman and Litt 1987). The transition of responsibility for following medical recommendations from the parent to the adolescent is an important current focus of research (Annunziato et al. 2008).

Treatment Interventions

Treatment for nonadherence is best conceptualized as a multimodal effort that should target both the child and the caretakers. Preventive efforts should be aimed at all children and adolescents with physical illnesses to enhance treatment adherence and include a gatekeeping strategy for the early identification of nonadherent individuals. Specialized treatment strategies for identified or suspected cases can then be offered (see Table 13–2).

Limitations of Intervention Studies

Selection Bias

Selection bias may influence the results of intervention research in studies in which subjects may not have major adherence issues. This potential for bias is almost always an issue, because those subjects who agree to enroll in studies are generally motivated and therefore are likely to be at lowest risk of nonadherence. This factor is particularly important in studies that involve elaborate and labor-intensive procedures (e.g., lengthy mental health assessment protocols, complicated treatments), which may lead the least adherent patients to drop out. Selection bias is a problem in adherence studies that are "piggy-tailed" onto existing drug studies, because drug manufacturers typically ensure, prior to enrollment, that the patients who are enrolled in their study are likely to be adherent. When evaluating a manuscript related to nonadherence, the reader should therefore pay close attention to the problem of selection bias.

Limitations in the Use of Meta-Analytic Techniques

Attempts have been made to gauge the effect sizes of specific intervention strategies by combining studies, using meta-analytic methods. However, assessment methods for nonadherence vary across studies, and the efficacy of a specific treatment is dependent on the way the outcome measure (adherence) is defined. For example, in a recent multicenter study

Table 13–2. Summary of approaches used to enhance treatment adherence

Treatment modality	Indications	Individual responsible for implementation
Preventive educational approaches[a]	All patients who are seen in a clinic	Clinic staff
Family-based approaches	Patients whose families are at risk (e.g., history of abuse) or are known to be distressed or dysfunctional	Care provider familiar with family systems approaches to treatment[b]
Behavioral treatment	Patients who are known to be nonadherent	Clinic staff and family members, with consultation with a mental health provider
Specific psychiatric or psychological interventions	Patients who are suffering from a known psychiatric disorder or who have behavioral health risks	Psychologist, psychiatrist, or clinical social worker
Changes in medication regimen	Patients whose nonadherence is thought to be related to either the side-effect profile of a medication or difficult administration	Medical team
Changes in organization of structures beyond the patient and family[c]	Patients whose nonadherence is related to factors such as clinic settings or insurance status	Social workers and clinic staff

[a]Nonspecific.
[b]A skilled individual is seldom available in clinical settings to administer these treatments.
[c]An example: helping the patient to get medication coverage benefits.

(Kato et al. 2008), 375 pediatric oncology patients were randomly assigned to receive either a video-based intervention to improve adherence or a video game (without the intervention) alone. In this study, adherence was assessed by four different methods. Results from the self-report tool, which was administered to all of the patients, determined that the intervention did not improve adherence. However, the intervention seemed to have worked for a small subgroup that used electronic monitors. In an even smaller group, in which medication metabolites were reviewed as indicators of adherence, one metabolite (6-mercaptopurine) but not the other (6-thioguanine) showed a significant improvement. Furthermore, no significant correlation existed between those four adherence measurement methods.

If the same study finds strikingly different treatment results when different methods of adherence detection are used, certainly grouping together *different* studies in a meta-analysis is risky and might result in estimates that are inaccurate. Thus, when the efficacy of a specific treatment strategy is considered, it is important to know what method was used to measure adherence. Meta-analyses, therefore, should be used very cautiously, if at all, when evaluating adherence research. They can provide support for specific interventions only if the meta-analyzed studies are comparable (i.e., replication studies), and they can serve as important tools to highlight general principles that can form the basis for future studies. However, they should not be interpreted as conclusive evidence for treatment efficacy and should not be used to try to determine whether a certain treatment is more promising than others.

Prevention

The hallmarks of interventions aimed at preventing nonadherence include 1) creation of a systematic method to assess adherence as a part of routine clinical care (e.g., routine questioning about it, routine medication blood level determinations); 2) provision of general and specific education about medication taking; and 3) prospective assessment of risk factors that are known or suspected to be related to nonadherence and addressing these risk factors as they are identified and before nonadherence occurs.

Specialized Treatments

Nonadherence can be managed in several ways once diagnosed, or even when suspected but not confirmed. Available treatment strategies may be classified as 1) treatments that focus on patient education and awareness, 2) treatments that focus on the adherence behavior itself, and 3) treatments that seek to reduce risk factors (e.g., psychopathology, poor social supports) that are considered to be the main reason for the patient's nonadherence. Approaches to treatment vary, and in addition to single-themed approaches addressing the patient may include family-based interventions, multicomponent interventions, and approaches that address social and contextual factors.

Although several evidence-based treatments do exist, Lemanek et al. (2001) concluded a review by stating that none should be considered "well established." Indeed, pediatric adherence intervention research is more often than not underpowered, performed in single centers, and unblinded, all of which severely limit the degree to which conclusions may be drawn. Nevertheless, in the following sections, we highlight some of the more promising approaches for which there is some evidence base.

Educational Approaches

Education that is provided to a patient who is known to be nonadherent is different from the education that can be given as a preventive measure to an entire clinic population. Once the patient is known to be nonadherent, education can be *interactive* (involving a discussion about educational needs) and *targeted* (addressing specific areas of deficiency in knowledge). This education, therefore, is an individualized effort to establish what the patient needs to know or understand in order to improve his or her adherence. The components of this approach are the *assessment* of the patient's (and parent's) actual understanding of the prescribed regimen, its administration, and the reasons for it; the *correction* of any misinformed notions that are discovered; and an *open discussion* about how the medication is being taken, how it can be better integrated into a patient's lifestyle, and what concessions or resources are needed to make medication taking possible. Thus, education is an interactive process in which the clinician tries to identify and address the patient's cognitive and procedural needs.

Although educational approaches have been shown to have limited but significant effects on adherence (Becker and Allen 2001; Bender 2002) and to have only a small effect size in improving adherence (Kahana et al. 2008), they are considered "promising" in some disease categories (Lemanek et al. 2001). Because they are relatively straightfor-

ward and may not be labor intensive, they could be attempted as a first line of treatment, with the caveat that education alone might not be sufficient in some cases (Katz et al. 1998).

Behavioral Approaches

Nonadherence can be addressed using behavior modification techniques that include frequent monitoring and supervision (Shemesh et al. 2008a, 2008b) and reinforcing desired behaviors by providing incentives rather than focusing on negative behaviors. Specific behavioral plans with appropriate incentives and an effective system of monitoring and rewards should be tailored for each patient. The family's (typically, a parent's) ability to implement behavioral techniques is frequently the most important determinant of success. Behavioral approaches to the treatment of nonadherence are probably more efficacious than educational efforts in some disease processes (Kahana et al. 2008). Thus, a behavioral approach should probably be considered in most (if not all) cases in which nonadherence has been identified. A specific subtype of a behavioral approach is the use of technology-based interventions (e.g., cell phone reminders). These interventions can be easy to implement on a large scale and could be relatively easy to follow, but more information is needed about their efficacy because very few studies to date have investigated their use in children (Kahana et al. 2008).

Risk Factor–Targeted Approaches

The association of a risk factor with nonadherence does not necessarily mean that the treatment or elimination of that risk will improve adherence. First, some risk factors may not be treatable. Second, other risk factors or reasons for nonadherence may appear alongside an identified factor. Addressing the whole spectrum of risks in a given patient might be a far better strategy than focusing exclusively on one factor (e.g., for a patient with mental retardation, the focus of treatment might not be on the mental retardation per se but rather on strengthening the family support). Thus, for example, although depressive disorders have been associated with nonadherence (Gibbie et al. 2007; Nau et al. 2007; Rietveld and Creer 2003; Vranceanu et al. 2008), robust targeted treatment studies are generally lacking about whether the treatment of depressive disorders per se is a valid strategy to improve adherence in most patients. Until more data are available, the following suggestions can be made:

- Assess risks using a comprehensive framework. The framework that we prefer is that of the biopsychosocial model. Some risk factors that are associated with nonadherence are summarized, using that model, in Table 13–1, which appears earlier in this chapter.
- Once a risk assessment has been finalized for a given patient, determine which risks are most relevant and are most likely to improve with intervention.
- Involve a team of providers to address specified risks. Psychiatrists may be best equipped to assist with frank psychopathology, whereas other mental health professionals may be better equipped to address family dynamics. Even a cursory review of Table 13–1, however, suggests that most risks are not related to mental health concerns and are probably better addressed by other team members.

Family-Based Approaches

Arguably, in most cases of pediatric nonadherence, the caretaker of the child needs to be involved. Family members can provide monitoring and supervision of a nonadherent child and assist in the implementation of a behavioral plan. Family members may also help address barriers to adherence, such as financial hardship, and provide useful information to the treating physician that may help guide the treatment. Conversely, a serious disruption of family structure and support (e.g., the disruption seen in families in which the child was abused in the past) is associated with severe and persistent nonadherence (Shemesh et al. 2007). In those and other less severe cases, interventions that are aimed at the family unit become important (Patton et al. 2008). Addressing the relationships between the child and the rest of the family, with a focus on behavior modification techniques, has been investigated as a way to improve adherence and medical outcomes (Wysocki et al. 2008) and should be attempted as indicated. Treatments that use systemic family approaches have been shown to be promising in improving medical outcomes, especially in children with diabetes (Wysocki et al. 2007, 2008), although researchers have not yet discovered whether the improvement in outcome is mediated exclusively by improvement in adherence.

Multicomponent Interventions

Due to the myriad risk factors that contribute to nonadherence and the different kinds of adherence that one might wish to address (e.g., adherence to

medications, diet recommendations), employing different strategies may be more beneficial than focusing on one approach alone. Thus, adherence interventions might be tailored to individual patients, or they might be eclectic and involve different modalities and even different providers. Although standardizing and studying such efforts are difficult, the few studies that have examined these approaches are promising. A meta-analysis by Kahana et al. (2008) indicated that multicomponent approaches might offer a medium to large effect size, and Lemanek et al. (2001) judged them to be "probably efficacious." Research and clinical teams should clearly define which specific items are included in multicomponent treatments in order to be able to "dismantle" the results in subsequent efforts and try to determine which components might be more or less promising than others. Dismantling studies are important to increase the efficiency of proposed multicomponent interventions.

Interventions Targeting Social and Contextual Factors: Beyond the Patient and Family

The clinic's structure, the patient's insurance status, and other social and contextual factors that are beyond a patient's or family's control may also be important. For example, improving the training of residents in a clinic and decreasing copayments for certain medications have both been advocated to improve adherence and disease control (Bernard et al. 1999; Chernew et al. 2008). Interestingly, few interventions that are targeted at the provider and societal levels have been rigorously studied in pediatric adherence research (Kahana et al. 2008). We believe that such interventions have great promise. In current practice, providers do not routinely inquire about adherence, do not provide ongoing comprehensive support for adherence promotion, and rarely check with patients concerning their understanding of treatment. Providers seldom anticipate or manage barriers to adherence or provide developmental "updates" or anticipatory guidance for children, adolescents, and families across developmental transitions (Pai and Drotar 2009).

Concluding Comments

Nonadherence to medical treatments is a major reason for treatment failure. A substantial body of knowledge exists about the definition of, assessment of, risk factors for, and treatment of nonadherence (Rapoff 1999). A safe conclusion is that assessment of adherence should be incorporated into clinical practice in any clinic that is caring for children who are chronically ill. When used as primary prevention, educational efforts may improve adherence. When nonadherence is suspected, an evaluation of risk factors and barriers should commence. Interventions can be tailored to address those risks and/or the behavioral aspect of nonadherence in and of itself. Interventions may also try to address caretaker behaviors, clinic settings, and societal impediments to adherence.

Although further research is needed, existing data suggest that many interventions could work. In the absence of conclusive evidence for the efficacy of any single treatment in pediatric nonadherence research for any disease category, clinicians should use the available information to tailor treatments. Researchers need to design and execute conclusive well-powered studies that can inform clinical care. Mental health clinicians can assist in designing and implementing clinical or research protocols to assess and treat nonadherence, or they can help in addressing specific risk factors associated with nonadherence. Mental health clinicians should participate in multidisciplinary teams that are charged with improving nonadherence. Such teams should expect an improvement in treatment responses, provided that adherence is indeed strongly related to outcomes in a given population. Research and practice efforts that target nonadherence have greatly expanded recently, and substantial additions to the knowledge base are likely in years to come.

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PART III

Specialties and Subspecialties

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14

Pediatric Critical Care

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The pediatric critical care setting offers ripe opportunity for mental health consultation, with the application of a variety of assessment and intervention skills. In recent years, recognition of patient, family, and staff psychological needs has increased, as have the willingness and resources to address these needs. Children and adolescents requiring critical care hospitalization present with a wide range of medical and surgical concerns that parallel those seen across other pediatric settings but are generally more severe or urgent (Colville 2001; Williams and Koocher 1999). Likewise, the mental health needs of both patients and their families can be extensive, multifaceted, and often quite pressing. Furthermore, the fast-paced and emotionally demanding critical care environment introduces ample opportunities for the mental health consultant to provide psychoeducation and support for interdisciplinary staff members. This chapter provides an overview of the nature and scope of mental health consultation in the pediatric critical care setting. Typical referral concerns and clinical themes are presented, and intervention models and strategies are reviewed.

Medical Overview

Several types of specialized pediatric critical care units exist. Many children's hospitals house a general pediatric intensive care unit (PICU), known alternatively as a medical intensive care unit (MICU) or medical-surgical intensive care unit (MSICU), depending on the patient population. Similarly, many obstetrical, pediatric, and general hospital settings have dedicated neonatal intensive care units (NICUs). Also, some hospitals have specialized pediatric cardiovascular intensive care units (CICUs), of which there are substantially fewer.

These various types of critical care settings share some common features. Each is characterized by a low staff-to-patient ratio. In a national survey of pediatric critical care resources across the United States, 81% (204 units total) of participating PICUs had a 1:2 nurse-to-patient ratio (Odetola et al. 2005). In some instances, as in complex and unstable surgical and acute medical presentations, a single patient is cared for by one or more than one nurse.

Given the high medical acuity of the patient population, the critical care environment is dominated by advanced technological monitoring and intrusive, often intimidating life support equipment as the care approaches "technological brinksmanship" (Ferrell and Coyle 2008). A high level of "traffic" is common, with hosts of urgently busy interdisciplinary staff members tending to various aspects of patient care. In addition to these practitioners is the continual presence of patients' family members, friends, and other visitors, as well as the frequent bustle of transport team and support staff. Given the nature of pediatric settings, children's toys, clowns, pets, photographs, and artwork make for a startling juxta-

position against the backdrop of technology and critical care medicine. Such effects can be potent reminders of the children's daily lives and their place in the world and can serve as a rich starting point for introduction and conversation (Macnab et al. 1997).

Pediatric Intensive Care Unit

The medical profiles of PICU patients are typically diverse and complex, representing a range of accidental and/or traumatic injuries; complex chronic medical, congenital, genetic, and developmental conditions; and new-onset acute medical conditions (e.g., diabetes, overwhelming infection, acute renal failure). PICUs serve patients with a wide age range, from infant to young adult, as well as adults with pediatric conditions such as cystic fibrosis. From 1995 to 2001, the number of general PICU beds in the United States grew from 306 units to 349 units, exceeding the rate of pediatric population growth in general (Randolph et al. 2004). Estimates suggest that more than 200,000 children are admitted to PICU settings annually in the United States (Colville 2008; Odetola et al. 2005).

Neonatal Intensive Care Unit

The NICU is a highly specialized setting for the medical care of critically ill newborn infants. According to the Centers for Disease Control and Prevention (2008), more than half a million babies in the United States are born prematurely each year, and many of these infants require NICU hospitalization for days, weeks, or even months. In addition to preterm and low-birth-weight infants, the typical NICU caseload includes babies with congenital anomalies and full-term newborns affected by prenatal or perinatal insults and/or birth trauma, including preeclampsia, eclampsia, and asphyxia. Other distinctive features of the NICU include specialized medical equipment (e.g., isolettes, breast pumps, rocking chairs) and postpartum mothers and fathers who have typically not yet held or cared for their infants.

Cardiovascular Intensive Care Unit

The CICU is a dedicated setting for the management of critically ill patients with congenital or acquired heart disease (Hoffman et al. 2002). Because only 10–15 pediatric CICUs exist in the world (Melvin Almodovar, personal communication, July 10, 2008), most pediatric cardiac patients are admitted to general PICU settings. Patients hospitalized in a CICU typically present as newborns with congenital heart disease (diagnosed either prenatally or postnatally), children and adolescents with a history of congenital heart disease who are manifesting ongoing or recurring cardiac symptomatology or require further interventions, patients with a history of congenital heart disease who are hospitalized for noncardiac concerns, or previously healthy children and adolescents with acquired heart disease. Representing a broad age range, CICU patients, including those awaiting or recovering from heart transplantation, undergo a variety of specialized diagnostic and medical procedures (e.g., echocardiogram, cardiac catheterization) and surgical interventions.

Common Mental Health Referral Concerns

In pediatric critical care settings, mental health consultation requests are diverse and require eclectic assessment and intervention approaches. Referral questions can be specific (e.g., "Please assess this patient for depression") or, more typically, vague general cries for help to assist the child, family, or staff (Meyer et al. 1996). Other common referral concerns include depression, anxiety, and other psychiatric symptomatology; changes in mental status; suicide attempts and other nonaccidental injuries; and support related to anticipatory bereavement and end-of-life issues.

The mental health consultant's direct access to patients is typically limited because pediatric patients in critical care settings are often sedated and pharmacologically paralyzed (Board 2005) or those who are awake are largely disengaged from their environment (Cataldo et al. 1979). Referral records from our institution, Children's Hospital Boston, indicate that only about half of the mental health consultation referrals request direct service to patients themselves; the remainder of referrals are initiated on behalf of parents or other family members, who have been described as "second-order patients" due to the pervasive nature of their own psychological needs (Ferrell and Coyle 2008).

Coping, Adaptation, and Traumatic Stress

Acute distress is commonly seen in hospitalized children and adolescents (Van Horn et al. 2001), and those requiring critical care may be particularly vulnerable (Jones et al. 1992). Patients are subjected to an unrelenting barrage of aversive, invasive stimuli

and interventions (Rennick et al. 2002), which can be highly distressing. Factors related to the illness or injury itself, as well as its treatment, are potential sources of medical trauma (Bronfman et al. 1998).

Colville (2008) suggested that methodological and ethical difficulties have limited the degree to which short-term distress is empirically examined in PICU patients. Her review of the few studies in this area suggests that after discharge, most children have memories regarding their admission, despite speculation that the amnestic effects of medications administered for sedation and analgesia may protect children from the development of psychiatric sequelae (Board 2005). Although many actual memories are neutral in content (Playfor et al. 2000), a number of children remember invasive procedures, delusional experiences including nightmares and hallucinations, and experiences of pain (e.g., Colville et al. 2008), all of which underscore the need for emotional support during hospitalization. Rennick et al. (2002) summarized the results of numerous observational studies from the past several decades, highlighting concerns regarding anxiety, fearfulness, restlessness, anger, hostility, and withdrawn behavior in pediatric critical care patients. Other responses that are frequently observed and may warrant clinical attention include low sense of control over one's health, apprehension about routine and/or nonpainful procedures, detachment from staff, and general sadness (Jones et al. 1992).

In pediatric critical care settings, as in other medical settings, individual factors that include coping style, developmental level, temperament, and past medical experiences may contribute to acute medical distress (Shaw and DeMaso 2006) and are important to consider in assessment and treatment planning. Several additional risk factors in PICU populations have been identified, including postextubation distress, prolonged or repeated admissions, and premorbid mood and anxiety disorders (Jones et al. 1992). Similarly, referral data from our institution suggest that previously healthy children with new-onset medical diagnoses or traumatic injuries, those with unanticipated critical care hospitalizations, and patients with substantially longer than average PICU stays tend to be referred for psychological services at rates higher than those of the overall PICU population (Tunick et al. 2007). Anecdotal evidence from work at Children's Hospital Boston indicates that children with new or temporary communication limitations (e.g., patients who are intubated or who have tracheotomies) are at risk for developing symptoms of distress (Costello 2000; Tunick and English 2008); these findings are consistent with those from earlier studies (Corbo 1985; Corbo and Abu-Saad 1984), which reported that intubated children and adolescents associate communication limitations with "negative feelings and attitudes." Finally, Rennick et al. (2004) reported an association between high numbers of invasive procedures and the development and persistence of psychological sequelae.

The traumatic stress that accompanies critical care hospitalization is also associated with acute stress disorder (ASD) and posttraumatic stress disorder (PTSD) symptomatology. The rates of both diagnoses and subthreshold symptoms are at least comparable to those observed in children hospitalized on general medical wards (e.g., Rennick et al. 2002), although some studies have found higher rates of disorder and symptomatology in PICU patients. For example, Rees et al. (2004) found clinically significant symptoms of PTSD, including irritability and persistent avoidance of reminders of the admission, in 21% of PICU patients 7 months after discharge, but none of the comparison group of patients hospitalized on a general medical ward evidenced symptoms that reached diagnostic threshold. In a follow-up study in India, Muranjan et al. (2008) found that 43% of PICU patients, compared with only 6.7% of children hospitalized on a general pediatric ward, reported "intrusive thoughts" (including images related to hospitalization, bad dreams, strong feelings, and difficulty sleeping) immediately following discharge. These sequelae were largely resolved at follow-up 1 month after discharge, suggesting higher levels of acute stress reactions than posttraumatic stress symptomatology in this population (Muranjan et al. 2008). Similar findings were reported in a study in the Netherlands (Bronner et al. 2008b) in which 13.8% of patients met diagnostic criteria for PTSD and 34.5% evidenced subthreshold symptoms following PICU hospitalization. These rates were comparable to those evidenced in a comparison sample of children who had survived a major fire disaster (Bronner et al. 2008b).

ASD and PTSD symptoms have been demonstrated across multiple medical and surgical diagnoses and experiences, including cancer (for review, see Stuber and Shemesh 2006), solid organ transplantation (Mintzer et al. 2005), burns (Saxe et al. 2001), motor vehicle accidents (De Vries et al. 1999), and cardiac surgery (Connolly et al. 2004). Such symptomatology may be related to factors as-

sociated with the injury or illness itself, as well as treatment-related variables, and Ward-Begnoche (2007) speculated that other PICU-specific factors, including exposure to distressing experiences or deaths of other patients, may be additional sources of trauma. Risk factors associated with the development of trauma symptomatology in PICU populations include uncontrolled pain, high emotional distress or levels of trait anxiety, acute dissociative symptoms, subjective appraisal of life threat or medical treatment as "hard" or "scary," and delusional memories regarding hospitalization (Colville et al. 2008; Stuber and Shemesh 2006; Ward-Begnoche 2007). Evidence also indicates that parent and child symptoms of traumatic stress are highly correlated (Rees et al. 2004), although the direction of this relationship is unclear. Interestingly, illness severity is not associated with the prevalence or severity of ASD or PTSD symptomatology in pediatric populations (Ward-Begnoche 2007).

Psychiatric Symptoms

Consult requests in pediatric critical care settings often concern psychiatric symptomatology, including depression, anxiety, substance abuse, and suicidal ideation or intent, and externalizing behavior problems that may interfere with treatment. Rates of anxiety, depression, and somatic symptoms in PICU patients have been found to be at least comparable to those observed in children hospitalized in general pediatric wards (Rees et al. 2004). As in other pediatric settings, prompt and thorough evaluation is needed to clarify the nature of the symptoms (e.g., whether depressive symptoms reflect a primary mood disorder; are caused by a medical condition or its treatment; or are best conceptualized as an adjustment reaction to injury, illness, or treatment-related factors), generate a working formulation, and guide recommendations and interventions (Shaw and DeMaso 2006). In the case of accidental overdoses, thorough assessment is warranted regarding the circumstances contributing to the ingestion and any ongoing risk potential; the psychiatric consultant often collaborates closely with social work and/or child protection colleagues. In such cases, the consultant may also be asked to assist with disposition planning.

The consultant may also be called regarding management of preexisting psychiatric symptomatology that is unrelated to the medical condition for which the child is hospitalized yet warrants clinical attention in the context of the child's illness. For example, staff may solicit input regarding management of a patient who, at baseline, carries a diagnosis of autism and often exhibits self-injurious behavior and who might have particular difficulties in the PICU with sensory stimuli such as vital sign leads and noisy medical equipment. In such situations, the psychiatric consultant may speak with the patient and/or family about strategies and supports that have been effective in other settings and may provide staff with psychoeducation and guidance for managing behaviors that might interfere with optimal medical care and practice.

Changes in Mental Status

Consults are frequently initiated regarding patients' mental status changes. Fluctuations in level of consciousness and orientation, affective dysregulation, and other cognitive and perceptual disturbances have been collectively coined "ICU psychosis" or "ICU syndrome" and were once thought to be caused by environmental factors specific to critical care settings (e.g., Kleck 1984). Critical care patients' increased vulnerability to mental status changes is now recognized as likely due to a confluence of factors related to the patients' underlying illness and drugs and other treatments rather than due to an exclusively environmental etiology. Environmental factors specific to the ICU that threaten patients' mental status, in interaction with other biological factors, include prolonged social isolation, unfamiliar surroundings, sleep deprivation and diurnal rhythm disruptions, and patient immobilization (Martini 2005). Such mental status changes are conceptualized within the framework of delirium, a serious neuropsychiatric disorder that has only recently been examined in pediatric populations (Martini 2005; Schieveld et al. 2007, 2008; Turkel et al. 2006). Delirium has been associated with high rates of morbidity and mortality, which may in fact surpass those of all other psychiatric diagnoses (Schieveld et al. 2008; Shaw and DeMaso 2006; Wise and Trzepacz 1996). Mental status changes associated with delirium may lead to profound levels of distress in patients, family members, and medical caregivers alike (Martini 2005; Schieveld and Leentjens 2005), further underscoring the importance of prompt diagnosis and proper management.

The mental health consultant is not commonly called to evaluate for delirium per se but is frequently approached with concerns regarding mental status changes, including sleep disturbances (e.g., altered sleep-wake cycles), perceptual disturbances (e.g., il-

lusions, hallucinations), other disturbances in consciousness (e.g., reduced ability to sustain attention), disorientation, language disturbances, agitation, irritability, or personality changes. According to Martini (2005), only the most severe cases of pediatric delirium are accurately identified, and other cases are typically ignored or mismanaged. The consultant can offer prompt assessment and psychoeducation as well as advocate for prevention, early detection, and management of delirium through environmental and psychopharmacological interventions.

Nonaccidental Injuries

Nonaccidental injuries, such as suicide attempts and suspected child abuse, should ideally trigger early automatic mental health referrals. The need for PICU level of care signals a high degree of lethality of the suicide attempt or seriousness of the inflicted injury. The risk of reattempting suicide is about 15% in the aftermath of a suicide attempt (Donaldson et al. 2005), highlighting the need for comprehensive assessment, assurance of safety, and careful disposition planning. Because the patient may remain intubated and/or sedated in the PICU, the bulk of the consultant's work in this setting is often with family members and/or collateral contacts such as outpatient therapists. In such cases, further assessment with the patient may occur either later in the PICU stay or following transfer to a general medical unit. Family members of patients hospitalized following suicide attempts can present with a range of strong affective responses, including disbelief, shame, fear, worry, anger, vulnerability, and sadness. Cases in which a youngster has intentionally tried to end his or her own life can be unnerving, frustrating, and emotional for staff, particularly given the pervasive lifesaving themes of the critical care environment (DeMaso and Meyer 1996). The mental health consultant can offer guidance, education, and support around such countertransference; begin the assessment of suicidality and safety with the patient; secure the availability of safety and prevention mechanisms (e.g., hospital security) as needed; and provide support for families.

Injuries sustained in cases of child abuse can invoke similar emotional responses by staff members. The mental health consultant is not invulnerable to such reactions and should be mindful of his or her own affective response in the face of such emotionally charged and often highly unsettling consults. Media attention and curiosity among other hospital staff may exacerbate these responses. In such cases, the consultant may be asked to provide assessment and/or support for patients and family members. Work of this nature is often carried out in close collaboration with social workers, child protective specialists, law enforcement officials, and forensic interviewers. The consultant is advised to remain in close communication with hospital legal services as well, and careful documentation is particularly warranted.

Concerns Regarding Parents and Families

In addition to spawning massive disruptions in daily home, school, and work lives, critical illness in children can have significant and far-reaching emotional effects on parents and families (Holmes 2004; Rothstein 1980). Miles and Carter (1982) were among the first to describe specific parental stressors inherent in the PICU, including unfamiliar and daunting sights, sounds, and procedures that are common in the environment; the altered and sometimes distressing appearance and behavior of the child; challenges and alterations in the parental role; the prolonged separation from home; and issues with staff communication and behavior. Mothers whose children required PICU level of care experienced greater state anxiety, depression, confusion, and anger than did mothers of healthy nonhospitalized children and mothers whose children needed hospitalization on general pediatric units (Berenbaum and Hatcher 1992; Board and Ryan-Wenger 2003). Likewise, fathers of PICU patients reported higher levels of perceived stress and stress symptomatology than did fathers of pediatric patients on general hospital units (Board 2004). Researchers investigating the short-term psychological impact of critical care hospitalization on family members have documented heightened anxiety, depressive symptoms, and acute and posttraumatic stress symptoms that warrant early case identification and intervention (Bronner et al. 2008a; Paparrigopoulos et al. 2006; Shears et al. 2005).

Parents of a child in the NICU are faced with unique stressors related to the child's prematurity and the parents' unexpectedly early entry into parenthood of a medically fragile infant. Other common parental NICU experiences include postpartum depression, inability to hold or care for one's newborn child who has been "farmed out" of one's care for an indefinite period (Aisenstein 1987), stressors related to multiple births, residual matters involving assistive reproduction technology (e.g., in vitro fertilization), themes of loss from missing the typical rejoic-

ing that is characteristic of welcoming a newborn into the world, and continual worry about the child's survival. The mental health consultant may be invaluable in offering support related to such themes, particularly when families are separated from their traditional support networks (Nottage 2005).

A growing body of literature has documented ASD and PTSD symptomatology in parents of critically ill children. Balluffi et al. (2004) found that 32% of parents of children in a PICU met diagnostic criteria for ASD, and 21% met criteria for PTSD upon follow-up. Recent results from a study in the Netherlands (Bronner et al. 2008a) indicated that more than three-quarters of parents of PICU-hospitalized children evidenced persistent subthreshold PTSD symptomatology. ASD and PTSD symptoms have been extensively documented in parents of infants requiring NICU hospitalization (e.g., Holditch-Davis et al. 2003; Lefkowitz et al. 2008; Shaw et al. 2006), and evidence indicates that parents' traumatic experiences related to their infants' NICU hospitalization may have both short-term and persistent effects on later behaviors, such as infant sleeping and eating (Pierrehumbert et al. 2003), and attachment and family functioning (Mayes 2003). Diagnostic rates of ASD and PTSD are higher among parents of children requiring critical care than among parents of children on general medical wards (Rees et al. 2004), and various risk factors for the development of traumatic stress symptoms in parents have been identified, including parents' perceptions of life threat to their children, the unexpected nature of the hospitalization, witnessing their children undergoing invasive or painful procedures or demonstrating emotional distress, and traumatic stress symptoms in the children (Ward-Begnoche 2007). Parental acute stress while in the PICU is predictive of subsequent PTSD symptoms (Balluffi et al. 2004).

Brothers and sisters of children requiring critical care hospitalization have unique needs and can benefit from psychosocial assessment and emotional support. Often, parents seek help about ways to "talk to" and support their other children at home, particularly advice about visiting the PICU and balancing the demands of child care and family life when one child requires hospitalization (DeMaso et al. 1997). At Children's Hospital Boston, we have found that about 10% of referrals for psychological services were generated on behalf of siblings. Brothers and sisters can experience an array of emotional responses to a sibling's hospitalization and the concomitant disruption in caregiving arrangements and family life, including increased stress, fearfulness, worries, sadness, or anger (Sourkes 1995; Spinnetta 1981). Because siblings can be particularly susceptible to complicated feelings of isolation, displacement, jealousy, and guilt when their sibling has a critical illness and necessarily demands so much of the parents' and family's resources to cope effectively, they can benefit greatly from psychosocial support.

Anticipatory Bereavement and End of Life

The Institute of Medicine estimated that 55,000 children die each year in the United States, with just over half succumbing in the first year of life (Field and Behrman 2003). Following infancy, the most common causes of pediatric death include unintentional and intentional injuries, congenital anomalies, and malignant neoplasms (Feudtner et al. 2002; Hoyert et al. 2001). Most pediatric deaths occur in acute care hospitals, and of these, about 80% occur within PICUs (Watson et al. 2002). Two-thirds of PICU deaths follow planned withdrawal of life-sustaining interventions, and withdrawal of mechanical ventilation is the most proximate cause of death. Johnson (1997) offered a more intimate look at how deaths unfolded in one particular unit over the course of 1 year; frequent deaths, often more than one a day, placed extraordinary burden on the grieving families, other families who witnessed the death, and staff members.

Although the consultant will undoubtedly come face to face with dying children and their families, he or she may feel unprepared and uncertain about how to help and intervene (Meyer et al. 1996). If possible, the consultant should observe and apprentice with experienced staff members who tend to dying patients and their families, thereby becoming emotionally familiar with the culture of death in the PICU before being expected to intervene professionally. Consultants may be summoned under tense circumstances, when the likelihood of death looms large and end-of-life decision making and conversations need to occur. Most often, but not always, the dying child will be intubated and sedated, limiting the direct interventions that are possible. If the child is awake and alert, however, the most important aspects of psychological care include providing adequate pain management and comfort; facilitating a means for the child to effectively communicate his or her needs, wishes, and fears; fostering opportuni-

ties for tender, uninterrupted intimate time with loved ones; and offering a customized blend of anticipatory guidance, emotional support, and reassurance (Field and Behrman 2003).

Parents can differ widely in their capacity, approaches, and preferences when faced with news that their child has not responded to treatment and that death is likely. Parents identify several priorities for pediatric end-of-life care, including honest and complete information, ready access to staff, communication and care coordination, support and emotional expression by staff, preservation of the integrity of the parent-child relationship, and faith (Meyer et al. 2006). The psychiatric consultant can be of help in raising and sorting through these important issues and facilitating family-provider meetings and decision making.

Treatment and Interventions

General Themes and Guidelines

The psychiatric consultant in the pediatric critical care setting needs to employ a variety of diagnostic, treatment, and consultation skills and can benefit from an eclectic approach. Due to the critical nature of patients' physical health and the overall ecology of crisis and trauma, the consultant is often under overt pressure to intervene quickly and effectively in a rapidly changing clinical situation (Colville 2001). Swift assessment skills and the ability to establish a therapeutic alliance are invaluable given these inherent pressures and constraints (Hazzard and Henderson 2004). Often, the consultant's mere arrival and calm, nonanxious presence can help to contain intense affect on the part of patients, families, and staff members alike and can have a de-escalating and soothing effect, underscoring the importance of prompt and responsive action following a referral (Meyer et al. 1996). Referral questions may be vague, often with limited information regarding psychosocial history (DeMaso and Meyer 1996), and the mental health consultant should prioritize assessment and interventions. A successful consultant addresses the immediate issues at hand, offers practical and feasible suggestions, models good communication and family-staff relationships, and fosters a climate of emotional safety and well-being. Written documentation is best when practical, focused, and succinct (Meyer et al. 1996).

By its nature, the PICU offers little privacy, and consultants must be flexible and creative about where, when, and how long to meet with patients and parents, balancing family members' wishes to remain at the bedside, the need for privacy, and the demands of critical care (DeMaso and Meyer 1996). The consultant should be vigilant to ensure that care delivery does not impinge on the ability of other staff to provide for critical medical needs (Small and Melnyk 2006). Given the emotional intensity of the PICU environment, the consultant may at times intuit the need to deviate from traditional boundary setting, anonymity, and neutrality (DeMaso and Meyer 1996).

Close interdisciplinary collaboration with other psychosocial care providers, including those in child life, social work, and chaplaincy, is invaluable, as are ongoing consultation and liaison with medical providers. Regularly scheduled psychosocial rounds may allow clinicians to "keep a finger on the pulse" of the unit, case find, and proactively address complex situations. Interdisciplinary collaboration can also be helpful in the context of highly complex ethical issues and decision making that often characterize the PICU environment (Colville 2001; Gill 2005).

Evidence-Based Treatment Models

Despite growing evidence regarding the short- and long-term consequences of traumatic stress experiences for patients and family members enduring pediatric critical care, little research has systematically examined the effectiveness of mental health interventions targeting these populations. Recently, however, the utility of several treatment models has been empirically supported. The Creating Opportunities for Parent Empowerment (COPE) program is a parent-focused educational and behavioral intervention that aims to improve the mental health outcomes of parents and, indirectly, their children (Melnyk et al. 2004, 2007). COPE is predicated on several theoretical premises: self-regulation theory (concrete, objective information facilitates the development of a cognitive schema, which in turn enhances coping by reducing the discrepancy between what is expected and what actually happens), control theory (in the face of discrepancy between one's typical behavior patterns and current circumstances, the discrepancy motivates return to standard behavior), and the emotional contagion hypothesis (emotional states are transferred between individuals through modeling and by virtue of being in the presence of others) (Melnyk et al. 2007). At the onset of a PICU admission, immediately following transfer to the medical floor, and several days after hospital discharge, the COPE program focuses on increasing parents'

knowledge and understanding regarding typical responses of children during and after PICU hospitalization. The program provides parents with suggested activities to increase direct participation in the medical and emotional care of their children while hospitalized. Results of a randomized, controlled trial supported associations between COPE intervention and stronger parenting confidence, decreased maternal negative mood state, higher levels of parental support of children, and reduced internalizing and externalizing adjustment problems in children following hospitalization (Melnyk et al. 2007). Of note, the clinical benefits to children were indirect, because the direct COPE intervention targeted parents only.

Curley (1988; Curley and Wallace 1992) found support for the clinical utility of a parent-supportive nursing intervention in the PICU, the Nursing Mutual Participation Model of Care, which also holds promise for mental health professionals in this setting. This intervention is based on the premises that parenting in the PICU has many stressful aspects and that individual variation in coping, adjustment, and perceptions of stress must be considered in supportive work with families. The model includes several steps. First, parents are asked open-ended questions to build rapport and establish a caring atmosphere. Next, direct questioning helps determine parents' goals, objectives, and expectations regarding their role in their child's treatment and recovery; their perceptions regarding the child's illness and its seriousness; and their beliefs and attitudes about health and adjustment in general. Finally, parents' suggestions and preferences regarding their child's care, as well as their own participation in that care, are invited. The elicited information is used to increase parental knowledge regarding and participation in their child's care. Results from a controlled quasi-experimental design (Curley 1988) and a replication of the original study (Curley and Wallace 1992) suggest diminished levels of perceived parent stress both during hospitalization and following discharge.

Conceptual Models and Treatment Approaches

Several broad conceptual models and general principles also have relevance for mental health consultation in pediatric critical care. The medical crisis counseling (MCC) model proposed by Pollin and colleagues (Koocher and Pollin 1994; Pollin and Golant 1994; Pollin and Kanaan 1995) offers a pragmatic crisis-oriented approach that has been adapted to working with medically traumatized children (Bronfman et al. 1998) as well as patients and families in the critical care setting (Meyer et al. 1996; Williams and Koocher 1999). MCC is based on the premise that traditional models of psychotherapy do not fully meet the emotional needs of individuals "caught up in the maelstrom of a medical crisis" (Koocher and Pollin 1994, p. 292). The MCC approach focuses on the disruption of normal life tasks that is spawned by medical crisis. The model emphasizes the degree to which accompanying emotional distress is a normal, expected, and even somewhat predictable response rather than reflective of a pathological process. MCC addresses eight common fears associated with chronic illness: loss of control, loss of self-image, dependency, stigma, isolation, abandonment, expression of anger, and death (Pollin and Golant 1994). Clinicians using MCC-based treatments focus on the medical condition and integrate psychosocial interventions with medical care delivery, normalize distress, and work with the client to collaboratively identify concrete actions toward adaptive coping, all within a limited time frame and with a focus on both symptom relief and prevention (Koocher and Pollin 1994). Williams and Koocher (1999) studied the utility of the MCC model with PICU patients and their families and found it to be effective across diverse medical and surgical presentations and psychological referral concerns. Of the common fears delineated by Pollin, loss of control, dependency, and death were those most often endorsed in the PICU setting, and consistent with the Pollin model, the mental health consultant in this setting functioned as a communicator, educator, and therapist (Williams and Koocher 1999).

Shulman and Shewbert (2000) proposed a model of crisis intervention for use in critical care settings that has great potential applicability with pediatric populations. They purported that traditional psychiatric consult services, wherein referrals are generated following identification of a specific mental health concern, fail to adequately address the extensive psychological needs of critical care patients and their families. As an alternative, Shulman and Shewbert proposed a holistic, systems-based, and comprehensive approach in which mental health interventions, involving both psychological consultation and ongoing supportive treatment, are integrated as a "standing consult" for all critical care patients and families. The model aims to provide an

approach to treatment in which the entire scope of patient needs is addressed effectively and efficiently after being identified by interdisciplinary clinical staff. Family support is provided on a regular basis, and the consultant works with the team to ensure that patients and families are updated regularly with concrete, realistic medical and prognostic information. The model is preventive via the integration of mental health services with other aspects of patient care and the proactive identification of conflict among the family and care team. Finally, the model promotes the consultant's ability to facilitate follow-up support as needed following patient transfer from the unit (Shulman and Shewbert 2000).

Various other general principles can be of value when implementing psychosocial treatments and interventions with critically ill children. As in other settings, crucial steps in tailoring and implementing appropriate interventions include clarification of the referral question or concern, careful assessment incorporating multiple sources of information, and development of a working formulation (Shaw and DeMaso 2006). The consultant must be aware of sociocultural factors that may influence health-related beliefs, perceptions, and practices and help inform interventions (Stern et al. 1998). A biopsychosocial approach to case conceptualization is advised, with careful consideration of contextual factors related to critical illness and/or its treatment (e.g., pain, sleep deprivation, medications) that may impact mental status. Multimodal treatments, including psychoeducation, psychopharmacological treatment, supportive therapy, cognitive-behavioral approaches, and play therapy, may be warranted. The consultant should rely on clinical intuition regarding the presenting problem, as well as various pragmatic constraints, to determine the best course of action at any given time.

Treatment approaches are optimally guided by knowledge about the child's cognitive and developmental level and normative, expected behaviors during different stages of development. Children should be provided with developmentally appropriate information about their illness and treatment whenever possible, as well as some degree of control and choice regarding their care (Meyer et al. 1996). This involvement of children is particularly important given the degree to which children's coping with the trauma of illness can be facilitated by a cognitive understanding of the disease and its treatment (Sourkes 1995). Jansen et al. (1989) discussed a treatment model aimed at enhancing psychosocial and cognitive development for medically stable, chronically ill young children who require long-term critical care hospitalization. They described various pragmatic and developmentally motivated interventions, including consistency in medical caregivers to foster children's growing sense of trust and stability, implementation of a predictable and comprehensive daily schedule to increase stability and consistency in day-to-day routines, and regular opportunities to engage with child life specialists in normal childhood play activities.

Physical limitations or restrictions imposed by the child's illness and/or its treatment are important considerations in determining effective interventions (Hansen et al. 1986). For example, implementation of a behavioral contingency plan must involve the inclusion of desirable behaviors and rewards that are permissible in the PICU. Consultation with a speech-language pathologist for augmentative and alternative communication strategies can be of great benefit in restoring a child's sense of autonomy and control and ensuring adequate pain management when medical interventions, such as intubation or tracheotomy, preclude typical communication ability (Costello 2000). Mobilization (e.g., getting out of bed, walking around the unit), when it is medically permissible, can be effective in promoting autonomy and independence (DeMaso and Meyer 1996).

Family-Based Interventions

Parents identify the need for information, ability to stay close and care for their child, and ready access to staff as vital during critical care hospitalization (Kasper and Nyamathi 1988; Kirschbaum 1990; Meyer et al. 2006). Unit policies and family-based interventions that support visitation hours, family conferences, parent presence during invasive procedures, and bedside rounds reflect the setting's culture, integration of family-centered care principles, and degree of parent-professional partnership. Family conferences and parent participation on rounds positively influence family satisfaction with care and decrease family-staff conflict (Kleiber et al. 2006; McDonagh et al. 2004; Williams and DeMaso 2000). Often, the mental health consultant is in the position to provide psychoeducation and support for such practices; establish and coax positive family-staff relationships; and serve as liaison, role model, and social change agent.

Kahn (2008) advocated for "etiquette-based" medicine, emphasizing the importance of good bed-

side manners, attentiveness, and respectful patient-provider interactions. Highlighted strategies include asking permission to enter a patient's room, greeting and shaking hands, introducing oneself and explaining one's role, and sitting down during discussions. Kahn argued that such rituals and social scaffolding of the patient-provider interaction can enhance the perception of professionalism and engender a calm, nonanxious therapeutic environment.

Patients and families value good communication and empathic relationships with care providers and often base perceptions of the quality of care on these factors (Curtis et al. 2002; Mack et al. 2005). Good communication can provide important information, improve treatment adherence, and promote better understanding and good decision-making processes (Levetown 2008). Conveying troubling news and engaging in difficult conversations with patients and families are vitally important yet anxiety-provoking components of practice. Even capable and competent clinicians may lack confidence and describe themselves as ill prepared for difficult interpersonal interactions (Crain et al. 2001). Due to the challenges implicit in these conversations, it is not uncommon for staff to delay, avoid, or abdicate responsibility for this vital area of practice (Meyer et al. 2009). The mental health consultant can initiate and facilitate family meetings and model and encourage good communication practices (Williams and DeMaso 2000).

Parent presence during invasive procedures and resuscitation is a growing yet controversial practice. Staff can harbor deep worries about the value, safety, and logistics of family presence during such procedures. Their concerns focus on the potential traumatic nature of the procedures, interruption in clinical workflow, maintenance of a safe therapeutic environment, ability to meet parents' needs for information and emotional support, compromise in procedural teaching opportunities, increased anxiety of practitioners, and potential risk for malpractice claims (Dingeman et al. 2007). Most family members prefer and appreciate having a choice regarding whether to remain present during their loved one's invasive procedures and resuscitation (Boie et al. 1999; Gold et al. 2006; Mangurten et al. 2005), and the mental health consultant can play a role in educating, modeling, and supporting families and practitioners regarding the intervention. Because parents and family members may be reluctant to ask or may not realize that they may remain present during such times, practitioners should educate parents and extend the opportunity whenever possible. Although findings are not conclusive, Boudreaux et al. (2002) purported that family members may experience less anxiety and depression and better bereavement adjustment if present during resuscitation efforts. Eichhorn et al. (1996) proposed that family-witnessed resuscitation requires discussing the plan in advance with the resuscitation team; assigning one team member to remain with the family to answer questions, clarify information, and offer emotional comfort; providing sufficient space to accommodate family members; and encouraging team members' mindfulness of family presence when communicating.

The mental health consultant may find that other pragmatic interventions, such as referrals for family members to other supportive specialties (e.g., lactation support, massage therapy), are often beneficial in bolstering existing supports and enhancing depleted coping resources. The consultant may employ simple yet meaningful strategies, such as encouraging parents to display photographs of their child and family, a practice that parents report serves both to motivate staff and to comfort themselves (Macnab et al. 1997). "Transfer anxiety"—that is, unanticipated anxiety and distress around the child's transfer from the PICU to a medical unit or discharge home, notwithstanding recognition and relief that the move represents overall improvement—is often seen in families of PICU patients and may be ameliorated with preparation that includes verbal and/or written information about what to expect during and following the transfer or discharge, together with concrete suggestions about ongoing available psychosocial support (e.g., Bent et al. 1996; Bouvé et al. 1999). The mental health consultant may facilitate this preparation, and may continue to provide services to patients and families during and following transfer to the general medical ward to maximize continuity of care. Similarly, parents of PICU patients often express fears regarding the longer-term impact of the admission on their child and the family; appropriate psychoeducation and referrals for outpatient follow-up treatment may help to minimize this distress (e.g., Diaz-Caneja et al. 2005).

Brothers and sisters need to have accurate, developmentally appropriate information about their sibling's critical illness (Kleiber et al. 1995). Children need to know they are welcome in the hospital and are regarded as important and vital family members. Recommendations include explanations about the

family's plans for hospitalization; consistent child care arrangements; and, if appropriate, a school-based liaison to give information and support. Some siblings relish the chance to make artwork to decorate the room, bring special toys and music from home, and spend special time with the ill child; all of these activities enable brothers and sisters to actively participate in and contribute to the care of the ill child. Structured sibling groups allow opportunities for brothers and sisters to learn about the hospitalization, share in play and expressive arts activities, and meet other siblings in similar situations. Consultants can be enormously helpful and reassuring to parents in discussion related to the needs, psychoeducation, and emotional support of brothers and sisters. When trauma has struck or death appears likely, parents can truly appreciate the services of the mental health provider who offers emotional support, anticipatory guidance, and a "road map" for how to navigate amid such circumstances (DeMaso et al. 1997). For many parents, being able to provide well for their other children can bolster parental self-esteem and offset the helplessness and vulnerability that so often accompany pediatric critical care illness.

Staff and Systems Issues

The pediatric critical care workload is physically, technically, and psychologically demanding and carries a heavy emotional toll by virtue of staff members' continual exposure to critical illness, death, and the intimate personal lives of strangers (Bearison 2006; Colville 2001; DeMaso and Meyer 1996; Ferrell and Coyle 2008). Through prolonged and persistent exposure to the suffering of children and families, high levels of acuity, and frequent encounters around death and dying, clinical staff are vulnerable to "compassion fatigue" (Meadors and Lamson 2008). Caregivers are particularly vulnerable when they have increased involvement in long-lasting and/or complicated cases, personal identification with a child or family, underdeveloped coping strategies, or previous history of trauma (DeMaso and Meyer 1996; Meadors and Lamson 2008). The unremitting stress of the pediatric critical care setting can also contribute to problems in communication and collaboration among care providers, and this may have personal, systemic, and clinical implications (Hawryluck et al. 2002).

The mental health consultant can work with staff to help build awareness about the normalcy of stress-related reactions, promote discussion of such topics in a shame-free and supportive environment, and provide psychoeducation regarding techniques to help manage or minimize symptoms (Meadors and Lamson 2008; Peebles-Kleiger 2000). Staff may be taught to recognize personal factors that contribute to difficulties in working with particular patients or families. The consultant may facilitate awareness around staff feelings, expectations, and attitudes and the extent to which these are reciprocally influenced by clinical work (Hansen et al. 1986). Staff support groups may provide an optimal forum for such interventions (Beardslee and DeMaso 1982; Montgomery 1999). When systemic communication breakdowns or difficulties are evident, the consultant can work with staff to identify and ameliorate sources of conflict. The consultant can also be helpful in facilitating staff discussion about the ethical issues that abound in pediatric critical care (Gill 2005) and in educating staff about ways to maximize the effectiveness of behavioral interventions with patients and families (Hansen et al. 1986).

The mental health consultant in pediatric critical care is not invulnerable to the grief and sadness overshadowing this setting (DeMaso and Meyer 1996), although the reactions around these day-to-day experiences are often overlooked (Koocher 2005). The unrelenting sense of urgency accompanying consult requests, the expectation to provide a "quick fix" in the face of overwhelming and affect-laden circumstances, and the perception of being misunderstood or underappreciated by other staff can evoke significant responses in the mental health consultant (DeMaso and Meyer 1996). These countertransference reactions may lead to avoidance of particular patients or situations and can take a toll on the consultant's overall well-being. To evade such unwelcome responses, the consultant is advised to maintain a balanced workload; pursue hobbies, physical exercise, and other pleasurable and personally nurturing activities; and seek ongoing supervision and emotional support from mental health colleagues (Colville 2001; Peebles-Kleiger 2000; Shulman and Shewbert 2000).

Concluding Comments

Mental health consultation in the pediatric critical care setting challenges the consultant with a host of clinical needs. Patients represent a broad age range and present with multifaceted and complex medical, surgical, and mental health concerns that can have

lasting psychological consequences for both patients and their family members. Referrals are often marked by a sense of urgency that is unparalleled in most pediatric settings, and the fast-paced, unpredictable, and rapidly changing culture of crisis and trauma prompts an approach to assessment and treatment that is flexible, eclectic, and creative. Empirical and conceptual models support the utility of pragmatic and strengths-based short-term treatment approaches that normalize stress reactions. Supportive work with family members and clinical staff can serve multiple individual and systemic needs as well as contribute to indirect patient benefit.

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15

Pediatric Oncology

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Medical Overview

Many aspects of oncology are different for children and adolescents than for adults. Differences include not only the types of malignancies that are most common in each age group, the prognoses, and the indicated treatments but also the types of settings in which cancer is treated, the types of services available at these centers, and the use of cancer protocols (American Academy of Pediatrics 2009). Although the rate of childhood cancer diagnosis in the United States has been increasing slightly (0.6% per year) over the past three decades, it is still only approximately 15 cases per 100,000 (American Cancer Society 2009). Cancer incidence rates in children ages 0–19 years, by sex, are listed in Table 15–1. In 2009, it is estimated that approximately 10,730 new diagnoses of cancer will be made in children 0–14 years of age.

In general, the prognosis for pediatric malignancies is better than for adult malignancies and is far better than it was 40 years ago. Before the 1970s, the 5-year relative survival rate for all childhood cancers combined was less than 50%; today, it is 80% (American Cancer Society 2009). This improved rate is largely due to increased understanding of cancer biology and of pharmacogenetics, leading to more targeted and effective treatment.

For children, as for adults, significant differences in outcome exist for different sites and histological types of cancers (see Table 15–2). Solid tumors, such as Wilms' tumor, are rarely fatal and often require little more than surgical removal of the affected kidney. Other tumors or hematological malignancies may require years of intensive treatment, with resulting toxicities. The various cancers of the white blood cells, known collectively as leukemia, are the most common type of malignancy in children younger than 14 years. Leukemia accounts for approximately 33% of all childhood cancers and for one-third of cancer deaths in children younger than 14 years. Cancers in the brain or nervous system are the second most common form of cancer in children and the second leading cause of cancer deaths in children younger than 14 years (American Cancer Society 2009).

The American Academy of Pediatrics (2009) has recommended that all children with cancer be treated at a major cancer treatment center and specified the medical, surgical, and psychosocial resources that should be available at such centers. These include pediatric social workers, pediatric psychologists, child life specialists, and family support group services. Specific treatment protocols, designed by national pediatric oncology groups, are used, with most children entered into clinical trials so that the data can be used to evaluate the effectiveness and toxicity of specific treatment protocols (Reaman 2009; Ruccione et al. 2005). Long-term follow-up focuses on both quality of life and survival. The goal is to minimize short- and long-term toxicity while maximizing long-term survival. This focus on survivorship issues is exemplified in the development of specific guidelines for care of children after treatment ends (Children's Oncology Group 2008).

TABLE 15–1. Cancer incidence rates[a] in U.S. children ages 0–19 years by sex, 2002–2006

Site	Male	Female	Total
All sites	17.7	15.5	16.6
Leukemia	5.1	3.9	4.5
Acute lymphocytic	3.9	2.9	3.4
Brain and other nervous	3.1	2.7	2.9
Soft tissue	1.1	1.0	1.1
Non-Hodgkin's lymphoma	1.4	0.8	1.1
Kidney and renal pelvis	0.6	0.7	0.6
Bone and joint	1.0	0.8	0.9
Hodgkin's lymphoma	1.2	1.1	1.2

[a]Per 100,000, age-adjusted to the 2000 U.S. standard population.

Source. Adapted from Horner MJ, Ries LAG, Krapcho M, et al. (eds): SEER Cancer Statistics Review, 1975–2006. Bethesda, MD, National Cancer Institute, http://seer.cancer.gov/csr/1975_2006/, based on November 2008 Surveillance, Epidemiology and End Results (SEER) data submission, posted to the SEER Web site, 2009.

Genetic susceptibility plays a part in some pediatric malignancies, such as retinoblastoma, generally through a mutation in tumor suppressor genes (Plon and Nathanson 2005). Specific clinical surveillance can now be used to improve survival and quality of life for at-risk children (Rao et al. 2008).

IMPACT AND SEQUELAE OF CANCER

Treatments of pediatric cancer include surgery, chemotherapy, radiation, and various combinations of these elements, depending on the histology and stage of the malignancy (Ludwig 2008). All of these treatments have the immediate impact of being strange and often frightening for pediatric patients and their families. Most treatment protocols also involve discomfort or pain, removal from familiar environments, and interference with usual developmental tasks, such as school and peer relationships. In addition to the acute impact of treatment, cancer diagnosis and treatment have long-term effects that are life altering physically and emotionally for the family and child. We consider first what is known about the acute emotional and physical impacts of pediatric cancer on child and family and then discuss the long-term emotional and physical sequelae.

TABLE 15–2. Cancer death rates[a] in U.S. children ages 0–19 years by sex, 2002–2006

Site	Male	Female	Total
All sites	3.0	2.4	2.7
Leukemia	0.9	0.7	0.8
Acute lymphocytic	0.4	0.3	0.4
Brain and other nervous	0.7	0.6	0.7
Non-Hodgkin's lymphoma	0.2	0.1	0.1
Soft tissue	0.2	0.2	0.2
Bone and joint	0.3	0.2	0.2
Kidney and renal pelvis	0.1	0.1	0.1

[a]Per 100,000, age-adjusted to the 2000 U.S. standard population.

Source. Adapted from Horner MJ, Ries LAG, Krapcho M, et al. (eds): SEER Cancer Statistics Review, 1975–2006. Bethesda, MD, National Cancer Institute, http://seer.cancer.gov/csr/1975_2006/, based on November 2008 Surveillance, Epidemiology and End Results (SEER) data submission, posted to the SEER Web site, 2009.

Acute Physical and Emotional Impacts of Pediatric Cancer

Acute Physical Effects of Malignancy and Treatment

Many childhood cancers are initially invisible to the child and family. They become evident through common and seemingly benign symptoms, such as bruising, fatigue, loss of appetite, or weight loss. Other types of cancers cause more severe or dramatic symptoms, such as seizures, diplopia, confusion, paralysis, weakness, or fractured bones. For many children, however, the physical difficulties of dealing with cancer are associated primarily with the treatment rather than the disease. Pain, nausea, amputation, infections, and ulcerations are all acute side effects of cancer treatment. Radiation and antitumor chemotherapy target rapidly dividing cells, a characteristic of most malignancies. However, mucosa, hair, skin, and bone marrow are also made up of rapidly dividing cells, so these are also destroyed by chemotherapy and radiation, resulting in the characteristic problems of nausea, hair loss, bleeding, anemia, and immunosuppression seen in cancer patients during active treatment (Ladas et al. 2006). The breakdown of the mucosa of the mouth and throat can be very painful and can make it difficult for children to swallow enough even to manage their own saliva. Mucosal breakdown in other parts of the gastrointestinal system leads to nausea and vomiting. The impact on bone marrow results in decreased production of white cells, red cells, and platelets. The immunosuppression resulting from ineffective or insufficient numbers of white cells can limit the child's participation in activities with other children, such as school, due to the frequent viral illnesses children carry to one another (Dadd et al. 2003). Inadequate red cell production can cause the extreme fatigue and weakness associated with anemia, and inadequate platelets can lead to extensive bruising and external or internal bleeding (Smith et al. 2006). Transfusions can help with the problems of inadequate red cells and platelets, and medications are available to stimulate production of cells in the bone marrow (Smith et al. 2006). However, bone marrow suppression can be fatal. Blood cell counts are carefully monitored during treatment, and chemotherapy or radiation may be delayed or reduced based on low counts. In extreme cases, intensity of chemotherapy and/or radiation required to eradicate the malignant cells may destroy the bone marrow. A bone marrow transplant would then be needed (as discussed in more detail in a later section).

Hair loss, although of little actual physiological significance, is often of great emotional significance for the pediatric oncology patient and family. The "bald kid" has become the symbol of childhood cancer and serves to designate that this child or teen is different from others. Baldness is also the aspect of cancer treatment that is most well known to many laypeople. Questions about the possibility of hair loss are often among the first asked by adolescents diagnosed with cancer. Partly because of its symbolic nature and partly because it is less frightening to think about than other aspects of cancer and treatment, hair loss can also become a focus of a great deal of emotion. A commonly expressed sentiment is, "I would rather die than lose my hair." Such statements should not be considered a type of suicidal ideation but rather be addressed as an expression of the importance of appearance and "fitting in" for children and adolescents.

Amputation is a less common component of treatment for pediatric cancer now than it was a few decades ago, due to improved chemotherapy and radiation techniques. Improvements in surgical approaches have also allowed increased preservation of function of an affected limb (Weisstein et al. 2005). Although amputation is always difficult for pediatric patients and families, it appears easier to accept if the patients have already had functional loss or pain (Clerici et al. 2004).

Cancer treatments and the medications used to treat complications of cancer treatments may also have direct impact on emotional and cognitive functioning (see Table 15–3). Sometimes a change to a different drug within a certain class of drugs can be of tremendous functional benefit to the child and family.

Cerebellar Mutism Syndrome/ Posterior Fossa Syndrome

Cerebellar mutism syndrome (also known as posterior fossa syndrome) is a serious acute complication of the treatment of brain tumors that may initially appear to be psychiatric (Turgut 2008). A significant percentage of children undergoing resection of a midline posterior fossa tumor experience the onset of diminished speech, progressing to mutism. Although this effect usually is seen 1–2 days postoperatively, some children have been observed to develop mutism as long as 90 days postoperatively (Kotil et al. 2008). These children also demonstrate

TABLE 15–3. Common indications and side effects of medications used in cancer treatment

Medication class	Indications	Side effects
Antiemetics Benzodiazepines Cyproheptadine Ondansetron Granisetron	Nausea/vomiting	Sedation Acute dystonic reactions
Analgesics Opiates	Pain Mucositis	Sedation
Antihistamines Diphenhydramine Hydroxyzine	Premedication for transfusion Antipruritics Mild sedatives Nausea/vomiting	Sedation Hallucinations Delirium Cholinergic rebound
Immunosuppressants Cyclosporine	Graft-versus-host disease	Delirium Encephalopathy Renal failure Hepatic failure Hirsutism
Corticosteroids	Graft-versus-host disease Appetite stimulation Nausea	Affective instability Steroid psychosis Cosmetic effects
Benzodiazepines Lorazepam Diazepam Clonazepam	Nausea Anxiety Insomnia	Sedation Cognitive slowing

Source. Reprinted from Shaw RJ, DeMaso DR: *Clinical Manual of Pediatric Psychosomatic Medicine: Mental Health Consultation With Physically Ill Children and Adolescents.* Washington, DC, American Psychiatric Publishing, 2006, p. 254. Copyright 2006, American Psychiatric Publishing. Used with permission.

emotional lability, hypotonia, and ataxia. In a study following children after resection of a midline posterior fossa tumor, 24% developed mutism. In the 107 children with this syndrome, symptom intensity was judged to have been severe in 43%, moderate in 49%, and mild in 8%. Brain stem invasion by tumor was the only risk factor that correlated positively with cerebellar mutism syndrome occurrence; a negative correlation was found between cerebellar mutism syndrome and cerebellar hemisphere tumor location (Robertson et al. 2008). The mutism symptoms are usually transient, with most children recovering speech (Kotil et al. 2008).

Acute Emotional Effects of Malignancy and Treatment

The immediate response to a diagnosis of cancer varies considerably based on the age and cognitive developmental level of the child. Younger children will not understand the meanings of the terms used but will quickly grasp that the doctors are very serious and that their parents are very frightened or angry. The parents' emotional response will be a key predictor of the child's emotional response (Kazak and Baxt 2007). Adolescents are able to understand much more of what the diagnosis could mean but will have different specific concerns than their parents or medical teams (Decker 2006). A review of studies of social support for adolescent cancer survivors found that the patients found social support from parents (particularly mothers) to be most helpful and voiced dissatisfaction about the social support from friends (Decker 2007).

The American Academy of Pediatrics published a technical report that outlines guidelines on communicating distressing information to children and families (Levetown 2008). Parents like doctors to give them prognostic information, even when it is upsetting (Mack et al. 2006). Parents tend to be overly optimistic about the chance of cure, even when they have a realistic understanding of the other risks and outcomes of cancer and cancer treatment (Mack et al. 2007).

Effects on Academic Functioning

The treatment for most childhood cancers takes weeks or months. Children often miss extended periods of time at school, partly because of clinic or hospital visits for treatment but also because children may need to stay away from school due to the immunosuppression resulting from the treatment. Many cancer treatments reduce immune function, making children vulnerable to serious illness in response to ordinarily minor infections. School requirements for vaccinations now lessen the exposure to serious contagious childhood illnesses such as chickenpox. However, many children are advised to avoid school when respiratory illnesses are endemic. Even when the children do attend school during cancer treatment, they may have difficulty learning. Fatigue, a common response to both chemotherapy and radiation, can interfere with concentration and sustained attention.

In addition to the medical obstacles to school attendance, children may feel uncomfortable at school. Changes in their appearance, such as hair loss, may make them self-conscious. They may feel unable to explain to their peers or teachers why they missed an activity or did not complete an assignment. Teachers may also feel ill prepared to explain the situation to their other students or may be fearful of having the child reenter the classroom while on active treatment. To address these issues, pediatric cancer programs have information they can send to schools, or they can have someone communicate directly with the teacher and/or school nurse. School reintegration can also be facilitated with a visit to the classroom by a trained person, allowing children to ask questions (Labay et al. 2004).

Long-Term Physical and Emotional Sequelae of Pediatric Cancer

Long-Term Cognitive Sequelae

Neurocognitive problems are seen in up to 40% of childhood cancer survivors (Krull et al. 2008). Survivors of childhood lymphoblastic leukemia and brain tumors, who have often been treated with chemotherapy or radiation that targets the central nervous system or is toxic to the developing brain, are at particular risk of later onset of long-term cognitive and learning deficits. Specific screening techniques (Krull et al. 2008) and guidelines have been developed for assessment and follow-up of later neurocognitive effects in childhood cancer survivors to ensure that early and specific intervention can be offered (Nathan et al. 2007). Problems of attention, memory, and information processing that occur after treatment for cancers in the central nervous system have been found to impact the child's psychological adjustment and quality of life (Peterson and Drotar 2006). Treatment with methylphenidate has been found to have at least some short-term efficacy for those survivors with problems of attention (Mulhern et al. 2004).

In the Childhood Cancer Survivor Study, 12,430 young adults who were at least 5 years postdiagnosis for pediatric cancer and 3,410 full siblings of the survivors were compared regarding use of special education services and educational attainment. Survivors were significantly more likely than siblings to require special education services. Survivors of tumors of the central nervous system, leukemia, non-Hodgkin's lymphoma, and neuroblastoma who did not receive special education services were significantly less likely to complete high school than were their siblings (Mitby et al. 2003). Another large study of childhood cancer survivors used parental reports to compare 800 survivors with 923 matched controls on educational outcomes. They found that survivors were more likely to have repeated a grade (21% vs. 9%), to have educational problems (46% vs. 23%), and to attend learning disability (19% vs. 7%) or special education (20% vs. 8%) programs than were controls. Survivors who had cranial radiation were more likely than other survivors to have had educational difficulties (Barrera et al. 2005).

Physical Outcomes of Long-Term Survivors

Although the immediate toxicity of intensive chemotherapy, steroids, antibiotics, and radiation has been evident from the start, the long-term impact has only gradually become apparent. The term *late effects* is used to refer to the medical problems that can be traced to cancer treatment but that do not become apparent until 5–10 years later (Nunez et al. 2007). Long-term follow-up of childhood cancer survivors has led to an understanding of the potential problems associated with specific treatments. In some cases, the treatment has been modified in response to these findings. For example, because intensive radiation to the central nervous system in early childhood was found to be associated with significant learning disabilities later, oncologists worked to see how little radiation could be used and still be effective. Intrathecal methotrexate is now often used instead of cranial irradiation, with a signif-

icant decrease in cognitive impairment (Spiegler et al. 2006).

The Children's Oncology Group (2008) document titled "Long-Term Follow-Up Guidelines for Survivors of Childhood, Adolescent, and Young Adult Cancers" details the specific problems that have been seen following treatments with radiation, heavy metals, antimetabolites, alkylating agents, antitumor antibiotics, corticosteroids, anthracycline antibiotics, enzymes, plant alkaloids, and epipodophyllotoxins. The guide addresses the potential damage to each organ system and the follow-up needed. Treatments may affect the eye, ear, neuroendocrine system, oral cavity, thyroid, breast, heart, lungs, spleen, liver, gastrointestinal system, musculoskeletal system, urinary tract, and reproductive system.

The following are examples of common long-term problems associated with cancer treatment that can have psychological or functional impact:

- Altered bone metabolism, resulting in earlier onset of osteopenia and osteoporosis (Wasilewski-Masker et al. 2008)
- Cardiotoxicity and cardiovascular damage, resulting in a dilated cardiomyopathy or early onset of cardiovascular disease (Ruggiero et al. 2008)
- Endocrine problems, such as hypothyroidism and growth factor deficiency (Stava et al. 2007)
- Significant deficits in attention, and smaller white matter volumes in the brain (Reddick et al. 2006)
- Hearing loss, resulting in learning problems (Gurney et al. 2007; Notteghem et al. 2003)
- Infertility (Fallat et al. 2008)

The Childhood Cancer Survivor Study has provided the most detailed information on the long-term impact of pediatric cancer and its treatment. Six health domains were assessed in 9,535 young adults diagnosed with childhood cancer between 1970 and 1986 and compared with those in 2,916 randomly selected siblings of the survivors. Compared with siblings, survivors reported poorer general health (odds ratio [OR]: 2.5), mental health (OR: 1.8), activity limitations (OR: 2.7), and functional impairment (OR: 5.2) (Hudson et al. 2003). The 15-year cumulative incidence of second malignancies or late mortality did not differ between racial or ethnic groups. However, survivors who self-identified as black or Hispanic were more likely than white survivors to be of lower socioeconomic status, and black survivors were less likely than white or Hispanic survivors to report adverse mental health, smoking, or drinking and more likely than white or Hispanic survivors to report use of preventive health care (Castellino et al. 2005).

Given the multiple physical problems experienced by survivors, researchers questioned how much these medical sequelae impact survivors' function and quality of life. Health-related quality of life (HRQOL) and life satisfaction were compared for 7,147 of the young adult participants from the Childhood Cancer Survivor Study and 388 siblings. Both survivors and siblings reported fewer symptoms of global distress than population norms, and most survivors reported present and predicted future life satisfaction (Zeltzer et al. 2008). Evaluation of HRQOL in survivors of Wilms' tumor and neuroblastoma found that these survivors did not differ from population norms on any component of the HRQOL other than the mental component (Nathan et al. 2007).

Long-Term Emotional and Social Outcomes

Although the acute experience of cancer diagnosis and treatment is stressful, both physically and emotionally, most children and families do well over the long term. For example, Zebrack et al. (2007) surveyed 2,778 survivors of solid tumors diagnosed in childhood regarding symptoms of depression, somatization, and anxiety. They found that the vast majority of the survivors reported few, if any, symptoms of distress. Predictors of distress included poor health status, low income, less education, and lack of employment.

The specific symptoms that have been most commonly reported have been those of posttraumatic stress. Posttraumatic stress symptoms appear to be rarely reported by childhood cancer survivors while they are still children and adolescents (Gerhardt et al. 2007; Kazak et al. 1997) but appear to emerge in approximately 13%–16% of survivors in young adulthood (Lee and Santacroce 2007; Rourke et al. 2007).

Long-Term Family Adjustment

Not surprisingly, parents of newly diagnosed childhood cancer patients are distressed. A meta-analysis of 29 studies found that compared with parents of healthy children, both mothers and fathers of children or adolescents recently diagnosed with cancer reported significantly more distress and problems

with marital and family functioning, with mothers reporting more distress than fathers for up to 1 year after diagnosis. The mothers of the children with cancer also reported higher levels of family conflict than mothers of healthy children (Pai et al. 2007).

The stress of a child's cancer diagnosis and treatment leaves some parents feeling helpless, extremely fearful, or horrified, thus setting the stage for symptoms of acute stress and/or posttraumatic stress symptoms (Pai and Kazak 2006). Children whose parents are distressed are more likely to be distressed themselves (Robinson et al. 2007); however, parents appear to be at significantly higher risk for posttraumatic stress symptoms than their children (Kazak et al. 2004). A study of 214 parents of pediatric oncology patients found that 33% of the parents reported symptoms consistent with acute stress disorder at 1 week postdiagnosis, and half of those reported symptoms of posttraumatic stress disorder at 4 months postdiagnosis. Mothers were more likely to report symptoms than fathers (Pöder et al. 2008). Another study of 201 parents using a different measure to assess acute and posttraumatic stress found that 51% of the mothers and 40% of the fathers reported symptoms meeting DSM-IV-TR (American Psychiatric Association 2000) criteria for acute stress disorder (Patiño-Fernández et al. 2008).

Stress symptoms may not necessarily resolve. Data suggest that parents of long-term cancer survivors are as psychologically symptomatic as those of recently diagnosed pediatric cancer patients, although the former are less angry and report less caregiving burden (Hardy et al. 2008). Parents with poor social support, adverse experiences with invasive procedures, trait anxiety, and negative beliefs about their child's illness and/or treatment have been found in most studies to be more likely to report posttraumatic stress symptoms, even many years after the completion of successful treatment (Rabineau et al. 2008). The Pediatric Psychosocial Preventative Health Model and the Medical Traumatic Stress Model are evidence-based treatment approaches designed specifically to address these issues (Kazak et al. 2007).

Brothers and sisters are also affected by the experience of a sibling's cancer diagnosis and treatment. They tend to feel left out, both by the family and by the medical team (Wilkins and Woodgate 2007). Little has been known about the long-term impact of childhood cancer diagnosis and treatment on siblings. The inclusion of brothers and sisters in the Childhood Cancer Survivor Study has provided the best information to date. Young adult siblings appear to do well in terms of HRQOL, education, general function, and emotional distress (Zebrack et al. 2007; Zeltzer et al. 2008).

Bone Marrow Transplantation

The term *bone marrow transplantation,* although still commonly used, is actually a misnomer. The term refers to a process in which a patient is treated with such intensity of chemotherapy and total body irradiation that the ability of the bone marrow to create blood cells is destroyed. This treatment is referred to as *conditioning* (Mori et al. 2008). The patient is then "rescued" with an infusion of hematopoietic (blood-making) cells. The infusion is done using an intravenous drip; no surgery or "transplantation" is done. The infused cells may be the patient's own bone marrow cells (autologous transplant), cells removed from a related or unrelated donor's bone marrow (allogeneic transplant), peripheral blood stem cells, or stem cells from umbilical cord blood (Bunin et al. 2008). Each method has advantages and disadvantages (Karanes et al. 2008; MacMillan et al. 2008).

The principal advantage of using the patient's cells is that they will be histocompatible with (biologically match) those of the body. This method avoids having the immunologically active white cells made by the transplanted hematopoietic cells attempt to reject the rest of the patient's body. This phenomenon, called graft-versus-host disease, is functionally like an autoimmune disease, in which the immune system attacks the other organs. The closer the match between the human leukocyte antigens (HLAs) of the transplanted blood cells and the recipient's cells, the less likely is graft-versus-host disease (Krance 2008). Recent studies have found that cryopreserved (frozen) umbilical cord blood from matched unrelated donors contains sufficient numbers of hematopoietic stem cells for pediatric patients, and even for some adults (Barker 2007). Because cord blood does not require as close a match or the harvesting of marrow from a living donor, the use of umbilical cord blood is becoming increasingly common (Sauter and Barker 2008). However, use of related family donors does appear to offer some benefits in terms of reduction of graft-versus-host disease (Fagioli et al. 2008).

Bone marrow transplantation is used for hematological malignancies that originate in the hematopoietic cells, such as leukemia and lymphoma, in which eradication of the disease requires ablation of

the bone marrow (Woods 2006). However, bone marrow transplantation may also be used as a rescue when the intensity of chemotherapy or radiation required to eliminate aggressive or metastatic disease destroys the bone marrow. This procedure is sometimes referred to as "salvage" (Woods 2006). Nonmalignant diseases of the bone marrow may also require ablation of the marrow, as well as rescue.

During the time between the destruction of the native bone marrow and the engraftment of the transplanted hematopoietic cells, the patient is unable to produce red cells, white cells, or platelets. The resulting immunosuppression requires protective isolation from environmental microbes, because normally benign bacteria, viruses, and fungi could prove fatal, even with use of antimicrobial agents. Food, toys, books, and clothes must be kept as sterile as possible, and rooms are usually ventilated so as to reduce introduction of microbes from the air outside the room. Visitors are limited, sick visitors are prohibited, and everybody must carefully wash their hands before entering the child's hospital room. Use of medications, such as granulocyte colony-stimulating factor, that enhance production of white cells has substantially decreased the amount of time patients are severely immunosuppressed (Mori et al. 2008; Smith et al. 2006). Precautions such as gowns, masks, and gloves are now rarely used, and low microbial diets and laminar airflow or high-efficiency particulate air–filtered rooms are used selectively (Dadd et al. 2003). Although these changes have greatly reduced the medical and psychological risks of prolonged immunosuppression and isolation, this is still a frightening and lonely time for both child and family (Phipps et al. 2005; Rini et al. 2004).

Children undergoing bone marrow transplantation are exposed to high levels of chemotherapy and radiation and are thus at high risk for many of the physical sequelae, including neurocognitive impact (Wilkins et al. 2007). Typical problems encountered by over 25% of survivors in the first 10 years after transplant include infections, cataracts, bone and joint complications, hypothyroidism, learning disabilities, and psychological problems (Ferry et al. 2007). Although cognitive status may be stable for up to 2 years posttransplant (Barrera and Atenafu 2008), neurocognitive impairment appears progressive over the first 5 years posttransplant and is chronic. It appears to be associated with radiation to the brain and affects memory, visual perception, and verbal learning (Shah et al. 2008).

Studies suggest that HRQOL is impaired prior to the transplant, becomes worse during conditioning, and improves in 4–12 months posttransplant. By 6 months to 8 years posttransplant, the pediatric recipients had HRQOL comparable to or better than population norms (Löf et al. 2009). Meta-analyses have shown that pretransplant family functioning and social skills are significant predictors of HRQOL (Clarke et al. 2008).

Transition of Care

Given the long-term risk for medical and emotional sequelae of cancer diagnosis and treatment, ongoing surveillance is recommended (Children's Oncology Group 2008). This recommendation has presented some challenges. Oncology treatment centers for adults are not accustomed to pediatric treatment protocols and their sequelae. Adult survivors of pediatric cancers feel awkward about continuing to visit a children's hospital when they are in their 30s or 40s. Specific transition or long-term follow-up clinics have been created to address these medical concerns within a developmentally appropriate framework. Long-term follow-up requires specific training for staff and protocols for screening and prevention (Freyer and Brugieres 2008). These long-term follow-up clinics provide developmentally appropriate care for adults who are generally healthy, but still at risk, and are emerging from the protected and somewhat dependent role of a pediatric patient (Freyer and Kibrick-Lazear 2006). A survey found that over 60% of young adult survivors of childhood cancer reported a desire for more age-appropriate information on cancer, diet, exercise, nutrition, complementary and alternative health services, infertility, mental health counseling, and camp or retreat programs for young adults (Zebrack 2009).

Palliative Care

As discussed in previous sections of this chapter, the treatment given in pursuit of cure for childhood cancer is extremely toxic, with many acute and long-term physical and emotional sequelae. Concern about the comfort of the pediatric cancer patient is always a part of treatment for oncologists, but comfort becomes the primary concern when cure is no longer an option. For parents, symptom-related care is an essential part of all cancer-directed therapy; this is a frequent reason parents give for seeking complementary or alternative care for their chil-

dren. The American Academy of Pediatrics has established guidelines for the use of complementary and alternative care with children and adolescents (Kemper et al. 2008).

Use of complementary and alternative medicine is common among children who are in active treatment or are survivors of cancer. Small clinical trials have supported the utility of acupuncture or ginger for nausea and vomiting, or hypnosis and guided imagery for pain or anxiety (Ladas et al. 2006). Although some interventions have been found to be safe and effective when used in conjunction with cancer treatment protocols, others present interaction risks. Therefore, open communication must be maintained regarding any additional treatment modalities pursued by the child or teen and family (Quimby 2007).

Seeking agreement between parents about end-of-life care is important on many levels. It is good for the couple and their ability to live with themselves and each other after the child's death (Edwards et al. 2008). Also, if the parents cannot agree on a primary goal of lessening suffering, they are more likely to report that the child suffered significantly from cancer-related treatment (Bluebond-Langner et al. 2007). Although the prognosis is much better than in the past, staff working with pediatric oncology patients must deal with a great deal of suffering and fear in the patients and families and frequently must watch their young patients die. Despite these stressors, burnout does not appear to be greater among staff in pediatric oncology than among staff in other pediatric specialties (Liakopoulou et al. 2008). Nurses who are able to avoid "compassion fatigue" appear to be able to focus on "moments of connection, making moments matter, and energizing moments" (Perry 2008, p. 87). Despite the extensive research into posttraumatic stress response in childhood cancer survivors and their families, very little has been done to examine "vicarious traumatization" of oncology nursing staff (Sinclair and Hamill 2007). The reader is referred to Chapter 16 for further discussion of issues related to palliative care.

Treatment Interventions

Psychosocial support at the time of cancer diagnosis and during treatment has always been an essential component of pediatric oncology programs and has increasingly been focused on acute stress responses (Stuber and Shemesh 2006). Pediatric oncology nurses provide crisis intervention for families dealing with a childhood cancer diagnosis (Hendricks-Ferguson 2000), in addition the social workers and pediatric psychologists who are a part of each program (American Academy of Pediatrics 2009). Interventions for acute procedural pain and anxiety, including hypnosis (Richardson et al. 2006; Wild and Espie 2004) and other types of complementary and alternative care such as acupuncture (Rheingans 2007), have been found to be useful for acute distress, although they are not offered at all centers.

A Pediatric Medical Traumatic Stress Toolkit is now available for download for medical professionals and families through the National Child Traumatic Stress Network (http://nctsnet.org). This toolkit provides simple tips for detection and prevention of posttraumatic stress symptoms in children of various ages. Materials are designed for use by doctors, nurses, and mental health care providers working with children and families in an emergency department, intensive care unit, or pediatric hospital (Stuber et al. 2006).

Completing a psychological intervention during the acute treatment period is often very difficult, given the many demands on the child and family (Stehl et al. 2009). A recent review of interventions found that most published studies have reported that interventions during active cancer treatment are more effective in reducing distress in the parents, with no significant effect sizes in either child or parental reports of child distress or child adjustment (Pai et al. 2006). One promising and practical type of intervention for parents is a brief family-based intervention that has been found to reduce anxiety and parental posttraumatic stress symptoms (Kazak et al. 2005; Pai and Kazak 2006). Another type of intervention that has proven effective for parents of recently diagnosed children has been a cognitive-behavioral intervention targeting problem-solving skills. A multisite study of 430 mothers found that both English- and Spanish-speaking mothers reported significantly enhanced problem-solving skills and significantly decreased negative affectivity after eight sessions, with persistence of benefit for 3 months posttreatment (Sahler et al. 2005). Interventions with siblings of children with cancer have also found that targeted camps can reduce the levels of distress, improve social competence, and improve knowledge of the impact of cancer and its treatment (Sidhu et al. 2006).

The interventions that have been studied and found to be useful for children have focused on cognitive functioning or posttraumatic stress. Statisti-

cally significant improvements in academic functioning and parental reports of increased attention have been seen after specific cognitive retraining interventions for childhood cancer survivors, although long-term utility has not yet been established (Butler et al. 2008). Structured family-based interventions have been successful in reducing posttraumatic stress symptoms, such as intrusive thoughts, avoidance, and arousal, in adolescent survivors of childhood cancer and their families (Kazak et al. 2004). Comprehensive preventive interventions on an acute basis, paired with longer-term targeted interventions for those with posttraumatic stress symptoms, are recommended at this point for children and their families (Kazak et al. 2007).

Medication interventions can be useful for acute distress. However, the most effective medical intervention is adequate pain relief, because this helps both acutely and in terms of prevention of later anxiety and posttraumatic stress symptoms (Stuber and Shemesh 2006). The reader is referred to Chapter 30, "Psychopharmacology in the Physically Ill Child," for discussion of interventions to address depression and cancer-related fatigue.

Concluding Comments

Enormous progress has occurred in pediatric oncology over the past 30 years. More advanced treatment has increased survival rates in many children who would not have previously survived. The cost of this progress, however, has been significant long-term physical and psychological sequelae for these survivors and their families. How to determine who is most at risk, how to prevent these sequelae, and how to identify and treat those affected are areas of active research. In addition, clinicians are starting to understand the associations between long-term or late-onset psychological distress and both functional impairment and poor health behaviors. Interventions that address all of these components are necessary to provide these children and adolescents with the opportunity for full lives.

The manifestation of posttraumatic stress symptoms in young adults despite the apparent lack of symptoms in children or adolescents presents unanswered questions. Are the symptoms masked or prevented in younger survivors? Do they emerge in much the same way that other physical "late effects" do, or are they a response to social developmental challenges such as completing education, choosing a career path, and finding a mate? This is an area of active research, with interesting implications for what is meant by "posttraumatic stress." Another relatively unexplored area is that of the psychological impact of cancer on infants and young children (Kazak and Baxt 2007). Despite the extensive research on the cognitive impact of cancer treatment on the developing brain, much less is understood about the impact of separation from parents and multiple painful procedures in preverbal children. With a growing literature on the ability of early trauma to activate genetic susceptibility to substance abuse and depression, an important goal is to reduce the trauma of lifesaving treatments to the extent possible. New evidence on the role of early painful experiences in development of hypersensitivity to pain may lead to appropriate alterations in procedures, as occurred with cranial radiation (Zeltzer et al. 2008).

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16

Pediatric Palliative Care

Michelle R. Brown, Ph.D.
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The goal is to add life to the child's years, not simply years to the child's life.
American Academy of Pediatrics 2000, p. 353

Pediatric palliative care is a new interdisciplinary frontier in the comprehensive care of children. Although children with life-threatening and life-limiting conditions have always been part of the health care system, only recently has an integrated vision toward their care begun to emerge. This momentum is reflected in the policy statement issued by the American Academy of Pediatrics (2000) calling for equitable support for curative, life-prolonging, and palliative care. Broadly defined, "Palliative care for [children and] young people with life-limiting conditions is an active and total approach to care, embracing physical, emotional, social, and spiritual elements. It focuses on enhancement of quality of life for the child and support for the family and includes the management of distressing symptoms, provision for respite, and care through death and bereavement" (Joint Working Party on Palliative Care for Adolescents and Young Adults 2001, p. 8).

In the pediatric model, as in the adult model of palliative care, quality of life is emphasized and comfort is a primary goal. Although transition to palliative care often occurs very close to the time of death in the adult model, in the pediatric model, efforts to initiate palliative care for children earlier in the illness trajectory—in a proactive manner—enable effective care planning for the entire family. Approximately 55,000 children die each year in the United States. Of those, over half are under age 1 year (Institute of Medicine 2003). (The percentages of deaths by age group and cause are presented in Figures 16–1 and 16–2, respectively.) Thus, pediatric palliative care encompasses a broad age range and may be initiated even before a child's birth. Pediatric palliative care also encompasses a broad spectrum of conditions that fall within one of four categories (see Table 16–1) (Joint Working Party on Palliative Care for Adolescents and Young Adults 2001).

Prognosis is often far less predictable among children than adults. As a result, much debate is occurring about the terms *life limiting* and *life threatening* as this new field develops (Abrahm and Sourkes 2004; Joint Working Party on Palliative Care for Adolescents and Young Adults 2001; Association for Children with Life-Threatening or Terminal Conditions and Their Families and Royal College of Paediatrics and Child Health 2003). *Life threatening* is a broader concept, in that it includes illnesses for which cure is possible, although the threat of a fatal outcome exists, as in the case of childhood malignancies. Of

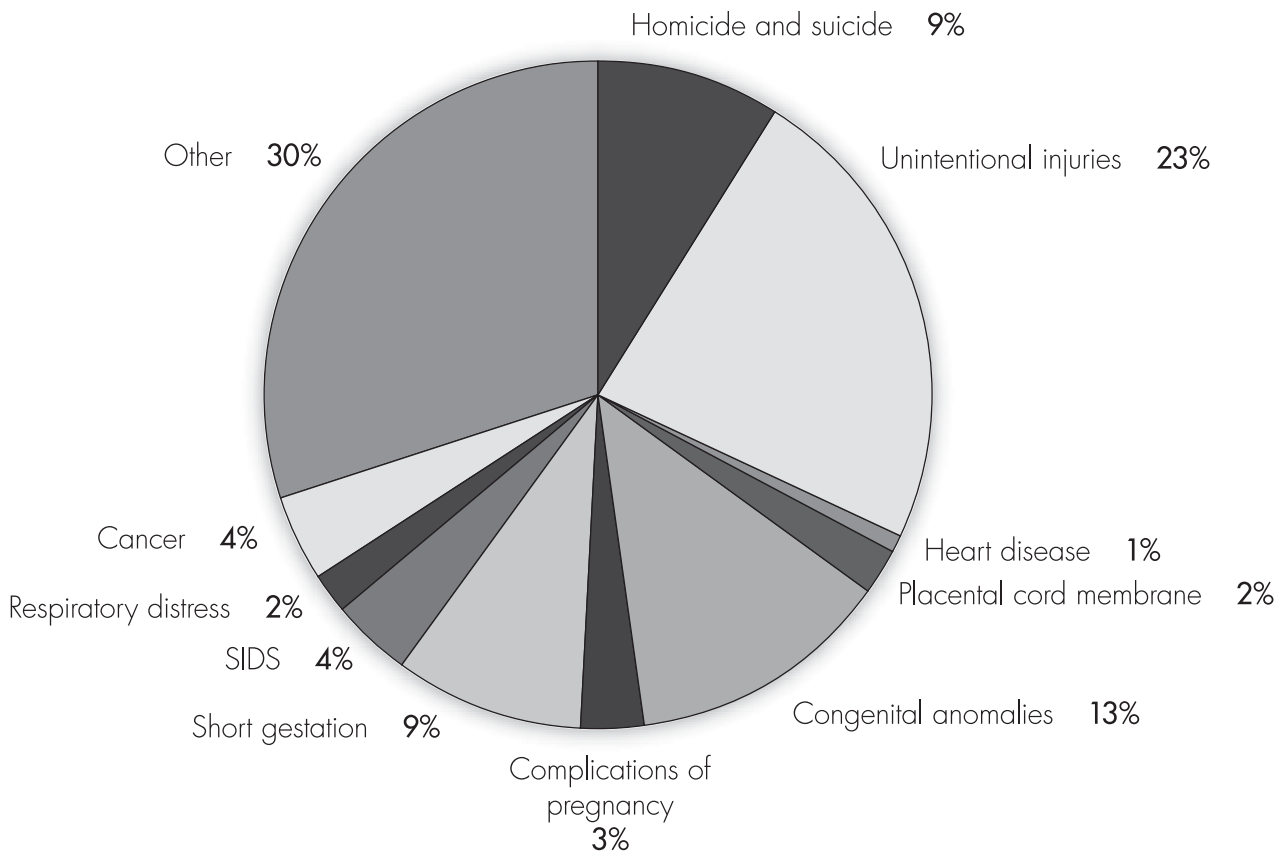

FIGURE 16–1. Percentage of total childhood deaths by major causes (2004).
Source. Data from Heron 2007.

course, an illness may begin as life threatening and convert into a life-limiting condition, as when a child relapses and curative options no longer exist. Life-limiting conditions are those that have no reasonable chance of cure from the outset; even if children survive for years and decades, they will not have a normal life expectancy. Thus, the necessity for palliative care may emerge at different points in the illness trajectory, depending on the prognosis for the child, the decisions made in choosing between treatment options, and the management of pain and suffering. Distinct models, such as those shown in Figure 16–3, are therefore necessary to depict the heterogeneous approaches to the provision of palliative care (Joint Working Party on Palliative Care for Adolescents and Young Adults 2001).

Models of Pediatric Palliative Care

Multiple models of pediatric palliative care exist nationally (Carter et al. 2006; Duncan et al. 2007; Friedrichsdorf et al. 2007; Rushton et al. 2006; Ward-Smith et al. 2007) and internationally (Friedrichsdorf et al. 2005; Monterosso and Kristjanson 2008). Differences lie primarily in the composition of the care teams rather than in the overall approach to care. Most programs include, at a minimum, a physician, often serving as medical director, and a nurse. In addition, dedicated support staff, such as a social worker, child life specialist, psychologist and/or psychiatrist, and chaplain, may be integrated into the core team. However, some palliative care programs utilize existing ancillary services, collaborating with the primary medical team already involved in the patient's care.

Consistent across the models is the provision of care throughout the illness continuum, from initial diagnosis and treatment to recurrence to end-of-life care and family bereavement follow-up. Continuity of care across treatment settings is emphasized, and when possible, palliative care teams provide children and their families with both inpatient and outpatient services, in addition to coordinating with community providers involved in the care. Clinical consultation is provided to primary medical teams

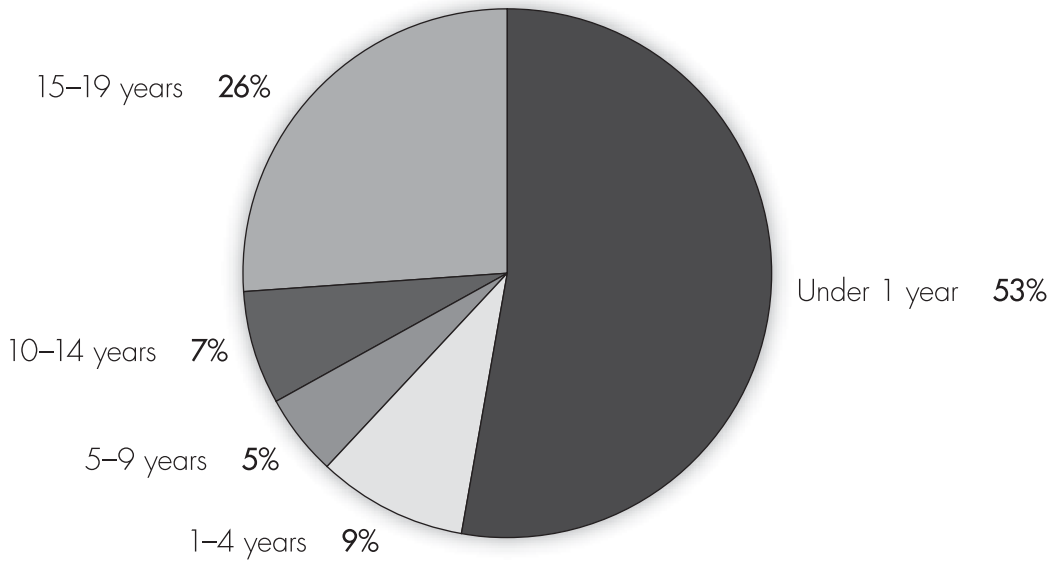

FIGURE 16–2. Percentage of total childhood deaths by age group (2004).
Source. Data from Minoño et al. 2007.

and families around issues such as adjusting analgesia and sedation; managing withdrawal from life-sustaining measures; helping families with medical decision making, home care needs, sibling support, grief, and bereavement; and providing staff support. Palliative care services may participate in residency education, monthly palliative care rounds, patient care conferences to facilitate communication and planning, and/or bereavement debriefing (Rushton et al. 2006).

Barriers to Pediatric Palliative Care

The medical, psychosocial, cultural, and financial barriers to the ideal delivery of comprehensive pediatric palliative care are many (Frager 1996; Liben 1996). Professionals and parents are often unable or unwilling to make the transition from curative to palliative care when the two are seen as mutually exclusive. In such models, palliative care is equated with "giving up." However, palliative care medicine does not preclude the appropriate application of life-sustaining therapies. In fact, these seemingly disparate approaches may in fact be offered concurrently, although one may predominate over the other at different points in time.

Misconceptions around medication pose a barrier to optimal palliative care. Often, children require far larger dosages of medication than those recommended in standard drug models (Sourkes et al. 2005). Misapprehensions about drug addiction and respiratory depression on the part of both professionals and parents lead to the imposition of artificial and unnecessary limits in the therapeutic plan.

At the hospital level, staffing issues often serve as barriers to optimal palliative care. Frequent changes in the treatment team may contribute to miscommunication and confusion about the child's treatment plan. Physicians typically rotate off-service on a weekly or biweekly basis, and primary nursing care is often not available. As a result, established treatment plans may not be sufficiently clarified or may not be implemented by subsequent providers who may disagree with previous decisions. Frequent staff rotation also increases the likelihood that treatment team members may possess varying levels of experience with palliative care (Liben et al. 2008).

Community barriers include the lack of hospice and other health care professionals familiar with pediatric symptom management. Often, children and their families become intensely dependent on their tertiary care center and do not rely on community resources, including their primary care clinician. As a result, such professionals miss opportunities to gain expertise in pediatric palliative care.

Reimbursement issues are another major hindrance in developing comprehensive palliative care services (Harris 2004). In most cases, third-party payers consider palliative care and curative or life-prolonging care as mutually exclusive. Thus, palliative services are not reimbursed if children continue

TABLE 16–1. Categories of life-limiting illness in childhood

1.	Life-threatening conditions for which curative treatment may be feasible but can fail. Access to palliative care services may be necessary during periods of diagnostic uncertainty and when treatment fails. Children in long-term remission or following successful curative treatment are not included. (Examples: cancer, irreversible organ failures of heart, liver, kidney)
2.	Conditions for which premature death is inevitable. Long periods of intensive treatment may be aimed at prolonging life and allowing participation in normal activities. (Examples: cystic fibrosis, HIV/AIDS)
3.	Progressive conditions without curative treatment options. Treatment is exclusively palliative and may commonly extend over many years. (Examples: Batten disease, mucopolysaccharidosis, muscular dystrophy)
4.	Irreversible but nonprogressive conditions causing severe disability leading to susceptibility to health complications and likelihood of premature death. (Examples: severe cerebral palsy, multiple disabilities such as following brain or spinal cord insult)

Source. Adapted from Joint Working Party on Palliative Care for Adolescents and Young Adults: *Palliative Care for Young People Aged 13–24.* Researched and written by Thornes R. Edited by Elston S. Bristol, UK, Association for Children with Life-Threatening or Terminal Conditions and Their Families, September 2001. Used with permission.

to receive treatments that are deemed life prolonging, such as blood transfusions or palliative chemotherapy. In addition, services often exceed the 6-month limit of the traditional hospice benefit. At present, advocacy efforts at the state and federal levels (e.g., Children's Hospice International, California Children's Hospice and Palliative Care Coalition) are working to ensure that children have access to an individually tailored care plan unlimited by the current restrictions.

Contributions of Psychology and Psychiatry to Pediatric Palliative Care

Comprehensive pediatric palliative care demands the integration of specialized contributions from multiple disciplines to address the medical, psychological, social, and spiritual concerns of the child and family (Joint Working Party on Palliative Care for Adolescents and Young Adults 2001; Institute of Medicine 2003). The specific and unique contributions provided by child mental health clinicians include evaluation of the child's psychological status, diagnosis of psychological or psychiatric symptoms and disturbance, provision of psychotherapy and psychotropic medication, and consultation to families and the treatment team. Healthy siblings are also included within this network of care. Thus, under optimal circumstances, the various contributions of child mental health clinicians can play a pivotal role in the integration of the patient's comprehensive palliative care plan.

Mental Health Evaluation

Although psychological or psychiatric treatment is not universally necessary, the mental health consultant's ability to identify "high-risk" children and intervene in a timely fashion is crucial. Ideally, the psychological status of each child admitted to palliative care should be evaluated to facilitate optimal care planning in the same way that medical and nursing assessments are carried out. Although sadness and anxiety are typical and expected reactions to prolonged illness and treatment, under sustained stress, such responses may progress to disabling clinical disorders that may ultimately necessitate psychotherapy and/or psychotropic medication; this is especially true for a child with preexisting vulnerabilities, including a prior psychiatric history in the child or a family member.

Although overemphasizing pathology in the child should be avoided, minimizing or failing to recognize important symptoms also presents risks. Unfortunately, both parents and clinicians often underestimate the degree of emotional distress experienced by pediatric populations with chronic illness. Differential diagnosis may be difficult for non–mental health providers because the normal emotions of sadness and grief overlap with the symptoms of clinical depression (e.g., crying, decreased appetite, difficulty sleeping, and decreased attention and concentration) (Kersun and Shemesh 2007; Shemesh et al. 2005). The mental health clinician, by assessing the severity of symptoms, particularly in terms of intensity and duration relative to the child's current reality, can determine whether psychotherapy is necessary or existing supportive services (e.g., child life,

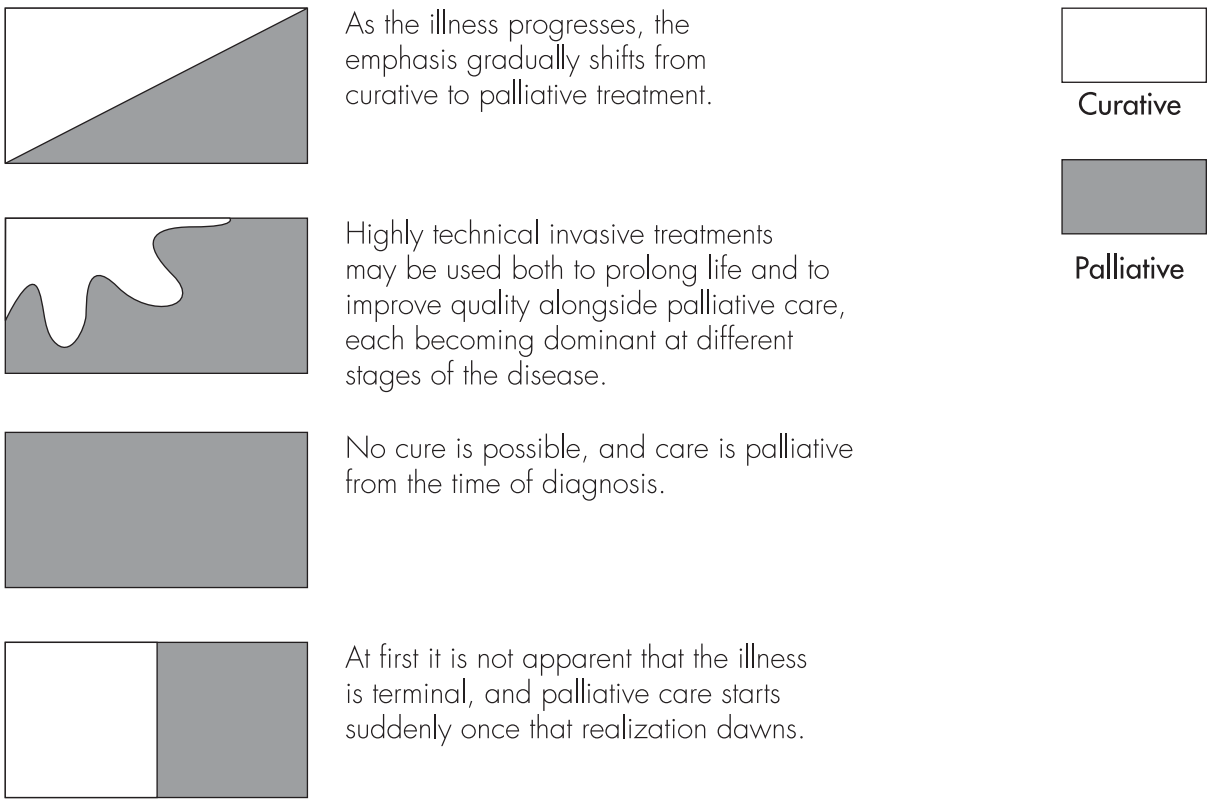

FIGURE 16–3. Curative and palliative care relationship.

Source. Reprinted from Joint Working Party on Palliative Care for Adolescents and Young Adults: *Palliative Care for Young People Aged 13–24.* Researched and written by Thornes R. Edited by Elston S. Bristol, UK, Association for Children with Life-Threatening or Terminal Conditions and Their Families, September 2001. Used with permission.

chaplaincy, ongoing relationships with physicians and nurses) would suffice.

Child mental health clinicians possess knowledge of normal psychological development that is essential for evaluating the impact of illness on a child, providing explanations in developmentally appropriate ways, and identifying appropriate interventions. Conceptions of death are thought to generally correspond with the progression through four sequential stages of cognitive development (Poltorak and Glazer 2006), as shown in Table 16–2, although children with a life-threatening illness often possess an advanced understanding of death relative to their healthy same-age peers (Bluebond-Langner 1996).

During infancy and toddlerhood, children hold little, if any, understanding of death; rather, death is equated with separation from caregivers. By preschool age, children develop an awareness of death; however, they are unlikely to recognize that death is universal, an inevitable outcome for all living things including themselves and loved ones (Poltorak and Glazer 2006). Lacking the concept of irreversibility, young children are also unlikely to understand the permanence of death. Thus, a young child of a deceased sibling may continue to ask days after his passing when her brother will be returning home. Additionally, preschoolers' limited understanding of cause and effect may lead them to wrongly infer causality, referred to as magical thinking. For example, young children may perceive themselves as responsible for negative events when such events have coincided closely in time with their own actions or thoughts. Within the context of psychotherapy, such beliefs can be explored and misconceptions clarified.

From approximately 6 to 12 years of age, children develop logical reasoning skills and are able to understand more objective causes of death. They also grasp that all functions of the living physical body cease to exist at the time of death. Children's fears of death remain primarily centered on the concrete fear of being separated from parents and other loved ones. By adolescence, abstract reasoning enables them to anticipate the future in a way that younger children cannot. The experience of death for the adolescent becomes more focused on existential issues related to an afterlife similar to that seen in adults.

TABLE 16–2. Development of the death concept

Stage	Age	Death concept
Sensorimotor	Birth to 2 years	No concept of death
Preoperational	2–6 years	Magical thinking
Concrete operational	6–12 years	Attainment of Universality Irreversibility Causality Nonfunctionality
Formal operational	12 years to adulthood	Increasingly abstract reasoning

Individual Psychotherapy

Psychotherapy is the treatment modality unique to mental health clinicians. Within its framework, the child seeks to integrate the facets of his or her life. Through words, art, and play, the child conveys the experience of living with the threat of loss and transforms the essence of his or her reality into expression. Self-help techniques, such as relaxation, guided imagery, and hypnosis, may be integrated into the psychotherapy to reduce symptoms of nausea, fatigue, insomnia, and pain (Kazak 2005; Kazak et al. 1996; Kersun and Shemesh 2007; Steif and Heiligenstein 1989). These techniques are not restricted to psychotherapeutic intervention and may be employed by other disciplines trained in their methodology.

Play therapy enables the seriously ill child to "reenter" childhood. Through play, children can approach and retreat from the intensity of their illness at will, thereby allowing some containment and mastery over their emotional experience. Play is the fundamental means of communication. Any trauma, including illness, can extinguish a child's capacity for play or erode its range of expression into rigid patterns (Sourkes 2000; Terr 1990). Within the context of play therapy, emotional restoration is evident when the child's play reflects earlier patterns of activity and liveliness.

For older children and adolescents, psychotherapy can facilitate psychological adjustment by enabling discussions about their illness and prognosis (Brown and Sourkes 2006). Abstract reasoning enables adolescents to anticipate the future in a way that many younger children cannot (Aldrich 1974; Brown and Sourkes 2006). Responding to adolescents' questions about their illness and prognosis or about the possibility of their death requires careful exploration of what is already known by the child, what is really being asked (the question behind the question), and why these questions are being asked at this particular time (Brown and Sourkes 2006; Sourkes 1992). Parents, in their own struggle with grief, sometimes discourage such questioning or provide optimistic responses in an attempt to avoid the pain associated with threatened loss. As a result, children often express frustration or resignation over their parents' unwillingness or inability to acknowledge the severity of their illness and the possibility of death.

Psychotherapy can provide children with a space of their own in which their thoughts and feelings are protected and confidential and their emotions can be expressed openly without fear of others' reactions. Adolescents can talk about their feelings that they feel are too painful for the family to bear. Through psychotherapy, children can experience a sense of stability and continuity during a time that may otherwise feel chaotic and unanchored. The therapeutic relationship in and of itself may be a profound intervention, even when issues of death and loss are not explicitly addressed. Often, mental health providers working with adolescents who are facing a life-threatening illness feel pressured to elicit the teens' emotions around their prognosis and to assist them in finding some meaning in their illness or impending death. However, such therapist-driven goals are typically not therapeutically indicated; rather, the mental health clinician should follow and respect adolescents' cues to ensure that issues important to them are addressed.

Individual psychotherapy can play a critical role by helping children formulate a hierarchy of their chosen goals (e.g., graduation from high school, travel, admission to college). For this reason, children have the right to know their diagnosis and prognosis. The information can provide a time context within which to organize and reorganize priorities, thereby instilling an increased sense of control

over the time remaining. At present, no empirical evaluation has been reported of group psychotherapy for children with life-limiting conditions. However, research in adults with life-threatening conditions has demonstrated that group psychotherapy is effective in reducing psychological distress (e.g., depression, anxiety) and improving quality of life and coping symptoms (Breitbart 2002; Miller et al. 2005). Thus, group psychotherapy may be a potentially useful modality for enhancing the end-of life experience for children as well.

Family Psychotherapy

Family therapy can play a pivotal role in sustaining, strengthening, and repairing family resources. The profound and enduring impact of the child's illness on the family is addressed within this context. Family therapy does not in any way preclude individual psychotherapy with the child; rather, it affirms the family unit as a whole and provides a framework for healing (Sourkes 1995). Family therapy is often provided in combination with individual psychotherapy to help open the lines of communication between children and their families about topics that parents are uncertain about how to approach. Most children who have lived with the cumulative toll of illness and treatment have acquired an accurate understanding of their life-threatened status or impending death long before others discuss it with them.

The protective stance of the past was that disclosure to children of their prognosis (and even, in some instances, the diagnosis) would cause increased anxiety and fear. Over the last two decades, however, a shift toward open communication has become more evident. To shield children from the truth may only heighten anxiety and cause them to feel isolated, lonely, and unsure of whom to trust (Sourkes 1995). Kreicbergs et al. (2004) found that bereaved parents who had discussed impending death with their children had no regrets about doing so; this was in sharp contrast to the regret felt by some parents who had avoided such openness.

Communication can be facilitated by the mental health clinician and may occur through a series of discussions that take place over a period of time (with the family's verbal and nonverbal cues guiding the pace) or by brief consultation to the family members so that they feel more capable of pursuing such discussions on their own. Considerations about what or how much to tell include the following: the child's age and cognitive and emotional maturity, and the family's structure and functioning, cultural background, and history of loss. These same factors apply at the end of life, with extreme sensitivity to how the parents have chosen to inform the child throughout the illness experience, how the child has understood and processed information up to this time, and what the child is now asking—both implicitly and explicitly—about his or her situation (Abrahm and Sourkes 2004; Sourkes 1995).

Siblings

A focus on the well siblings is an important aspect of the family work. Too often, the siblings stand outside the spotlight of attention, even though they have lived through the illness experience with the same intensity as the child and parents (Sourkes 1987). Healthy siblings experience many of the same issues as the ill child: loss of control and predictability over their schedules, loss of a personal identity (e.g., being identified as the sibling of a dying child), and loss of interpersonal relationships (because of changes in routine that exclude them from their normal social opportunities) (McSherry et al. 2007). The healthy siblings share common questions and concerns; they raise some with parents, professionals, or another trusted adult, but they harbor others silently.

Typical sibling concerns may include the fear of becoming ill, guilt about escaping the disease, and anxiety resulting from a lack of information or misinformation (Sourkes 1987). Rarely mentioned but often present is the unacceptable feeling of shame at having a "different" family, marked by an ill sibling who is disfigured or dying. Siblings may harbor anger around diminished attention and nurturance from their parents, especially when the ill child is in the hospital. Siblings who themselves are feeling deprived may also resent stepping in as surrogate parents for younger brothers and sisters. Once the ill child is home, siblings may resent the extra attention and privileges accorded to him or her, shifting their complaint from that of "too little attention" to "preferential treatment." Parents, meanwhile, often struggle to maintain equality and normality when, in fact, a distinctly "abnormal" factor in the family constellation exists. Another common issue is that of siblings' anger at parents for not having been able to protect the patient or even their perception that the parents (by commission or omission) played a role in the cause of the illness.

Siblings' academic performance may be impaired because of their preoccupation, or they may focus on school to ensure a sense of competence in the face of stress and helplessness. Similarly, siblings

may curtail contact with their peers in their need for a family focus, or they may turn increasingly to their friends for support or to flee the pain at home. Physical symptoms and sleep problems are commonly found within a sibling group. They may develop as an expression of stress and distress or as a means of attracting parental attention; the siblings' preoccupation with their ill brother or sister may also lead to carelessness about themselves. In some instances, psychosomatic symptoms symbolically represent a sibling's concerns or fears (e.g., the sibling of a child with a brain tumor may develop intense headaches).

Liaison Between Family and Medical Team

When a child becomes aware of the diminishing curative or life-prolonging options that he or she faces, the child may ask anxiously about the options remaining if the treatment is unsuccessful (Sourkes 1982). Families are confronted by a series of decisions regarding the nature and intensity of medical interventions they wish to pursue. As a liaison between the family and medical team, the mental health clinician can serve to clarify both experimental and palliative options and their consequences. In most instances, the parents make the decision; however, to varying degrees, the ill child or adolescent is involved in such discussions. In such circumstances, the clinician must rely on clinical judgment to assess children's understanding of the contingencies they are facing.

Given that a child may express thoughts about treatment options and awareness of living with the threat of death to individuals other than his or her parents or primary care clinician, the mental health clinician can be an important liaison at critical junctures in the illness trajectory. This involvement is particularly helpful when the child's wishes or goals for treatment differ from those of the parents or treatment providers. On the one hand, physicians may recommend an aggressive course of treatment, while the child and parents are concerned about the pain and suffering associated with such an approach. On the other hand, physicians may encourage a transition to palliative care while the family still wishes to exhaust every possible life-prolonging option. Under such circumstances, the mental health clinician can clarify these differing perspectives and their implications and facilitate discussions toward a common treatment goal. Furthermore, the mental health clinician can serve to reduce the risk of miscommunications and misunderstandings (albeit unintended) that may have lasting emotional repercussions for the family.

Differing priorities may lead to misunderstandings, especially when curative care and palliative care are perceived as mutually exclusive. For example, an adolescent's behavior might be perceived as nonadherent and oppositional when he or she misses medications or procedures that are time consuming or painful. However, the adolescent may be asserting that quality of life and/or comfort is more important than curative efforts. By evaluating the unique characteristics of each child and family (e.g., personal and religious beliefs, hopes related to treatment), the mental health clinician is able to advocate for the individual needs of each patient.

Cultural Considerations

As liaison between the adolescent, family, and/or treatment team, the mental health clinician must evaluate culturally defined characteristics of each family. Some important areas to explore in this regard include 1) how the family's ethnic, cultural, or national background impacts their experience in the hospital and with caregivers; 2) whether the family is a member of the dominant ethnicity in the medical environment or is in the minority (special attention should be directed to immigrant and minority families); 3) whether cultural or linguistic barriers, overt or covert, may affect their experience; 4) what their beliefs and values are in relation to childhood illness, death, medical care, and family involvement; and 5) what unique roles the patient/family and extended community play in their culture.

It remains questionable whether the prevailing principles of Western culture are as relevant to children and families of different cultural origins. Although open communication is emphasized in Western medical practice, other cultures exclude children from discussion of disease diagnosis and death (Liben et al. 2008). In Chinese culture, for example, discussion about the possibility of death in the presence of a sick person can be perceived as a curse or effort to hasten death. Some cultures perceive that honest discussions about dying deprive children of the sense of safety and security associated with the innocence of childhood and rob parents of their role as protectors from harm.

Culturally defined health beliefs and practices can significantly influence acceptance of and adherence to prescribed therapies, the degree and quality of parental involvement in patient care, and the family's relationship with health care staff. Behavior

that is viewed in isolation without consideration of the cultural context is often misinterpreted by treatment providers. For example, "resistances" observed among many Asian Americans (e.g., hesitancy to open up, tendency to give limited information) may be mislabeled (Lee 1982). Whereas openness may be embraced by European Americans, many Asian Americans have been taught that premature disclosure of emotions to a stranger is an indication of lack of self-control, immaturity, and a cause for shame. A mother from a patriarchal sociocultural system may be regarded by a medical team as passive or uninvolved due to her silence during discussions about medical treatment or her refusal to consent to procedures in the absence of her husband. According to her cultural norms, however, such behavior may be considered reprehensible. As a cultural broker, the mental health clinician can raise awareness of cultural influences, thereby facilitating understanding, communication, and development of a treatment plan that is congruent with a family's cultural heritage (Trill and Kovalcik 1997).

In geographic areas with a complex mix of ethnicities and cultures, care providers cannot be expected to be experts in the background of all the families they serve. However, through sensitive and thorough inquiry, the mental health clinician can glean important information that promotes therapeutic relationships based on mutual understanding and respect.

Spiritual and Religious Considerations

Spiritual issues are central to the family's experience when facing the end of a child's life (Liben et al. 2008). However, spiritual needs seem to receive less attention than physical, social, and psychological needs, in terms of both research and clinical practice (Davies et al. 2002). Spiritual care is distinct from the medical, nursing, and social work dimensions of care that focus on identification and resolution of specific problems. In contrast, spiritual care is about accompaniment and presence in the journey of making meaning, and it often involves assisting in the challenging task of redefining hope (Davies et al. 2002). Research by Robinson et al. (2006) highlighted the integral role of spiritual care at the end of a child's life. In their study, when parents were asked what helped them most during their child's last phase of life, 73% of the responses reflected spiritual or religious themes (e.g., prayer, faith, access to and care from clergy, belief that the parent-child relationship transcends death).

Health care professionals, however, often lack training in assessment of patients' religious and spiritual concerns and, as a result, may inadvertently neglect an important aspect of care. To assist in bridging this gap, Davies et al. (2002) provided guidelines for addressing the spiritual issues of children and families in pediatric hospice and palliative care. Optimal spiritual care can be provided when knowledge of such attitudes and perspectives of the individual child and family is then coupled with familiarity about the philosophies, beliefs, ceremonies, and rituals of various religions.

Symptom Management

Recent strides have been made in the area of pediatric symptom management, yet children's symptoms at the end of life remain notoriously undertreated. Systematic evaluations demonstrate that children and adolescents with cancer continue to suffer from pain and other distressing symptoms often and substantially (Hechler et al. 2008; Pritchard et al. 2008; Theunissen et al. 2007; Wolfe et al. 2000). Symptoms most commonly reported during the last days of life included fatigue, pain, dyspnea, poor appetite, nausea, vomiting, and constipation. Of note, previous research (Hechler et al. 2008; Pritchard et al. 2008; Theunissen et al. 2007; Wolfe et al. 2000) has relied on retrospective parental reports, ranging from 6 months to 7 years after their child's time of death. In future research, attempts should be made to obtain self-reports from children diagnosed with a broader range of medical illnesses.

Psychological symptoms in seriously ill children are often multiply determined and in flux (Sourkes 2006). Physical pain, metabolic imbalance, neurological dysfunction, infection, and the impact of medications are closely linked with and at times inseparable from psychological distress. Most common are diagnoses in the broad categories of anxiety and depression. Anxiety represents a widely diverse group of developmentally appropriate and pathological coping responses, ranging from preexistent anxieties exacerbated under the stress of illness, to cumulative generalized anxiety, to posttraumatic stress disorder. Also, sleep deprivation and delirium may present as anxiety and agitation.

The psychological and somatic symptoms of depression can be hard to differentiate from effects of the illness and treatment. Furthermore, sadness and anticipatory grief are sometimes confused with clinical depression. Psychotic and organic brain syndromes often present with cognitive and perceptual

disturbances. Delirium may also present as anxiety or oppositional or aggressive behavior; parents frequently report sensing that something is "different" about their child but are unable to describe specifically the change. For reasons such as these, definitive psychiatric diagnosis can at times be elusive. As a result of these diagnostic ambiguities, one often proceeds with psychological or psychotropic intervention on the basis of managing specific symptoms rather than treatment of a presumed underlying psychiatric disorder.

Setting of the Child's Death

Some families have the opportunity to plan ahead and choose a setting for their child's death—home, hospice, or hospital. The child may express a preference about where he or she feels safe or prefers to be. Clear information about how the child is likely to die and professional support to validate the family's choice are crucial. Even more important is the explicitly stated "permission" from all members of the professional team that the family may change their choice freely at any time—that all options remain open and that no decision is irrevocable.

Although in the current culture of palliative care, having children die at home is strongly advocated, the actual place of death may be less important than previously thought (Dussel et al. 2009). Rather, dying in the family's *preferred location* may be the more critical variable. In fact, Dussel et al. (2009) found that the opportunity to plan for a child's location of death was associated with parental perceptions of high-quality end-of-life care. Thus, although beneficial effects have been associated with a child's home death (Goodenough et al. 2004; Lauer et al. 1989), professionals must bear in mind that for some children and families, the hospital is a better option, and that choice must be respected.

As a child's and family's mental health needs continue beyond a transition to home or hospice, the mental health clinician is likely to meet with them in alternative settings, outside of the hospital or clinic. Although psychosocial support is often provided as a component of hospice care, this does not replace the therapeutic benefit of ongoing contact with the mental health clinician who has known the child and family before the end-of-life phase. Continuity of care serves to minimize a sense of abandonment when contact with the hospital staff and physicians is greatly reduced.

Bereavement

> Parenting is a permanent change in the individual. A person never gets over being a parent. Parental bereavement is also a permanent condition. The bereaved parent, after a time, will cease showing the…symptoms of grief, but the parent does not "get over" the death of a child. (Klass 1988, p. 178)

For families who experience the death of a child, bereavement is a process that ebbs and flows over a lifetime. Certain experiences in the bereavement process are relatively universal; however, the experience is highly individualized for each family, depending on many factors. These factors include the child's developmental level, past psychiatric history (particularly coping with past losses or trauma), family composition and background, ethnicity, culture, spiritual beliefs, and available support (Raphael 1983; Rosen 1998; Stroebe et al. 1993). Individuals in the same family grieve in different ways and on different "schedules"; in fact, couples often express loneliness when one member is not "in sync" with the other, despite the fact that they are mourning the loss of the same child (McCracken and Semel 1998; Rando 1986; Rosof 1994; Schiff 1977; Shapiro 1994a, 1994b). All too often, siblings are "disenfranchised grievers" (Davies 1999); their loss is minimized compared to that of the parents. Thus, they are often admonished to "be strong for your parents" with little acknowledgment of their own unique grief.

Bereavement follow-up by the professional team is an intrinsic component of comprehensive pediatric palliative care. Families often express the sentiment of a double loss: First and foremost, they mourn the loss of their child, as an individual and as a member of the family and the greater community. Second, compounding their grief and disorientation, they mourn the loss of their "professional family"—the treatment team whom they have known and trusted, often over months and years (Contro et al. 2002; Institute of Medicine 2003). Contact from a team member after the child's death not only assuages the family's sense of abandonment but also can serve a crucial preventive role by identifying families at particular risk for serious psychological, social, emotional, and physical sequelae. A history of many losses, mental illness (e.g., severe depression or past suicidal behavior), and alcohol or substance abuse are a few of the issues that may indicate a predisposition to an especially difficult bereavement period. Family relationships that were already fragile or

stressed can become severely disrupted or deteriorate further. In both adults and children, extremes of emotion (or lack thereof) that persist over time, such as consuming rage that envelops the individual and alienates the family or total suppression of any sign of feeling, can be debilitating.

The palliative care team, in conjunction with other community providers, assesses the needs of the bereaved family and assists them either directly or by advocating for and engaging appropriate resources. In most communities, at least some resources are available for the bereaved, including religious institutions, hospice support groups, mental health agencies and providers, and school counselors. Common shortcomings, however, are that services are still geared primarily toward adults and are in short supply for non-English speakers. These reservations notwithstanding, the palliative care team should maintain a current resource list that targets the demographics of their population (Sourkes et al. 2005).

Concluding Comments

The newly emerging field of pediatric palliative care offers unique opportunities for psychologists and psychiatrists to participate in enhancing the quality of life of the most vulnerable children and families. Although these professionals have long been represented within medical settings, they remain on the periphery in palliative care, serving more as consultants than as core members of the interdisciplinary treatment team (Bearison et al. 2005; Haley et al. 2003; Nydegger 2008). This is true in adult and, in particular, pediatric settings. Existing discipline-specific training in medicine and nursing, such as the End-of-Life Nursing Education Consortium (see http://www.aacn.nche.edu/ELNEC) and Education in Palliative and End-of Life Care (see http://www.epec.net/EPEC/webpages/index.cfm), has broadened their curricula to increase their relevance to other professions. Efforts to expand awareness of palliative care within medical school and pediatric residency programs have led to a burgeoning of educational curricula (Bagatell et al. 2002; Sahler et al. 2000; Schiffman et al. 2008). Interdisciplinary training programs, such as those of the Children's Project on Palliative/Hospice Services, National Hospice and Palliative Care Organization, and Initiative for Pediatric Palliative Care, are inclusive of "psychosocial issues" and provide a cohesive framework for understanding the complexity of the field. The critical missing link for the mental health professions is education that focuses on psychiatric diagnoses and intervention in palliative care and hospice settings. The development of such initiatives will result in the increased integration of psychology and psychiatry into pediatric palliative care as the field continues to evolve.

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17

Sickle Cell Disease

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Medical Overview and Epidemiology

Sickle cell disease (SCD) is a group of inherited autosomal recessive disorders, including sickle cell anemia, sickle beta-thalassemia, and other hemoglobinopathies, which are characterized by the production of abnormal hemoglobin. SCD affects approximately 1 in every 400–500 African American newborns annually in the United States (Tarnowski and Brown 2000). Although most common in people of African descent, SCD also affects other ethnic groups, including persons of Mediterranean, Caribbean, South and Central American, Arabian, and East Indian descent.

In persons with SCD, abnormal genes for hemoglobin produce a change in the shape of red blood cells from their normal disk shape to a sickle shape. The abnormally shaped cells can obstruct normal blood flow and production of new red blood cells, resulting in chronic anemia and pain. Persons with SCD are susceptible to pneumococcal and other infections, stroke, and multiple organ dysfunctions. The most common type of SCD is the homozygous condition, sickle cell anemia, which is caused by two abnormal genes for hemoglobin S (Hb SS) and is associated with earlier and more frequent and severe symptoms than are other types of SCD (Charache et al. 1989).

Although SCD continues to be associated with a reduced life expectancy (Charache 1994; O.S. Platt et al. 1994), treatment for the disease has improved significantly (Cohen 1998; Ris and Grueneich 2000). Treatment advances reflect findings from clinical, molecular, and genetic studies (Hagar and Vinchinsky 2000) and the use of new tools, including transcranial Doppler ultrasonography, to evaluate patients for stroke risk (Abboud et al. 2004; Adams 2000).

In addition, new therapies are under investigation, including hydroxyurea, a drug that stimulates production of fetal hemoglobin, a determinant in the clinical severity of SCD. Although hydroxyurea was initially established as safe and efficacious in adults (Charache et al. 1995), studies in children have demonstrated encouraging findings. Specifically, a Phase I/II trial of hydroxyurea in children ages 5–15 with SCD demonstrated similar safety and efficacy as in adults (Kinney et al. 1999). Moreover, clinical efficacy of hydroxyurea has been reported in small groups of children (Ferster et al. 1996, 2001; J.P. Scott et al. 1996). In a Phase I/II pilot study, the feasibility and safety of hydroxyurea were demonstrated in very young children (ages 5–24 months), with no negative effects on growth and development (Hankins et al. 2005; Wang et al. 2001b). A recent pilot study also revealed that

hydroxyurea may prevent chronic organ damage (Thornburg et al. 2009). Finally, use of bone marrow transplantation holds promise for some patients with SCD (Hoppe and Walters 2001; Locatelli et al. 2003; Nietert et al. 2000; Walters et al. 2000).

Because SCD is a genetic condition present from birth, the disease is likely to interact with developmental factors in infancy or early childhood and therefore to have implications for cognitive and psychosocial functioning (Berkelhammer et al. 2007; Gustafson et al. 2006; Schatz and Puffer 2006). In this chapter, we summarize current knowledge about the brain bases of the psychological effects of SCD and psychological factors associated with adjustment and quality of life. Additionally, we review available evidence-based interventions for treatment adherence, pain coping and psychosocial adjustment, and cognitive and academic difficulties.

Cognitive Effects

Research has consistently documented higher rates of cognitive deficits among children with SCD than among control populations. In some children, cognitive decrements of SCD are direct results of neurological damage from overt cerebrovascular accident (CVA) or silent cerebral infarcts (Armstrong et al. 1996). However, children with SCD and no history of CVA also frequently exhibit cognitive deficits compared with peers (Brown et al. 1993a; Schatz et al. 2002a). Table 17–1 summarizes the common cognitive effects of SCD based on patients' CVA history.

Cognitive Effects of Cerebrovascular Accident in Children With Sickle Cell Disease

Overt CVA, or "clinical" stroke, is typically characterized by neurological signs of a CVA (Ohene-Frempong et al. 1998), and SCD has been associated with a 200-fold increase in risk for stroke during childhood (Earley et al. 1998). Children with SCD can experience infarctive stroke, which is often associated with focal seizures, hemiparesis, hemisensory deficits, and visual disturbance, or hemorrhagic stroke, which is more often manifested by acute changes in mental status and severe headache (Adams et al. 2001). The Cooperative Study of Sickle Cell Disease (CSSCD) estimated a prevalence rate of approximately 5% for overt stroke among children with the SS genotype (i.e., sickle cell anemia) and somewhat lower prevalence rates for other SCD subtypes, ranging from 0.84% to 2.43% (Ohene-Frempong et al. 1998). Among children with SCD, infarctive stroke is more common than hemorrhagic stroke (Ohene-Frempong et al. 1998), and CVA-related injury occurs most often in the frontal regions of the brain (Brown et al. 2000a; Schatz et al. 1999), primarily in areas supplied by the middle and superior arteries (Pavlakis et al. 1989).

Overt stroke often adversely affects children's cognitive and academic performance. Research has shown that overall IQ scores of children with stroke are significantly lower than those of children with SCD who do not have a history of CVA; across studies, the average IQ difference between the stroke and nonstroke groups is 14 standard score points (Schatz and Puffer 2006), indicating clinically observable differences. Mean IQ scores among children with SCD and stroke typically fall in the borderline range of intellectual functioning compared with test norms (i.e., IQ standard scores of 70–80), whereas children with SCD without stroke typically exhibit mean scores within the low average range (IQ standard scores of 80–90) (Armstrong et al. 1996; Brown et al. 2000b; Hariman et al. 1991; Steen et al. 1998; Wang et al. 2001a). Several studies have documented larger differences in performance IQ scores than verbal IQ scores between the two groups, suggesting that overt stroke may have greater impact on visual, motor, and processing speed abilities than on language and auditory processing abilities (Bernaudin et al. 2000). Evidence further suggests that attention and executive functioning skills are specific areas that are most often affected by stroke, particularly when stroke damage occurs in the anterior regions of the forebrain (Armstrong et al. 1996; Brown et al. 2000a; Craft et al. 1993; DeBaun 1998; Schatz et al. 1999). Specific tests of academic achievement have also revealed reading and math deficits associated with stroke in SCD, with the largest deficits observed in math abilities (Wang et al. 2001b).

Another type of CVA prevalent among children with SCD is silent cerebral infarct, or silent stroke, characterized by ischemia or infarcts that are detected on magnetic resonance imaging (MRI) but are *not* associated with observable neurological signs (Moser et al. 1996). The prevalence rate of silent stroke among children with SCD has been estimated to be approximately 11%–20%, with prevalence rates for children with the SS genotype falling at the upper end of this range (Armstrong et al. 1996; Bernaudin et al. 2000; Hindmarsh et al.

TABLE 17–1. Cognitive effects of sickle cell disease (SCD) by cardiovascular accident (CVA) history

SCD history: CVA	Common areas of cognitive difficulty
Overt CVA	Mental status, visual, and motor deficits at time of CVA Decreased overall IQ (mean standard scores: 70–80) Larger deficits in performance IQ abilities Deficits in attention and executive functioning Decreased academic abilities (math and reading)
Silent stroke	Decreased overall IQ (less severe deficits than overt stroke) Larger deficits in verbal IQ abilities Deficits in attention and executive functioning Deficits in verbal learning and nonverbal reasoning Decreased math abilities Decreased academic attainment/school functioning
No stroke history	Decreased overall IQ (mean deficits of 4–5 standard score points)* Deficits in attention, processing speed, and executive functioning* Deficits in verbal and memory functioning*

*Deficits appear to increase with age.

1987; Pavlakis et al. 1989). As imaging techniques have become more sophisticated, data have indicated that these rates may be underestimates of silent infarcts in the population; Steen et al. (2003) documented a 35% rate of silent stroke with the use of more sensitive imaging techniques.

Silent stroke can also cause cognitive decrements in children with SCD, although the deficits are not typically as large as those associated with overt stroke (Armstrong et al. 1996; Brown et al. 2000a). Data from the CSSCD indicate that children with SCD and silent stroke earned significantly lower full-scale IQ scores than did children with SCD but no MRI abnormalities (Armstrong et al. 1996; Wang et al. 2001a). Unlike the IQ pattern associated with overt stroke, silent stroke was most associated with lower verbal IQ scores, with silent stroke associated with decrements of 7–9 standard score points. Compared with test norms, the mean verbal IQ score for children with silent stroke fell in the borderline to low average range of ability, indicating clinically significant deficits. Mean performance IQ scores in children with silent stroke fell in the low average range in both studies, which were closer to scores exhibited by children with SCD and no stroke than by those with SCD and overt stroke. Studies conducted by Brown et al. (2000a) and Schatz et al. (2001) further documented that children with silent stroke exhibit deficits on measures of attention and executive functioning abilities compared with children with SCD and normal MRI. DeBaun (1998) also tested cognitive screening measures that may help identify children who have had silent infarcts prior to MRI; results suggested that silent infarcts were often predicted using a measure of verbal learning and memory, the California Verbal Learning Test (Delis et al. 1994), and the Block Design subtest from the Wechsler Abbreviated Scale of Intelligence (Wechsler 1999), which requires nonverbal reasoning, visual-motor ability, and executive functioning skills. These results suggest that silent stroke may have unique effects on these specific cognitive skills and that cognitive testing may be a clinically useful tool in detecting cerebral infarcts in conjunction with routine imaging.

In addition to affecting discrete cognitive skills, silent stroke has been associated with lower academic achievement, particularly in math (Armstrong et al. 1996; Wang et al. 2001a). High rates of difficulties in academic attainment and overall school functioning (e.g., failing to pass school grades, need for special education services) also have been documented in these children (Schatz et al. 2001). Although research has identified these overall patterns of cognitive and academic difficulties associated with silent stroke, studies also have documented variability in cognitive outcomes *within* groups of children who have had silent stroke. Indeed, the magnitude of cognitive deficits has been associated with volume of brain injury (Schatz et al. 2002b) and level of anemia severity as measured by blood hematocrit (Bernaudin et al. 2000).

Cognitive Effects of Sickle Cell Disease in the Absence of Cerebrovascular Accident

Many children with SCD who have no history of CVA also exhibit cognitive decrements on general IQ measures and on measures of specific cognitive abilities relative to both the general child population and demographically matched comparison groups (Brown et al. 1993a; Schatz et al. 2002a). A meta-analysis conducted by Schatz et al. (2002a) documented that children with SCD and no CVA often scored lower on general IQ measures than healthy children, with 51% of studies reporting significant differences. On average, school-age children with SCD scored 4–5 standard score points lower than controls, with their age-adjusted scores falling in the low average range of ability. Research that examined specific cognitive domains found more robust and consistent differences, with 71% of studies reporting significant decrements in at least one cognitive domain (Schatz et al. 2002a). Medium-size effects corresponding with clinically significant decrements have been found most frequently in attention, processing speed, and executive functioning skills (Bernaudin et al. 2000; Brown et al. 1993a; Fowler et al. 1988; Knight et al. 1995; Noll et al. 2001; Schatz 2004; Wang et al. 2001a), and several studies have also documented verbal, language, and memory deficits (Bernaudin et al. 2000; Brown et al. 1993a; Knight et al. 1995; Noll et al. 2001; Schatz 2004; Steen et al. 2005; Wang et al. 2001a; Wasserman et al. 1991).

Cognitive decrements in children with SCD and no history of stroke appear to begin early in life and progress in severity throughout childhood and adolescence (Schatz and Roberts 2007; Thompson et al. 2002; Wang et al. 2001a). Thompson et al. (2002) documented an initial decrease in cognitive functioning between 12 and 24 months of age in children with SCD, and Schatz and Roberts (2007) found early deficits in attention and executive functioning in a sample of young preschool children with SCD, particularly in those with higher-risk SCD genotypes. Furthermore, a longitudinal study conducted with school-age children showed progressive effects of SCD on cognitive ability from early childhood throughout middle and late childhood (Wang et al. 2001a). Cognitive decrements in children ages 6–18 years became significantly larger over time in several domains in this study, including verbal IQ, math achievement, and processing speed, with scores decreasing an average of 0.5, 0.9, and 0.2 standard score points, respectively, per year (Wang et al. 2001a). Across these areas of ability, findings suggest that many children with SCD exhibit abilities in the lower end of the average range during early and middle childhood, with scores subsequently falling below the average range of their same-age peers by adolescence.

Cognitive declines in children with SCD are often clinically and practically significant. Decreases in cognitive scores reflect that children with SCD are falling further behind their peers in abilities that are central to learning and academic progress. Several studies found that children with SCD showed high rates of enrollment in special education services relative to peers and were likely to have academic attainment problems throughout school (Fowler et al. 1988; Nettles 1994; Schatz 2004). Results from a study comparing children who have SCD with demographically matched peers showed that children with SCD were much more likely to exhibit academic difficulties in terms of requiring remedial instruction or grade retention (i.e., 31% of patients vs. 14% of controls; Schatz 2004).

The causes of cognitive decrements and academic difficulties in children with no history of CVA are not yet clear, although research suggests that both disease-related and psychosocial factors may play a role in determining cognitive outcomes. In young children, studies have identified associations between cognitive performance and disease subtype (Schatz and Roberts 2007), parenting factors (Thompson et al. 2002), and socioeconomic variables (Tarazi et al. 2007). In older children, socioeconomic status has also been related to cognitive performance, although it explains only some of the variability in cognitive outcomes (Brown et al. 1993a; Fowler et al. 1985; Schatz 2004).

Results from studies examining disease-related variables related to cognitive outcomes in school-age children suggest that anemia severity is a key factor in determining cognitive scores, because children with more severe anemia consistently exhibited larger cognitive decrements across multiple domains (Bernaudin et al. 2000; Brown et al. 1993a; Steen et al. 1999, 2003). One explanation for the link between anemia and cognition is that mild, chronic cerebral hypoxia occurs with more severe anemia, leading to diffuse structural and functional brain abnormalities (Steen et al. 1999). Studies conducted by Steen et al. (1999, 2003, 2004, 2005) have used quantitative MRI techniques, which have

revealed abnormalities in gray matter structures that are significantly associated with anemia severity and cognitive scores. Investigations using positron emission tomography (Powars et al. 1999), perfusion MRI (Kirkham et al. 2001; Oguz et al. 2003), and single photon emission computed tomography (Al-Kandari et al. 2007) have also documented localized metabolic and perfusion problems in children and adolescents with SCD that may help explain cognitive difficulties.

Studies to date have not shown significant effects of number of hospitalizations or school absences on cognitive or achievement test scores in SCD (Brown 1993; Fowler et al. 1985; Wang et al. 2001a). Other measures of illness severity, such as incidence of pain or fatigue levels, are more difficult to quantify and have not been adequately studied. Overall, further research is required to examine the multiple biological, behavioral, and psychosocial factors that may interact to determine cognitive outcomes in children with SCD.

Psychosocial Adjustment

Child Adjustment

Research suggests that children with SCD are at higher risk for psychological adjustment difficulties than are children without chronic illness. Studies have estimated that one-third to over one-half of children with SCD exhibit clinically significant emotional or behavioral problems (Barbarin et al. 1994; Cepeda et al. 1997; Thompson et al. 1993, 1995; Trzepacz et al. 2004). The majority of these studies used parent and child report measures of psychological and behavioral functioning to compare the adjustment of children with SCD to that of same-age peers. Results have documented higher rates of internalizing problems (e.g., symptoms of anxiety and depression) but much lower rates of externalizing problems (e.g., aggressive or defiant behaviors) in children with SCD (Barbarin et al. 1994; Britto et al. 1998; Brown et al. 1993b; Hurtig et al. 1989; Kell et al. 1998). Studies conducted by Thompson et al. (1993, 1995) included structured diagnostic interview assessment of symptoms in addition to questionnaires. Results showed that 50% of a sample of 50 children ages 7–14 with SCD met criteria for an emotional or behavioral disorder; the most frequent diagnoses were anxiety, phobias, or obsessive-compulsive disorders (Thompson et al. 1993).

In addition to evaluating rates of emotional and behavioral disorders in children with SCD, researchers have examined psychosocial adjustment related to broader aspects of well-being, including quality of life and functioning in social and school settings. Findings suggest that children with SCD experience challenges in their daily lives that interfere with their ability to engage in academic, physical, and social activities as easily as other children (for reviews, see Barbarin and Christian 1999; Edwards et al. 2005). For example, Palermo et al. (2002) measured health-related quality of life in children with SCD to assess domains of functioning often affected by illness and ongoing medical treatments. In this study, caregivers' reports suggested significant impairment related to their children's physical, psychological, and social well-being.

Research examining social functioning has suggested that SCD symptoms, such as lethargy and pain crises, affect children's ability to participate in academic and extracurricular activities as actively as their peers (Bonner et al. 1999; Eaton et al. 1995; Gil et al. 2000; Noll et al. 1996). In a series of studies, Noll et al. (1992, 1996, 2007) reported that children with SCD were rated by peers as having fewer friends and being less athletic than other classmates; females were also rated as being less well liked and as having fewer leadership qualities (Noll et al. 1996). However, other studies in younger children with SCD have not found evidence of parent-, teacher-, or self-reported social problems, suggesting that social competence in young children may serve as a protective factor against disease-related stress (Lemanek et al. 1994). However, social skills for complex peer interactions may be particularly difficult for children with central nervous system and neurocognitive effects of SCD (Boni et al. 2001; Nassau and Drotar 1997). These difficulties could be attributed, at least in part, to difficulties in understanding the content of social interactions, a task that requires emotional decoding and social information processing (Boni et al. 2001).

Adolescent Adjustment

Adolescence is a critical developmental period fraught with challenges that may be exacerbated in the presence of a chronic illness such as SCD (Baskin et al. 1998; Pinckney and Stuart 2004). Not only do adolescents with chronic illness face the normative tasks of transitioning to young adulthood, such as living independently, finishing school, starting a career, and establishing long-term romantic attachments (Arnett 2000), but they must continue to engage in the regular responsibilities

inherent in the management of a chronic illness. Additionally, they must face new health care challenges, such as transitioning from pediatric to adult care clinics (Baskin et al. 1998; Telfair et al. 2004). Exacerbating these transitions is the fact that in addition to having increased rates of cognitive deficits described earlier, adolescents with SCD often experience a delay in physical maturation, which may further impact their psychosocial adjustment (Pinckney and Stuart 2004).

Studies have suggested that adolescents with SCD are at particular risk of having social difficulties, as reflected in the association between SCD-related pain and increased social anxiety that is not found in younger patients (Wagner et al. 2004). One study compared parent-, teacher-, and self-report findings of psychosocial functioning of children and adolescents with SCD. Results showed that adolescents with SCD experienced more difficulties in peer relationships, particularly as indicated by adolescent self-report (Rodrigue et al. 1996). These difficulties may be related to delayed puberty, increasing academic problems, and decreased participation in social activities secondary to pain crises and hospitalizations (Morgan and Jackson 1986; Wagner et al. 2004). Therefore, assessment of peer relationships is particularly important when evaluating psychosocial adjustment in adolescents with SCD (Rodrigue et al. 1996).

Caregiver Adjustment

Caregiver adjustment to a child's chronic illness is critical not only for parental well-being but also for child coping and adjustment. Indeed, several studies have determined that parental adjustment can be a key factor in determining child adjustment (e.g., Brown et al. 2000b; Hocking and Lochman 2005). Caregivers are typically responsible for many aspects of the child's medical care, including day-to-day responsibilities such as medication administration, management of painful episodes, and nutrition management, and they help the child to cope with the social and academic difficulties associated with the disease (Ievers-Landis et al. 2001). Indeed, studies have suggested that care demands for a child with SCD may add as much as an additional 2 hours per day, and that the burden of care as perceived by parents is particularly high (Moskowitz et al. 2007).

Summary of Psychosocial Adjustment

Research findings consistently support the importance of assessing psychosocial functioning in youth with SCD, indicating that the combined stress of chronic illness and other psychosocial challenges can lead to difficulties for these youth and their families (see Table 17–2 for a summary of psychosocial difficulties in SCD). However, significant variability exists within children who have SCD, with many children and their caregivers exhibiting remarkable strength and resilience while coping with this disease (Barakat et al. 2006; Ievers-Landis et al. 2001). Psychosocial interventions should therefore be developed with considerations of both the unique risks and protective factors that affect psychosocial well-being in children with SCD and their families.

TABLE 17–2. Psychosocial adjustment in pediatric sickle cell disease

Domain of functioning	Findings in pediatric SCD
Emotional/behavioral well-being	High rate of internalizing symptoms (up to 50%) Low rate of externalizing symptoms
Health-related quality of life	Limitations in physical, psychological, and social functioning
Peer relations/social functioning	Limited participation in social activities Fewer friends Low rates of participation in athletic and extracurricular activities
Adolescents' adjustment	Stress during transition from pediatric to adult care Increased difficulties forming peer relationships Increased social anxiety related to disease-related pain Decreased self-esteem Limited independence due to illness Stress related to delayed puberty/maturation

Psychological Factors

Research suggests that the psychosocial adjustment of children with SCD is determined by multiple disease-related and psychosocial factors. To examine these factors, researchers have applied the following biopsychosocial models of stress and coping to study children with SCD: 1) the transactional stress and coping model (Hocking and Lochman 2005; Thompson and Gustafson 1996; Thompson et al. 1993, 1994) and 2) the risk-resistance adaptation model (Brown et al. 2000b; Wallander and Varni 1992; Wallander et al. 1988, 1989). Although a full review of the literature is beyond the scope of this chapter, several factors are particularly important to psychosocial outcomes for children with SCD: gender and age, health-related coping, stress appraisal, and caregiver and family factors (Barakat et al. 2006; Hocking and Lochman 2005).

Gender and Age

Studies have demonstrated significant differences in the emotional and behavioral adjustment of males versus females with SCD. Across most studies, males have exhibited higher rates of symptoms and more severe difficulties with respect to both internalizing and externalizing symptoms, particularly as children enter adolescence (Baskin et al. 1998; Brown et al. 1995). Some data suggest that this gender difference may be due to higher rates of disease complications in males (Barakat et al. 2002) and to decreased self-esteem and social problems related to delayed puberty and limitations in physical activity (Barakat et al. 2006; Hurtig and White 1986).

Adjustment difficulties of young people with SCD often increase with age (Brown et al. 1993b, 1995). Adolescents report more social difficulties and lower self-esteem than younger children (K.D. Scott and Scott 1999). Especially in adolescents with more severe SCD, increasing difficulties could be associated with decreased daily living skills, which limit activity level, independence, and peer acceptance (Brown et al. 1993b). Additionally, adolescents exhibit lower treatment adherence (Baskin et al. 1998) and report significant worries related to the process of transitioning from pediatric to adult health care systems (Telfair et al. 1994).

Health-Related Coping

Because SCD is characterized by physical, often intense pain crises as well as other complications associated with significant discomfort, addressing the role of disease-related stress and health coping skills is important in determining psychological and behavioral adjustment. Gil et al. (2003) documented significant relationships between daily pain level and mood such that increased pain predicted higher stress, lower mood, and lower levels of activity. The ways in which children and adolescents cope with pain have also been associated with psychological adjustment in several studies (Barakat et al. 2007; Gil et al. 1989, 1991, 1993). These studies have documented that negative thought patterns and passive coping approaches are often associated with higher levels of stress, more severe pain, and reduced activity. Conversely, proactive coping is associated with higher social, academic, and home activity levels and reduced need for health care (Gil et al. 1993). Moreover, Lewis and Kliewer (2007) found that the combination of active coping strategies and hope in children with SCD was predictive of lower levels of anxiety. Based on laboratory studies of pain and coping, Gil et al. (1997a) reported that children with SCD who use active cognitive and behavioral coping strategies are less likely to report pain during laboratory-based pain stimulation. Additionally, Brown et al. (1993b) documented an association between an internal health locus of control and better adjustment in children with SCD, suggesting that children who feel more control over health outcomes likely experience less psychological distress.

Another mechanism associated with coping is religion and/or spirituality, although this has not been studied frequently in pediatric populations. Limited research has suggested that spirituality is viewed as a strength and that praying can be conceptualized as a coping mechanism (Barbarin 1999; Harrison et al. 2005). Indeed, Barbarin (1999) noted that religion and spirituality, including a relationship with a community church and a personal relationship with God, were important resources in helping families and children adjust to SCD. In this study, a greater proportion of families with children who have SCD reported being religious compared with a group of control families, and a number of adolescent patients mentioned religion in their ability to understand and cope with their diagnosis (Barbarin 1999).

Caregiver and Family Factors

Studies have found significant relationships between caregiver adaptation and child adaptation in terms of overall psychological adjustment and use of coping strategies. Thompson et al. (1993, 1994)

and Brown et al. (2000b) documented that approximately one-third of caregivers of children with SCD reported distress or adjustment difficulties on self-report measures. Furthermore, caregiver maladjustment was related to psychosocial factors, including daily stress, palliative and disengagement coping strategies, and lower family support. Adjustment difficulties in caregivers are important to consider in relation to child well-being, because interactions between maternal and child distress have been documented (Thompson et al. 1999), and coping strategies in caregivers have been associated with children's adjustment (Brown et al. 2000b).

Overall family functioning has been associated with adjustment in children with SCD (Barakat et al. 2005; Mitchell et al. 2007). Data from the CSSCD demonstrated that high levels of family conflict, high levels of family disorganization, and low levels of support within families were significantly related to parent-reported behavior problems in children; longitudinal data further showed that increases in child behavior problems corresponded with increases in family conflict (Thompson et al. 1999). Moreover, researchers have advocated for a family systems and social ecological approach to the assessment of psychosocial well-being in SCD, because such an approach recognizes the importance of the larger cultural and economic challenges that often disproportionately affect the ethnic minority populations affected by this disease (for review, see Radcliffe et al. 2006).

Health-Related Quality of Life

The accurate assessment and study of health-related quality of life (HRQOL) in SCD have recently come to the forefront as a critical issue for understanding psychosocial adjustment (Panepinto 2008). Two well-known questionnaires for the assessment of HRQOL have recently undergone validity studies for children with SCD; McClellan et al. (2008) used the Pediatric Quality of Life Inventory, and Panepinto et al. (2004) used the Child Health Questionnaire. Such studies confirm reports of poor HRQOL in youth with SCD compared with healthy peers, particularly in the realm of physical, psychological, and social well-being (Palermo et al. 2002). Additionally, when both parents and children were asked to assess HRQOL, parents rated their children as more severely limited in almost every domain than normative children (Panepinto et al. 2005). Findings such as these underscore the necessity of both parent- and child-report data when assessing HRQOL and, as discussed in the previous section, the potential influence that parent adjustment may have on child adjustment.

Evidence-Based Treatments

Intervention research for children with SCD remains somewhat scarce, although researchers have begun trials of both biomedical and psychosocial treatments for the varied consequences of the disease. In this section, we discuss interventions that have been developed to address concerns related to treatment adherence, pain coping and psychosocial adjustment, and cognitive and academic difficulties. Attention will be given to those interventions for which some evidence has been presented in the literature, although further research is clearly needed in each area of treatment development to establish a stronger evidence base for interventions in pediatric SCD.

Treatment Adherence

Because SCD can lead to varied, and sometimes severe, complications throughout development, both children's and caregivers' knowledge of SCD and adherence to treatment recommendations are important for child health and adjustment. For instance, quick recognition and response to serious illness complications, such as severe headache or spleen enlargement, can significantly improve child outcomes (Day et al. 1992); likewise, drinking adequate fluids and avoiding extreme temperatures can decrease frequency of pain crises. Therefore, to enhance disease-related knowledge and to increase children's practice of positive health behaviors, educational and behavioral interventions have been designed and evaluated.

The most typical educational interventions have involved the development of informational booklets that are distributed to families, although the efficacy of this approach has not been systematically evaluated (Chen et al. 2004). However, in one study, Day et al. (1992) combined informational materials with follow-up phone calls and home visits from nurses and compared preintervention and postintervention data. Results showed increases in parents' knowledge of SCD and lower secondary infection rates than reported in other studies.

Some researchers have examined the use of behavioral strategies for increasing positive health-related behaviors. One study showed that children with SCD demonstrated increased adherence over

time in taking antibiotics when given rewards each time they took the medication; however, results did not show any differences between the group that received rewards and the control group (Berkovitch et al. 1998). Burghardt-Fitzgerald (1989) reported that creating a behavioral contract between adolescent patients with SCD and nurses reduced the duration of hospitalizations. Together, these results suggest that behavioral techniques may be effective in increasing health-related behaviors in some youth with SCD. These strictly behavioral approaches, however, may be most effective when used in short-term situations (e.g., hospitalizations) or with children exhibiting particular difficulty with specific important behaviors (e.g., drinking enough water, taking daily medications).

Pain and Psychosocial Adjustment

Because pain is a central feature of SCD, a key concern of patients, families, and medical professionals is pain management and coping. The reader is referred to Chapter 9 for a general review of pediatric pain and descriptions of intervention techniques. (For reviews related to pain management in SCD, see Chen et al. 2004; Swain et al. 2006.) In addition to the expected emotional and psychological distress associated with chronic pain, increased levels of pain and related hospitalizations in children with SCD have also been associated with increased rates of psychosocial difficulties, including high rates of school absenteeism and removal from the peer group. As discussed earlier, children with SCD are also at increased risk for psychological and emotional adjustment problems, including depression, anxiety, and social difficulties (Barbarin et al. 1994; Brown et al. 1993b; Thompson et al. 1995). Therefore, interventions that aim to decrease pain and to increase effective coping are important in promoting children's physical, psychological, and social well-being.

Pharmacological Interventions

Pharmacological interventions often used in the treatment and prevention of pain in SCD include nonsteroidal anti-inflammatory agents, oral narcotics, and parenteral opioids. These medications are typically provided in combination with hydration, reduced physical exertion, and treatment of underlying hypoxia or infections (A. Platt et al. 2002). These treatments can be used quite effectively to treat SCD pain in some cases, although SCD pain is often persistent and sometimes undertreated in health care settings (Claster and Vichinsky 2003; A. Platt et al. 2002).

Cognitive-Behavioral Therapies to Enhance Coping Skills

Behavioral interventions are important adjunct approaches to SCD treatment to address both pain and illness-related concerns. Many behavioral interventions have been developed based on the empirical finding that active coping strategies are associated with decreased pain and more positive psychosocial outcomes, whereas negative thinking and passive coping are associated with more pain and higher levels of psychological distress (Gil et al. 1989, 1991, 1993). Therefore, cognitive-behavioral therapy (CBT) interventions have been developed to target the thoughts and behaviors associated with an active, positive approach to coping. Many programs focus on teaching specific coping strategies, including relaxation techniques, imagery, problem-solving skills, and positive self-talk (Gil et al. 1997b; Powers et al. 2002; Thomas et al. 1998).

Based on results from randomized, controlled studies, Gil and colleagues reported that a one-session group coping skills intervention was associated with decreased negative thinking, lower levels of pain during laboratory-based pain stimulation (Gil et al. 1997b), and lasting reduction of pain and health care utilization in a subset of the children who actively practiced coping skills following the intervention (Gil et al. 2001); CBT was not associated, however, with decreased SCD-related pain in the children who did not report ongoing skills practice (Gil et al. 1996). Thomas et al. (1998) also showed some benefits of CBT, documenting that children who received the treatment showed increased positive coping and self-efficacy regarding their ability to manage their pain; however, the authors reported only weak evidence related to benefits of CBT for other psychological outcomes, such as symptoms of depression and anxiety.

Biofeedback

Some researchers have examined interventions focusing specifically on biofeedback training, which involves learning to decrease muscle tension. In one small study with children and adolescents, Cozzi et al. (1987) documented decreases in muscle tension, headache, analgesic use, and anxiety following biofeedback coupled with relaxation training. Studies have also shown reduced pain and medication use

after self-hypnosis training (Dinges et al. 1997; Hall et al. 1992; Zeltzer et al. 1979), although these studies were small and did not include control groups.

Family-Based Interventions

The feasibility and efficacy of family-based interventions in treating children and adolescents with SCD have also been examined. Research has shown connections between parent and child coping strategies (Gil et al. 1991) and suggested that families of children with chronic illness play an important role in coping with illness-related stressors (Kazak and Drotar 1997). Kaslow et al. (2000) conducted a trial of a family-based coping intervention that included disease education, coping skills training, and strategies to improve interpersonal and family relationships. Results showed that SCD knowledge increased, although no significant effects of the treatment were found on measures of psychological adjustment. In addition, Kaslow et al. (2000) documented the importance of developing treatments that take the sociocultural context of families into account and that allow for flexibility and ongoing adaptation in treatment procedures. Powers et al. (2002) conducted a small pilot study (N=3) that provided six sessions of intensive pain management skills training to both children with SCD and their caregivers (for session outlines, see Powers et al. 2002). Results revealed that all participants showed improvements in coping and daily functioning, although specific changes in coping strategies varied across participants.

Social Support

Limited research has also been conducted on the efficacy of interventions designed to increase social support within groups of children and adolescents with SCD. In an evaluation of a support group intervention, Telfair and Gardner (1999) documented that adolescents' satisfaction with the intervention was a significant predictor of psychological well-being. Starlight Children's Foundation has developed an Internet site (http://www.starlight.org) that provides children with educational activities about SCD and forums for online social contact with other patients with SCD. Among hospitalized children, data show that the foundation's social network, Starbright World, has been associated with increased perceived peer support for children with SCD, as well as decreased use of negative coping strategies among adolescents with the disease (Hazzard et al. 2002).

Summary of Interventions to Decrease Pain and Enhance Effective Coping

Evidence to date has shown benefits of CBT coping skills interventions. Results from the randomized, controlled studies of adults and children conducted by Gil et al. (1996, 1997b, 2001) suggest that CBT meets the requirements for a "probably efficacious" treatment for SCD pain, as defined by the Chambless criteria for empirically supported interventions (Chambless and Hollon 1998; Chen et al. 2004). Further research is needed to develop well-established treatment approaches for coping with pain and psychosocial stressors in patients with SCD. In addition, although current interventions show promise for increasing positive coping strategies, treatment studies to date have not identified interventions that significantly improve psychosocial and psychological adjustment in children with SCD, especially in children who may be experiencing clinically significant psychological symptoms of depression and anxiety. Although certain CBT approaches are well established as treatments for general child clinical populations (for review, see Compton et al. 2004), these treatments have not been tested specifically for pediatric SCD populations and would likely need to be adapted to address issues specific to illness-related adjustment.

Cognitive and Academic Difficulties

Very few SCD-specific interventions have been developed to address the cognitive and academic problems experienced by many children with SCD. However, researchers have started to investigate the possible cognitive and academic benefits of biomedical treatments for SCD, cognitive rehabilitation strategies, and educational interventions. Some researchers have proposed that biomedical treatments that decrease anemia severity, such as chronic transfusion therapy and oral hydroxyurea therapy, may improve cognitive functioning or prevent cognitive decline in children with SCD. These hypotheses are based on the theory that cognitive and academic problems are likely related to the impact of anemia and chronic hypoxia on the brain (Steen et al. 1999). Therefore, treatments that address these disease effects could mitigate the effect of SCD on both the brain and cognitive outcomes.

In support of this hypothesis, studies have found that both regular transfusions and oral hydroxyurea are effective in decreasing secondary stroke risk in children with a history of CVA (Adams 2000; Ware

et al. 2004). Kral et al. (2003) reported that children on transfusion therapy who had elevated stroke risk, as measured by transcranial Doppler ultrasonography, performed better on cognitive testing than children with elevated stroke risk who were not on transfusion therapy. Two recent small studies also found preliminary evidence that hydroxyurea therapy may have cognitive benefits. A nonrandomized, case-control study documented that children and adolescents taking hydroxyurea scored significantly higher on measures of verbal comprehension, fluid reasoning, and global cognitive ability than participants not taking the drug (Puffer et al. 2007). Early results of a study conducted by Thornburg et al. (2009) also showed that children taking hydroxyurea early in life do not appear to show the cognitive decline during early childhood that had previously been documented in very young children with SCD (Thompson et al. 2002). Larger studies need to be conducted to determine the cognitive effects of transfusions and hydroxyurea.

A small number of studies have examined the effects of school-based and educational interventions in children with SCD. One randomized, controlled study (Koontz et al. 2004) demonstrated that brief educational interventions with teachers (in-service instruction) and peers (classroom presentation) of children with SCD was associated with large positive effects on SCD-related knowledge in teachers, classmates, and the children with SCD themselves (Koontz et al. 2004). Children with SCD in the intervention group had significantly fewer absences than children with SCD in the control group condition, and teachers' satisfaction ratings were also higher in the intervention group. Notably, large numbers of teachers and peers in the control condition exhibited very low awareness of important risks of SCD (e.g., stroke) and misconceptions regarding the mode of SCD transmission. This finding is consistent with results showing that teachers frequently report not having adequate information about the health conditions of their students (Robinson et al. 2001). Therefore, data suggest that teachers and peers likely benefit from education related to SCD; however, research has not determined whether this type of intervention strategy can serve to improve academic performance or educational services for children with SCD. Only one small study has examined specific cognitive and academic intervention techniques for children with SCD (Yerys et al. 2003). This study, which included children with SCD and a history of cerebral infarcts, showed that children who received both tutoring and memory training showed more academic improvement than children receiving only academic tutoring (Yerys et al. 2003). Despite these promising results and the recognition that specific cognitive rehabilitation strategies are needed (King et al. 2008), no further research has been published on cognitive rehabilitation in children with SCD.

Because of the lack of specific evidence-based cognitive or academic interventions for children with SCD, most children with SCD who exhibit difficulties receive standard educational resources. In public schools in the United States, children with SCD are usually eligible for a plan that provides accommodations *within* the regular classroom environment (e.g., preferential seating) under the terms of Section 504 of the Rehabilitation Act of 1973 (P.L. 93-112) and the Americans With Disabilities Act of 1990 (P.L. 101-336), or an Individualized Education Program (IEP) that provides both classroom accommodations *and* special education services (e.g., small-group instruction, speech therapy). Children with SCD often qualify for these plans, although studies have documented that many children who would benefit from special education services do not have an IEP (Herron et al. 2003; Peterson et al. 2005). Therefore, health care teams need to understand educational services to help families obtain academic interventions. Additionally, children should receive periodic evaluations by a pediatric psychologist to assess specific cognitive and academic skills often affected by SCD and to interpret test performance with knowledge of the literature on the cognitive effects of SCD. When possible, members of the health care team should be available for school consultation, and testing reports should provide specific recommendations for school services.

Concluding Comments

SCD, a group of genetic disorders, is most common in individuals of African descent and occurs with lower frequency in other ethnic groups. SCD causes chronic anemia and can impact multiple organ systems, including the brain. The consequences of SCD often begin early during childhood and often lead to frequent health care contacts, hospitalizations, and related reductions in school attendance and activity level. Due to the numerous effects of SCD, children with the disease are at increased risk for psychosocial difficulties, particularly internalizing problems and social difficulties, which can sig-

nificantly increase stress and decrease quality of life for both children with SCD and their families. Additionally, the central nervous system effects of SCD can cause cognitive deficits that often affect children's academic functioning and educational attainment. Therefore, available literature supports the importance of including assessment of neurocognitive functioning, psychosocial well-being, and quality of life within routine health care for children with SCD.

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18

Gastrointestinal Disorders

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The commonly used phrase "gut feeling" is illustrative of the intimate connection long known to exist between gut and brain and speaks to a cultural awareness of how feelings and emotions may be linked with the activities of the gastrointestinal system. Individuals regularly experience changes in gastrointestinal sensation or motor function in association with subjectively stressful situations and emotional arousal. Preliminary scientific observations that the appearance of the gastric mucosa of a patient with a gastric fistula changed in association with emotional distress paved the way for research that has consistently associated emotional arousal with changes in gastrointestinal sensory and motor function, including work employing functional brain imaging (Van Oudenhove et al. 2007).

An established system for communication between gut and brain has been termed the *brain-gut axis.* Communication is bidirectional and conducted along neural pathways typically considered to be part of the autonomic nervous system, as well as by neuroendocrine and neuroimmune mechanisms (Jones et al. 2006). Primary afferent neurons from the gut project via the vagus to the nucleus of the solitary tract and then to the thalamus, with subsequent projections being directed not only to somatosensory areas but also to important brain areas involved in arousal, emotion, and neuroendocrine and behavioral responses to challenge, such as the amygdala, the locus coeruleus, and the periaqueductal gray matter. Descending pathways from brain structures that process information from the gut modulate gut sensation and motility and provide a mechanism linking emotional and cognitive processes with gut functioning.

Familiarity with the structure, function, and vagaries of the human gastrointestinal tract inevitably leads to important questions about the relationship between the gut and its intrinsic nervous system (i.e., the enteric nervous system), the central nervous system, emotion, and the ability to adapt to life adversity and threat. The enteric nervous system, essentially the nervous system of the gastrointestinal tract, is derived from the same embryonic cells as the central nervous system and shares other commonalities with the central nervous system, including interneurons, a myenteric-blood barrier analogous to the blood-brain barrier, glial cell sheaths, and many of the same neurotransmitters and neuropeptides (Gershon 1998). The enteric nervous system has as many neurons as the spinal cord, with sensory neurons, interneurons, and motor neurons interconnected via chemical synapses to form an independent nervous system or "minibrain" in the walls of the gut (Wood 2008). Neurotransmitters and peptides that are considered to be of importance in the emotional disorders—such as corticotropin-releasing factor, cholecystokinin, neuropeptide Y, oxytocin, and serotonin—are capable of modulating gastrointestinal transit, motility, and

sensation. Such commonalities provide a template for understanding observed connections between gastrointestinal and psychiatric disorders, and the close structural and functional relationships between the gut and the brain make disorders of the gastrointestinal system of special interest in psychosomatic medicine. The remainder of this chapter will focus on three major illnesses relevant to pediatric gastroenterology and its day-to-day practice: functional gastrointestinal disorders, inflammatory bowel disease, and hepatitis C. These disorders not only are common and practically important in pediatric gastroenterology but also reflect a conceptual spectrum of problems—from the "psychosomatic" to the "somatopsychic"—that often confront specialists in psychosomatic medicine.

Functional Gastrointestinal Disorders

The close relationship between gastrointestinal function and emotional life is perhaps best demonstrated by the functional gastrointestinal disorders (FGIDs), defined as chronic or recurrent gastrointestinal symptoms in the absence of explanatory structural or biochemical abnormalities (Drossman et al. 1990). The term *functional* has increasingly been used descriptively in general medicine to refer to the experience of physical symptoms where standard medical evaluation reveals no disease or biophysical process sufficient to explain the symptoms or their impact. The Rome III criteria (Drossman et al. 2006), the most recent iteration of the widely accepted classification system for FGIDs, offer several specific diagnostic categories for children and adolescents that have been developed based on clinical experience and expert consensus in conjunction with literature review (Rasquin et al. 2006). We focus on FGIDs associated with abdominal pain and cyclic vomiting syndrome.

Abdominal Pain

Medical Overview and Epidemiology

Chronic abdominal pain is one of the most common physical symptoms in childhood, affecting approximately 10% of children and adolescents (Chitkara et al. 2005) and being the reason for presentation in approximately 2%–4% of general pediatric office visits (Starfield et al. 1980). The prevalence peaks between ages 4 and 6 years and again in early adolescence, with an equal gender ratio in early childhood and greater female symptom reporting in adolescence. Most children with chronic or recurrent abdominal pain, probably over 90%, do not suffer from explanatory physical disease, such as peptic ulcer or Crohn's disease (American Academy of Pediatrics Subcommittee on Chronic Abdominal Pain 2005), and are considered to suffer generically from functional abdominal pain (FAP). Traditional physical disease, with demonstrable structural, infectious, inflammatory, or biochemical findings, is especially unusual in the absence of red flags such as weight loss, gastrointestinal bleeding, fever, anemia, or persistent vomiting. *Helicobacter pylori* infection and celiac disease are not etiological in most cases, and despite suspicions about food allergies, lack of dietary fiber, and lactose malabsorption, results of dietary intervention such as fiber supplementation and lactose-free diets have been disappointing (Huertas-Ceballos et al. 2008a).

A common clinical presentation of FAP involves a child whose abdominal pain began with an apparent bout of gastroenteritis or other inflammatory process but then persisted following the apparent resolution of gut inflammation. Prior gut inflammation may be one pathway to the heightened gut sensitivity (i.e., visceral hypersensitivity) often observed in youth with FAP, perhaps lowering the threshold for particular sensations to be experienced as painful or distressing; the mechanism may involve the neurotransmitter serotonin, which is distributed throughout the gut and the central nervous system (Spiller 2007).

A detailed discussion of the medical assessment of chronic abdominal pain is beyond the scope of this chapter, but some basic principles warrant attention. Assessment should be individualized and should ideally incorporate multiple sources of information beyond the patient, including parents, other professionals, teachers, and school nurses. The presence of red flags that may signal undiagnosed physical disease (e.g., evidence of gastrointestinal bleeding, persistent vomiting, weight loss, fever, other signs of systemic illness) should prompt the clinician to consider additional medical assessment.

Psychosocial Adjustment

Youth with FAP can easily fall through the cracks of the existing health care delivery system, primarily because the pain is "medically unexplained" in the traditional sense. Consequently, many patients, family members, and clinicians may assume that the pain must then be "psychological" in nature or even a fabrication by the patients. Although true illness

fabrication is quite unusual in youth with chronic abdominal pain, patients and families may appear hypersensitive to any suggestion that the pain may be "all in the head." Youth with FAP and their families are thus at risk for a variety of negative experiences with health care professionals, with many feeling dismissed or misunderstood after hearing that the doctor "cannot find anything wrong." Similarly, patients and families are often distressed by professionals' attempts to explain the pain using a psychological model and may feel that clinicians minimize the abdominal pain by attributing the child's symptoms to an anxiety or depressive disorder.

Compared with peers without FAP, youth with FAP as a group are considerably more impaired (e.g., poor school attendance and performance); use more ambulatory health services; are at heightened risk to undergo potentially dangerous medical investigations; and have more somatic, anxiety, and depressive symptoms and disorders (Campo 2007). Anxiety disorders and depressive disorders have been reported in approximately 75% and 40% of youth with FAP, respectively (Campo et al. 2004a; Garber et al. 1990; Liakopoulou-Kairis et al. 2002). Unfortunately, comorbid anxiety and depressive disorders are seldom recognized in clinical settings, and specialty mental health referral rates are low (Edwards et al. 1994). Temperamental constructs related to neuroticism, such as trait anxiety, negative affect, and harm avoidance, have been associated with FAP in clinical samples (Campo et al. 2004a; Davison et al. 1986). These traits have been associated with pessimistic worry, fear of uncertainty, and sensitivity to environmental change or adversity (Andrews 1996), as well as a vulnerability to develop anxiety, depression, and functional somatic disorders (Watson and Pennebaker 1989), including irritable bowel syndrome (Talley et al. 1998). Youth with FAP who have higher levels of negative affect are more likely to develop abdominal pain in response to daily life stresses and hassles (Walker et al. 2001). Youth with FAP may be especially sensitive to both internal and external threats, as suggested by attentional biases toward words conveying threatening messages of pain and to those implying social danger (Boyer et al. 2006).

Diagnostic Classification

Youth with chronic abdominal pain that is medically unexplained have been referred to as suffering from FAP. The Rome III classification system for FGIDs parses FAP into a number of narrower, specific diagnoses, including a narrowly defined diagnosis of *functional abdominal pain.* In the remainder of this chapter, the specific Rome III diagnosis of functional abdominal pain will be spelled out and italicized to distinguish it from FAP in the more global, descriptive sense. The most widely used Rome III diagnoses associated with abdominal pain are listed in Table 18–1 and include irritable bowel syndrome (IBS), functional dyspepsia, childhood functional abdominal pain, childhood functional abdominal pain syndrome, and abdominal migraine (Rasquin et al. 2006). Baber et al. (2008) found that the Rome III criteria classified nearly 90% of youth with FAP, an improvement from the 68% classified using the previous Rome II criteria. In their study, 45% of youth with FAP met Rome III criteria for IBS, 23% for abdominal migraine, 15% for functional dyspepsia, 11% for functional abdominal pain, and 6% for functional abdominal pain syndrome. Nevertheless, despite the growing use and acceptance of the Rome III criteria among gastroenterologists, their validity and reliability have yet to be demonstrated (Ford et al. 2008).

Abdominal migraine is a diagnosis that is also addressed by the International Classification of Headache Disorders, in which it is defined as a recurrent idiopathic disorder seen mainly in children and characterized by episodic midline abdominal pain manifesting in attacks lasting 1–72 hours, with normality between episodes; the pain is of moderate to severe intensity and associated with vasomotor symptoms, nausea, and vomiting (Lewis and Pearlman 2005). Abdominal migraine has been reported to have a prevalence of 1%–4% in children, is more common in females (Rasquin et al. 2006), and appears to predict migraine headache in adulthood (Dignan et al. 2001). A strong family history of migraine tends to support the diagnosis of abdominal migraine in the presence of classic symptoms (Rasquin et al. 2006).

Evidence-Based Treatment Approaches

In treating patients with FAP, clinicians can begin by acknowledging the reality of the patient's suffering and the family's concerns about the abdominal pain and any associated symptoms. The clinician should examine the timing, context, and characteristics of the pain. Familial and social reinforcements for the pain and other potential benefits of the sick role should be probed, as parents can inadvertently reinforce sick role behaviors by behaving solicitously in response to complaints of pain or by allowing the child to avoid unpleasant activities or school

TABLE 18–1. Abdominal pain–related functional gastrointestinal disorders

Irritable bowel syndrome[a]
Abdominal pain or discomfort associated with two or more of the following at least 25% of the time:
Improvement with defecation
Onset associated with change in stool frequency
Onset associated with change in stool form/appearance
Functional dyspepsia[a]
Persistent or recurrent pain or discomfort centered in the upper abdomen
Not relieved by defecation or associated with changes in stool frequency or form (i.e., does not meet criteria for irritable bowel syndrome)
Childhood functional abdominal pain[b]
Episodic or continuous abdominal pain
Does not meet criteria for another functional gastrointestinal disorder
Childhood functional abdominal pain syndrome[b]
Must meet criteria for functional abdominal pain and has one or more of the following at least 25% of the time:
Some loss of daily function
Additional somatic symptoms such as headache, limb pain, or difficulty sleeping
Abdominal migraine[c]
Paroxysmal episodes of intense, acute periumbilical pain that lasts for 1 hour or more
Intervening periods of usual health lasting weeks to months
Pain interferes with normal activities
Pain is associated with one of the following:
Anorexia
Nausea
Vomiting
Headache
Photophobia
Pallor

Note. Functional gastrointestinal disorders are not associated with evidence of an explanatory inflammatory, anatomic, metabolic, or neoplastic process.
[a]Diagnostic criteria must be fulfilled at least once per week for at least 2 months.
[b]Diagnostic criteria must be fulfilled at least once per week for at least 1 month.
[c]Diagnostic criteria must be fulfilled at least twice in the preceding 12 months.
Source. Content adapted from Rasquin et al. 2006.

because of complaints related to FAP (Walker and Zeman 1992; Walker et al. 1995). Identifying learning skills deficits and peer problems such as bullying is also important, given that they can reinforce the pain and any related impairments such as school absenteeism.

A discussion of treatment options typically is delayed until the clinician, patient, and family reach consensus on the child's proper diagnosis. The clinician should offer reassurance that the pain associated with FAP does not signal ongoing tissue damage or a life-threatening and progressive physical disease; emphasize the importance of good communication and collaboration among the patient, family, and referring professionals; and discuss the nuances of different but related child, parental, and professional roles and responsibilities. Ideally, diagnosis should help direct psychoeducational efforts with the patient and family, allowing for discussions about the prognosis, the expected course, and the

existing state of knowledge regarding treatment. Only then can patient and family consent for any subsequent treatment be truly informed.

Patients and families should be helped to understand that although scientifically valid information about treatment for FAP is limited, some basic principles of care do appear to be helpful and a few treatments that have been studied show promise. Professional efforts to review what is and is not known about treatment can help to create informed consumers of care and to establish an active treatment alliance, and clinicians can feel comfortable instilling hope and positive expectations for improvement in patients and their families. Some consensus appears to support the value of helping patients and caregivers develop a rehabilitative mind-set focused on coping with and overcoming the illness by returning to usual activities and responsibilities rather than simply waiting for a "cure." The clinician should help create the expectation that the patients should return to developmentally appropriate functioning regardless of the presence of FAP by helping families identify and reward health-promoting behaviors while minimizing any secondary gain (i.e., the familial and/or social reinforcement that may maintain the symptoms) associated with the illness (Campo and Fritz 2007). By emphasizing a rehabilitative approach to care, the clinician challenges existing misperceptions about the child as inordinately vulnerable or prone to invalidism and allows a focus on the child as being tough enough or strong enough to cope with the problem. Healthy activity should be presented as being both safe and desirable for youth with FAP. Full school attendance, which is an indicator of developmentally appropriate functioning, should be a primary goal, either immediately or incrementally, and may be encouraged by a stepwise behavioral program; homebound instruction should be avoided. Consolidation of responsibility for school excuses and coordination of the child's care with a single health care professional—ideally, the primary care provider or gastroenterologist—are highly recommended.

The available evidence for specific treatments can be parsed into what is known about pharmacological and nonpharmacological interventions. Regarding the latter, the use of cognitive-behavioral therapy (CBT) was first shown to be helpful in a number of small controlled studies (Sanders et al. 1989, 1994), with a few additional studies also supporting the use of CBT (Huertas-Ceballos et al. 2008b). Most available studies have applied some combination of psychoeducation for children with FAP and their families to provide an explanation for the pain and a rationale for pain management, contingency management training for parents, and relaxation training for treated youth (e.g., Finney et al. 1989). Promising results have also been associated with the use of isolated self-management strategies, including relaxation training, guided imagery, and hypnosis (Anbar 2001; Ball et al. 2003; Vlieger et al. 2007).

Research on the pharmacological treatment of pediatric FAP has been limited, and firm conclusions have yet to be reached (Campo 2005). Following a brief 2-week randomized, double-blind, placebo-controlled trial of peppermint oil for pediatric IBS, Kline et al. (2001) reported improvements in abdominal pain for 71% of drug-treated and 43% of placebo-treated subjects, but no reductions in other symptoms. A placebo-controlled study of the H_2 receptor blocker famotidine in 25 children with FAP suggested some benefit in children with dyspeptic (i.e., upper tract) symptoms but excluded youth with anxiety or depression (See et al. 2001).

Given the high observed rates of comorbid anxiety and depressive disorders in youth with FAP, the use of antidepressant medications can have special appeal. Antidepressants, including the tricyclic antidepressants (Drossman et al. 2003) and the selective serotonin reuptake inhibitor (SSRI) citalopram (Tack et al. 2006), have been reported to be of benefit in the treatment of adults with FAP (Jailwala et al. 2000). An open trial of citalopram for pediatric FAP found that 21 of 25 (84%) treated youth responded positively based on clinician ratings of *much improved* or *very much improved,* with child and parent ratings of abdominal pain, anxiety, depression, other somatic symptoms, and functional impairment all improving significantly over the course of the study (Campo et al. 2004b). A small controlled trial indicated that the tricyclic antidepressant amitriptyline performed better than placebo in the management of pediatric IBS (Bahar et al. 2008), while another found no advantage of drug over placebo (Saps et al. 2009). Pediatric gastroenterologists have often favored the use of tricyclic antidepressants in youth with FAP based in part on adult experience. However, the limited nature of the evidence for efficacy of tricyclic antidepressants, their potential toxicity in overdose, a handful of reports of sudden death associated with their use in pediatric patients, and their lack of efficacy in comorbid depressive disorders in youth (Geller et al. 1999) make it difficult to

advocate their widespread use in pediatric FAP. Other than a single positive case report of duloxetine in pediatric FAP (Meighen 2007), reports of efficacy for other classes of antidepressant medications are lacking in children and adolescents. Mirtazapine has sometimes been used anecdotally based on some degree of serotonin 5-HT_3 receptor–blocking activity, as well as antihistaminic properties that can increase appetite and aid with sleep onset.

The knowledge base regarding the treatment of abdominal migraine is equally limited, although common sense dictates that as with migraine headache, the wise approach is to begin with prevention. Known triggers such as caffeine, glaring lights, monosodium glutamate (MSG), nitrites, fasting, automobile rides, and fatigue should be avoided when possible (Rasquin et al. 2006; Russell et al. 2002). Based on a small controlled trial of 16 children with abdominal migraine, Russell et al. (2002) reported positively on the use of pizotifen, a serotonin antagonist prescribed in Europe for migraine prophylaxis. Other anecdotal reports support the use of prophylactic medicines commonly used to treat classic and common migraines, including propranolol, cyproheptadine, and divalproex sodium; drugs used in acute migraine management, such as sumatriptan, have also been reported to abort acute episodes (Rasquin et al. 2006).

Evidence for the effectiveness of dietary interventions for pediatric FAP is lacking at present, despite speculation that FAP could be a consequence of food allergy or intolerance. A systematic review failed to find benefits for fiber supplementation or lactose-restricting diets in children, and the efficacy of fiber and bulking agents in adults has not been established despite several trials of variable quality (Huertas-Ceballos et al. 2008a). Also, interest in the administration of probiotics (i.e., live microorganisms such as *Lactobacillus*) for the management of FAP has increased, but pediatric studies are inconclusive (Bausserman and Michail 2005; Gawronska et al. 2007).

Cyclic Vomiting

Medical Overview and Epidemiology

According to Rome III pediatric criteria for FGIDs, cyclic vomiting syndrome (CVS) is a severe, recurrent debilitating disorder consisting of cyclic bouts of intense and recurrent vomiting or retching that last for hours to days, with subsequent return to usual state of health for weeks to months (Rasquin et al. 2006). Some interesting facts about CVS include a 2% prevalence rate among school-age children, with a slight female predominance; a median age of onset of 4.8 years; a median number of episodes of vomiting per bout of 15; an average of 20–24 absentee days from school yearly; and average estimated direct and indirect costs per case of $17,035 in 2003 (Li and Misiewicz 2003). The disorder is often considered a migraine precursor, with nearly one-third of children developing migraine headaches by age 9½ years and three-quarters by age 18 years (Li and Misiewicz 2003). Specific triggers for episodes of CVS are in keeping with those observed for migraine and may include menstruation (22%); dietary exposure to cheese, chocolate, or MSG (23%); fatigue (24%); car sickness (12%); infection (31%–41%); and stress (34%–77%), including positive stressors such as family celebrations or vacations (Li and Misiewicz 2003).

CVS is a diagnosis of exclusion in the sense that diagnostic criteria are met in the absence of other explanatory disease, most notably gastrointestinal obstruction. A careful medical history and physical examination should be performed because surgical or metabolic causes are found in a minority of patients with recurrent or persistent vomiting; the episodic and potentially life-threatening gastrointestinal obstruction that occurs with malrotation or with intermittent volvulus can mimic symptoms of CVS (Li et al. 2008). The prompt diagnosis of intestinal obstruction or volvulus is of critical importance, setting the stage for lifesaving surgical intervention. Diagnostic clues include the presence of bilious and bloody emesis, paucity of air throughout the gastrointestinal tract or air/fluid levels on abdominal films, and paucity of bowel sounds. Other surgical causes of recurrent vomiting include appendicitis; ureteropelvic junction obstruction leading to acute renal hydronephrosis; and central nervous system tumors, especially in the posterior fossa. Nonsurgical causes of recurrent vomiting or retching include pregnancy as well as less common disorders such as acute intermittent porphyria, mitochondrial disorders, diabetes mellitus, urea cycle defects, and organic aciduria (Lewis and Pearlman 2005; Li and Misiewicz 2003).

Initial laboratory evaluation should include electrolytes, calcium, glucose, blood urea nitrogen, and creatinine, and consideration should be given to an upper gastrointestinal series to evaluate for the presence of malrotation. In the presence of severe abdominal pain or tenderness and bilious or bloody

emesis, the following may be considered: abdominal and pelvic ultrasound, computerized tomography, and endoscopic examination. Obtaining studies for ammonia, amino acids, urine organic acids, and porphobilinogen is especially indicated when attacks appear to be precipitated by fasting, intercurrent illness, or a high-protein meal. Consideration should also be given to magnetic resonance imaging of the brain to rule out intracranial processes such as a posterior fossa tumor, particularly if the examination finds evidence of papilledema or abnormal neurological findings (Li et al. 2008).

Psychosocial Adjustment

Children with CVS have been described in the past as more anxious than unaffected peers, and their parents are similarly viewed as being more anxious and prone to view their children as more vulnerable than parents of unaffected children (Reinhart et al. 1977). Recent work confirms relatively high rates of internalizing disorders in children with CVS, with one study finding the prevalence of anxiety and mood disorders to be 47% and 14%, respectively (Tarbell and Li 2008). The high presence of internalizing disorders, most notably anxiety disorders, suggests that a diathesis-stress model may be applicable in illustrating how stress can lead to symptoms of CVS through its effects on the hypothalamic-pituitary-adrenal axis and the presumed underlying diathesis (Tarbell and Li 2008). Some evidence supports a matrilinear inheritance pattern for CVS and migraine headaches, suggesting complex non-Mendelian inheritance through mitochondrial DNA, patterns that have generated interest in both depression and IBS (Boles et al. 2005).

Evidence-Based Treatment Approaches

The treatment of CVS is complicated by a limited understanding of its pathophysiology and the lack of large systematic randomized, controlled trials. Given the absence of conclusive scientifically proven treatments, empirical guidelines have been developed (Li et al. 2008). Known precipitating factors such as chocolate, cheese, or MSG should be avoided when possible (Chow and Goldman 2007; Li and Misiewicz 2003). When anxiety or stress has been identified as a precipitant, the following may be preventive: psychotherapeutic treatment, the use of relaxation training and related self-management strategies, and the use of anxiolytics (Chow and Goldman 2007). When attacks occur more than once per month, prophylactic medication is also recommended (Chow and Goldman 2007; Li and Misiewicz 2003). Migraine prophylactic medications are commonly used, including tricyclic antidepressants, cyproheptadine, propranolol, and divalproex sodium (Chow and Goldman 2007; Li and Misiewicz 2003). Existing recommendations (Li et al. 2008) favor the following: use of cyproheptadine as prophylaxis in children ages 5 years and younger, with low-dose amitriptyline, a tricyclic antidepressant, recommended for those older than 5 years; the beta-blocker propranolol as a second choice at both younger and older ages; and complementary nutritional therapies with carnitine or coenzyme Q, which have also been used with little empirical data.

Once an episode of CVS has started, over 50% of children will require intravenous rehydration to avoid dehydration and acidosis (Chow and Goldman 2007; Li and Misiewicz 2003). Supportive measures include placing the child in a quiet, less stimulating environment and avoiding bright lighting, along with the use of antiemetics such as ondansetron and sedatives such as lorazepam (Chow and Goldman 2007; Li and Misiewicz 2003; Li et al. 2008). The off-label use of triptans such as sumatriptan has been suggested as potentially helpful in the management of acute CVS episodes when administered early. Antipsychotic medications such as prochlorperazine have been demonstrated to be efficacious in the management of acute migraine (Siow et al. 2005) and have shown promise in the management of intractable pediatric migraine (Kabbouche et al. 2001), raising questions about their potential utility in CVS, but clinical experience has apparently been uninspiring (Li et al. 2008). The use of proton pump inhibitors to prevent heartburn and dyspepsia has also been advocated during acute episodes. Due to the severe stress that a recurrent disabling condition can place on families, awareness of support and informational resources such as the Cyclic Vomiting Syndrome Association (http://www.cvsaonline.org) may be helpful, and formal family therapy may prove useful in some instances to help families and patients deal with the stress of illness and to prevent this stress from becoming a precipitant (Chow and Goldman 2007; Li and Misiewicz 2003).

Inflammatory Bowel Disease

Medical Overview and Epidemiology

Inflammatory bowel disease (IBD) is characterized by chronic inflammation of the gastrointestinal

tract that is of unknown etiology, with two relatively distinct subtypes. Crohn's disease, also known as regional enteritis, is distinguished by segmental involvement of the gut in a nonspecific granulomatous inflammatory process that affects all layers of the gut wall and that may affect any portion of the gut, from mouth to anus. Ulcerative colitis is notable for primarily mucosal and submucosal inflammation of the rectum and sometimes the colon, but not the small intestine. Approximately 25% of IBD presents in childhood and adolescence, typically with some combination of abdominal pain, weight loss, and diarrhea, as well as blood in the stool. IBD typically has a relapsing and remitting course, and although the cause remains unknown, immune dysregulation appears to be important to the disease process (Beattie et al. 2006).

Psychosocial Adjustment

Given the close relationship between gut and brain, gastrointestinal disease may convey a special risk for psychiatric disorder, or vice versa. Youth with IBD are at greater risk of having depressive and anxiety symptoms and disorders than are healthy children (Burke et al. 1989; Engstrom 1992; Szigethy et al. 2004a, 2004b), but only a subset have psychiatric disorders of clinical significance, with depressive disorders being noted in 10%–20% of children and adolescents with IBD (Burke et al. 1989; Szigethy et al. 2004a). Although the depressive symptoms associated with IBD may be a consequence of cytokine-mediated inflammation and/or medications used to manage IBD, depressive symptoms and disorders can occur during periods in which IBD appears to be in remission, and the degree to which comorbid psychiatric disorder may be influenced by drugs used in the treatment of IBD such as corticosteroids is unclear (Szigethy et al. 2004a). Similarly, abdominal pain is common in patients with IBD who appear to be in remission, without evidence of active gut pathology (Farrokhyar et al. 2006). Review of existing studies suggests that the rates of internalizing disorders observed in association with IBD typically do not exceed those documented with other chronic physical disorders and may be a bit lower than the high rates noted in pediatric FGIDs (Mackner and Crandall 2007).

A related but different question is to what degree a psychiatric disorder such as depression can impact the course, prognosis, and even pathophysiology of the disease process in IBD. Stressful life events may appear to exacerbate the disease process, but research in children has been limited. Theoretically, depression may impact physical health by influencing patient and family adherence to prescribed treatment regimens and the requirements of a healthy lifestyle and could also have a direct physiological impact on the disease process itself, perhaps via immune mechanisms. Consequently, aggressive management of depressive disorders in patients who are physically ill might be found to benefit physical health status, and considerable interest has been shown in whether treatment of depression or anxiety in patients with IBD might positively impact the course of the disease.

Evidence-Based Treatment Approaches

Scientifically informed treatment of psychiatric disorders, such as depression, in children with chronic illness is hampered by the fact that randomized, controlled trials have typically excluded youth with physical illness, such as those with IBD. In the absence of data from systematic and representative randomized, controlled trials, clinicians must weigh the available evidence carefully and consider the degree to which active psychiatric treatment of the child with IBD might productively proceed in keeping with evidence gleaned from studies of otherwise physically healthy children with emotional disorders for whom CBT, pharmacotherapy with SSRI antidepressants, and the combination have been shown to be effective. Of note, clinical treatment research specific to depressed youth with IBD has been conducted by Szigethy et al. (2004a, 2007), who applied CBT to the management of youth with depressive symptoms and Crohn's disease, initially in a promising open trial (Szigethy et al. 2004a) and then in a small randomized, controlled study that found CBT to be superior to usual care in reducing depressive symptoms and improving functional status (Szigethy et al. 2007). This preliminary work suggests that CBT is an effective treatment for depression in youth with IBD, consistent with findings in depressed youth who are physically healthy.

Although controlled studies of psychopharmacological treatment in youth with IBD and comorbid psychiatric disorders are not available to guide practice, pharmacological treatment may be worthy of consideration either alone or in combination with psychotherapy, particularly if the patient and family express that preference or if psychotherapeutic intervention alone fails. Case reports of improvements in both depression and IBD course in antide-

pressant-treated adults have generated interest in the possibility that active psychiatric treatment might modify the disease course (Mikocka-Walus et al. 2006). The efficacy of SSRI antidepressant medications for major depression, obsessive-compulsive disorder (OCD), and non-OCD anxiety disorders has been demonstrated in physically healthy children and adolescents (Bridge et al. 2007). There is little reason to suspect that the presence of IBD is a contraindication for the use of antidepressant medications in clinically appropriate circumstances, although appropriate caution must be exercised, particularly with regard to drug interactions.

Based on current knowledge, the use of an SSRI such as fluoxetine or citalopram would likely represent the first line of psychopharmacological treatment for youth with IBD and an anxiety or depressive disorder. Meighen (2007) described the successful treatment of chronic pain and major depressive disorder in two adolescent girls with Crohn's disease using the selective serotonin–norepinephrine reuptake inhibitor duloxetine. A handful of case reports have associated the onset of IBD remission with initiation of treatment with the antidepressants bupropion (Kane et al. 2003) and phenelzine, a monoamine oxidase inhibitor (Kast 1998). Bupropion has been reported to lower levels of tumor necrosis factor-alpha, a circulating proinflammatory cytokine associated with gut mucosal erosions in Crohn's disease (Brustolim et al. 2006). Mirtazapine, another novel antidepressant, has been reported to increase levels of tumor necrosis factor-alpha, leading some to suggest that its use should be avoided in patients with IBD (Kast 2003).

Hepatitis C

Medical Overview and Epidemiology

Hepatitis C is a common blood-borne infection that when left untreated can lead to cirrhosis, hepatic encephalopathy, and death and is a leading cause of chronic liver disease, liver transplantation, and hepatocellular carcinoma (Saunders 2008). The presentation of hepatitis C infection is variable, with most acutely infected people being asymptomatic (70%–80%), although they may have elevated liver enzymes. The most common symptoms of acute infection include fever, malaise, loss of appetite, jaundice, fatigue, nausea and vomiting, dark urine, and joint pain (Dieperink et al. 2000). With chronic infection, the most common presentations include jaundice, encephalopathy, or ascites. In the pediatric population, those who use injectable drugs and those born to infected mothers are at highest risk, with approximately 4% of children born to mothers with hepatitis C going on to develop hepatitis C (Saunders 2008).

Psychosocial Adjustment

The neuropsychiatric effects of hepatitis—most notably symptoms of fatigue, depression, and cognitive dysfunction (Ozkan et al. 2006)—have long been recognized, although pediatric-specific research is limited. Fatigue is reported to occur in more than 50% of patients with hepatitis C (Saunders 2008). The presence of comorbid depression has a significant negative impact on health-related quality of life in those with hepatitis C (Ozkan et al. 2006), and rates of depression as high as 30% have been reported in untreated patients with hepatitis C (Dieperink et al. 2000; Saunders 2008). Patients infected with hepatitis C have also been reported to have subcortical frontal cerebral dysfunction that manifests as impaired concentration and slow processing prior to the development of cirrhosis and hepatic encephalopathy (Perry et al. 2008; Saunders 2008).

Evidence-Based Treatment Approaches

Current treatments for hepatitis C include ribavirin and pegylated interferon alpha. The use of interferon alpha is complicated by numerous well-known side effects, including early flulike symptoms, elevated triglycerides, gastrointestinal symptoms, dermatological disorders, and neuropsychiatric symptoms that include depressed mood, poor concentration, loss of appetite, fatigue, hostility, and suicidal ideation (Dieperink et al. 2000). Depression has been reported to develop in as many as 39%–45% of patients receiving interferon alpha (Capuron et al. 2003; Lotrich et al. 2007). Pegylated interferon, when compared with conventional interferon, does not protect against depression (Lotrich et al. 2007). The use of interferon alpha has also been associated with completed suicide (Fukunishi et al. 1998; Janssen et al. 1994). The risk of depression and suicidal ideation may continue after withdrawal from interferon alpha. Patients with hepatitis C should be monitored routinely for depressive symptoms and suicidal ideation during and after treatment with interferon alpha. Work with adults supports the use of prophylactic or symptomatic antidepressant treatment for hepatitis C patients, typically using SSRI

medications such as citalopram (Kraus et al. 2008) or paroxetine (Raison et al. 2007), but additional research is necessary, and pediatric studies are lacking.

Concluding Comments

The gut has its own intrinsic nervous system and is in active communication with the brain and central nervous system. Therefore, it is not especially surprising to note that disorders of gastrointestinal function exist in the absence of evidence of tissue damage, with the relationship between FGIDs and gastrointestinal diseases such as Crohn's disease perhaps being analogous to that between common psychiatric disorders such as anxiety or mood disorders and neurological diseases such as multiple sclerosis. FGIDs are indeed common, impairing, and strongly associated with anxiety and depressive disorders; new treatments share common features with treatment regimens that are successful in the management of emotional disorders and migraine headache. Psychiatric symptoms and disorders, particularly depression, are also commonly comorbid with gastrointestinal diseases such as IBD and hepatitis C, sometimes in relation to associated treatments such as corticosteroids and interferon alpha.

The recognition and management of comorbid psychopathology are relevant given its potential to negatively impact disease course via effects on regimen adherence, lifestyle adaptations, and pathophysiology of the disease process itself. Future research should attempt to link the course of gastrointestinal disease with that of comorbid psychopathology. Gastrointestinal disease can present challenges to the psychopharmacologist via effects on drug absorption, distribution, biotransformation, and excretion.

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19

Endocrine and Metabolic Disorders

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Endocrine and metabolic disorders encompass a heterogeneous set of medical conditions that vary widely in terms of their genetic, physiological, behavioral, and cognitive expressions. The demands and stressors placed on a child and his or her family by a given endocrine disease and its treatment also vary widely. In this chapter, we provide an overview of the primary endocrine and metabolic disorders most likely to be referred for mental health consultation in the pediatric context. These include type 1 and type 2 diabetes, as well as thyroid, adrenal, and gonadal disorders. We describe characteristic features, comorbidity, and possible presenting complaints associated with these disorders and discuss any empirically supported treatments for such disorders.

Diabetes

According to the Centers for Disease Control and Prevention's National Center for Chronic Disease Prevention and Health Promotion (2005), the total prevalence for type 1 and type 2 diabetes in the United States in 2005 was 20.8 million people, or 7.0% of the population. Of those individuals, 14.6 million had been given a formal diagnosis, and 6.2 million were estimated to have undiagnosed diabetes. In 2002, diabetes was the sixth leading cause of mortality, resulting in 73,249 deaths. This number is thought to be an underestimate, according to the Centers for Disease Control and Prevention, whose figures suggest that diabetes contributed to the deaths of 224,092 individuals. The American Diabetes Association (2009b) estimated the total national cost of diabetes in the United States to be $174 billion in 2007 alone. That figure represents an estimated $116 billion in medically related costs and $58 billion from loss of productivity. Loss of productivity included reduced or lost productivity at work or home, unemployment due to chronic disability, and early mortality. Clearly, the cost of diabetes to children, their families, and society is tremendous.

Type 1 Diabetes

Type 1 diabetes mellitus is one of the most common of all chronic illnesses of childhood, occurring in approximately 1 of every 400–600 children. The

American Diabetes Association (2009b) estimated that approximately 186,300 youth under age 20 years have been diagnosed with type 1 diabetes. The International Diabetes Federation (2006) estimated that worldwide, 440,000 children ages 0–14 years have been diagnosed with type 1 diabetes, with 70,000 new cases expected each year. Type 1 diabetes is an autoimmune disorder in which pancreatic islet cells have been destroyed, resulting in permanent insulin deficiency. Because insulin replacement is essential for survival, youth with type 1 diabetes must receive daily insulin injections or delivery of insulin through an insulin pump. Currently, the exact cause of type 1 diabetes is unknown, although both environmental and genetic factors have been implicated (American Diabetes Association 2009a).

The treatment for type 1 diabetes is complex and multifaceted (Wysocki et al. 2003). On a daily basis, children are asked to monitor their dietary intake, monitor and test their blood glucose levels, receive varying amounts of insulin injections, reduce stress, and limit physical overexertion (American Diabetes Association 2009c). Testing of blood glucose levels is usually conducted via finger pricks at set times throughout the day, such as before meals and at bedtime, to inform the child and parent if any changes in dietary intake or insulin administration need to be implemented. Because carbohydrates greatly affect blood sugar levels, children are asked to count or monitor the amount of carbohydrates they consume during meals and snacks. Maintaining a balance of blood glucose is critical for the child's well-being and livelihood. Adhering to this regimen helps to ensure that individuals avoid low or high blood glucose levels (hypoglycemia or hyperglycemia, respectively). Hypoglycemia can cause dizziness, hunger, nausea, confusion, lightheadedness, sweating, and shaking and is usually the result of not eating, excess amount of insulin through injections or medication, physical overexertion, and excessive alcohol intake (Wysocki et al. 2003). Hyperglycemia can result in fatigue, loss of consciousness, and diabetic ketoacidosis if untreated (Delamater 2000). Therefore, children must strictly adhere to their treatment regimen to avoid these short-term complications.

The potential long-term complications of type 1 diabetes are serious and sometimes life threatening; these include damage to the eyes (retinopathy and possible blindness), damage to nerves in the extremities and possible amputation (neuropathy), heart damage, and renal failure. Importantly, research has demonstrated a linear relationship between blood glucose levels and health outcomes, such that maintaining normal to near-normal levels of glycosylated hemoglobin (Hb_{A1c}) can significantly reduce the risks of developing such complications (Diabetes Control and Complications Trial Research Group 1994). Therefore, health care providers have increasingly adopted aggressive approaches to diabetes management, including comprehensive training of parents in diabetes care, frequent glucose testing, and use of team approaches (Wysocki et al. 2003).

Child Adjustment to Type 1 Diabetes

A considerable amount of research has been conducted over the past three decades that examines youth adjustment to type 1 diabetes. Collectively, the extant research suggests that many of these children are well adjusted across multiple domains of emotional and behavioral functioning (e.g., Delamater 2007; Jacobson et al. 1997; Johnson 1980). At the same time, a consistent subset of youth with type 1 diabetes appears to be at risk for developing significant adjustment difficulties, particularly depression, anxiety, and eating disorders (e.g., Kovacs et al. 1997). However, the relative risk to these individuals for developing a significant mental disorder and the extent to which their disease directly or indirectly contributes to psychiatric symptomatology remain to be determined. Indeed, some of these youth may have experienced premorbid adjustment problems and family dysfunction prior to the diagnosis of type 1 diabetes. Although Kovacs et al. (1997) found relatively high rates of major depression and anxiety disorders over a 10-year period after diagnosis (27% and 12%, respectively), others have found psychiatric rates to be no higher than in healthy controls (Jacobson et al. 1997). Still other researchers have found no differences between youth with type 1 diabetes and healthy controls on various dimensions of psychosocial maturation (Pacoud et al. 2007). Interestingly, Martínez-Aquayo et al. (2007) found that younger high school students (grades 8–10) with type 1 diabetes used less alcohol, tobacco, and illicit drugs than did healthy controls. By grades 11 and 12, however, their use was comparable to (but not greater than) that of healthy peers. Although tempting to conclude that youth with type 1 diabetes are therefore no more at risk for psychiatric disturbance or drug and alcohol use than their healthy peers, one could also argue that the health

risks associated with such psychiatric disorders are substantially higher when one has diabetes and that a more aggressive approach should be taken in terms of prevention and intervention. Furthermore, to the extent that these children do exhibit adjustment problems, the risk of nonadherence, glycemic control problems, and school absenteeism; the need for home health visits; and the rate of hospitalization are increased significantly (e.g., Chisholm 2003; Korbel et al. 2007).

Decades ago, Johnson (1980) argued cogently that perhaps the most fruitful (and clinically relevant) approach to examining adjustment to type 1 diabetes is to identify the multiple interrelated factors that are associated with or predict such difficulties. Since that time, a large number of risk factors for adjustment problems have been documented. Children who exhibit adjustment problems soon after diagnosis are at higher risk for future adjustment problems (e.g., Kovacs et al. 1995). High family conflict and dysfunction not only appear to place youth at risk for psychiatric problems but also predict metabolic control and diabetic ketoacidosis. Girls are more likely than boys to receive a psychiatric diagnosis as well (Northam et al. 2004), although gender bias and cultural issues may well play a role in this diagnostic pattern. Delamater (2007) noted that single-parent status and low income have been implicated in glycemic control problems and, therefore, should also be seen as potential risk factors for adjustment difficulties.

Parenting style has also been identified as a risk factor, with higher levels of maternal control being associated with higher levels of depressed mood in older adolescents with type 1 diabetes (Butler et al. 2007). Higher levels of parental overprotectiveness have been associated with greater depressive symptomatology in younger children with type 1 diabetes, with this relationship being magnified under conditions of greater parenting stress (Mullins et al. 2004). Mothers' and children's appraisals of involvement in coping with the stressors associated with type 1 diabetes have also been linked to adjustment. Berg et al. (2007) found an inverse relationship between a child's perception of his or her mother's supportive involvement and depressive symptoms. They further found that the mother's and child's perceptions of lower involvement with each other's stressors were associated with greater depressive symptoms and less positive mood. Clearly, a large number of personal, familial, cognitive, and environmental factors may place a child at risk.

Eating Disorders in Children With Diabetes

An additional and somewhat unique concern in children and adolescents with diabetes is the occurrence of disordered eating. Such disordered eating is believed to be the result of both the focus that the treatment of diabetes places on dietary intake and the fact that treatment modalities often result in weight gain. However, some controversy exists regarding the prevalence of disordered eating in individuals with type 1 diabetes. Some studies have found no significant increase in diagnoses of eating disorders, yet other studies have found a higher incidence of eating disorders and eating disorder–type behaviors in individuals who have type 1 diabetes. In addition, as in the general population, younger adolescent females with type 1 diabetes appear to be the most susceptible to the development of an eating disorder (Jones et al. 2000; Meltzer et al. 2001; Verrotti et al. 1999).

The treatment for diabetes itself has also been used by some adolescents to manipulate their weight. Specifically, some adolescents limit or omit their insulin intake, resulting in calorie loss. As with eating disorders in general, this specific behavior appears to be particularly problematic for young females. Finally, the American Diabetes Association has identified some potential warning signs of eating disorders that can be helpful in identifying individuals who may be struggling with disordered eating. These warning signs include delayed onset of puberty (e.g., menarche) and unexplainable fluctuations in blood sugar (American Diabetes Association 2002; Crow et al. 1998; Hudson et al. 1983; Jones et al. 2000).

Parental Adjustment to Type 1 Diabetes

Although the majority of parents of children with type 1 diabetes adapt well, a subset of parents reports clinically significant psychological distress following initial diagnosis and throughout the course of their child's illness (e.g., Kovacs et al. 1990; Parker et al. 1994). Increased maternal psychological distress (e.g., symptoms of anxiety, somatization, anger, suspiciousness, depression, dysphoria) has been observed immediately following diagnosis. Parents of children with chronic illness have reported increased depressive symptoms (Mullins et al. 1995), greater negative affective states (Cadman et al. 1991), and higher global psychological distress (Chaney et al. 1997; Northam et al. 1996; Silver et al. 1998). Moreover, maternal distress after the ini-

tial diagnosis of child type 1 diabetes is highly predictive of subsequent maternal psychological symptomatology (Kovacs et al. 1990).

The transactional association between maternal distress and child distress has also been well documented in the literature in both medically well and non–medically well populations (Beardslee et al. 1983; Burge and Hammen 1991). Specifically, among children with type 1 diabetes, increased distress among fathers (Chaney et al. 1997) and mothers (Chaney 1991; Mullins et al. 1995) of children with type 1 diabetes predicted concurrent child psychological distress. Metabolic control of adolescents with diabetes has also been significantly associated with the physiological reactivity of parents to an acute stressor (Mengel et al. 1992). Such parent-child transactional relationships demonstrate the systemic nature of adjustment to chronic illness and argue for a family systems approach to the prevention of various forms of psychological distress in these populations.

Cognitive Changes in Children With Type 1 Diabetes

Evidence suggests that children with type 1 diabetes may experience a wide range of cognitive difficulties associated with their disease. A number of studies document that these children are at risk for learning disabilities and may experience difficulties with attention, processing speed, long-term memory, and executive functioning (e.g., McCarthy et al. 2003; Rovet and Alvarez 1997; Schoenle et al. 2002). As a result, academic problems may emerge, particularly for those children who have earlier age at onset and who tend to have severe, recurring hypoglycemic episodes. Neurocognitive screening or a complete neuropsychological evaluation should therefore be considered for youth with type 1 diabetes, particularly for those who have experienced many negative glycemic events or who are struggling with school performance. Such an evaluation may well help the school develop an Individualized Education Plan that addresses needed academic and/or physical accommodations.

Psychosocial Interventions for Children With Type 1 Diabetes and Their Parents

Over the past three decades, a variety of psychosocial and behavioral interventions have been utilized in the context of type 1 diabetes (for comprehensive reviews of such interventions, see Delamater 2007; Hampson et al. 2000; Winkley et al. 2006). These interventions have tended to fall into one of four overlapping categories: 1) patient/family education and teaching of self-management skills; 2) improvement of adherence to medical regimens; 3) psychosocial interventions for children; and 4) family-based interventions.

Clearly, knowledge about diabetes and its treatment is an essential basis for diabetes management. Thus, systematic efforts have been made to impart such information through clinic-based interventions that occur immediately after diagnosis, as well as through other avenues such as summer camps (e.g., Harkavy et al. 1983; Karaguzel et al. 2005; Santiprabhob et al. 2008). What is also clear, however, is that diabetes knowledge is insufficient for successful diabetes management. Indeed, knowledge is inconsistently associated with Hb_{A1c} levels (e.g., Johnson 1995). To further enhance diabetes management, researchers have used a variety of approaches that build on a knowledge base, such as group coping skills training (Grey et al. 2000) or behavioral contracting (e.g., Wysocki et al. 1989). Wysocki et al. (2003) aptly pointed out that families may also benefit from specific training in the use of self-monitoring of blood glucose, because a number of studies have documented that such efforts result in better diabetic control, better adherence, and less diabetes-related conflict (Anderson et al. 1989; Delamater et al. 1990; Wysocki et al. 1992). Although methodological problems still plague much of this research, many of these interventions appear to be at least moderately effective in improving disease management, particularly when the interventions are theoretically driven (Hampson et al. 2000).

More recently, the critical role of the family and family system has also been highlighted in diabetes management (Delamater 2007). Indeed, comprehensive psychosocial and family-based interventions have been developed in the hopes of better addressing issues of adherence, interpersonal adjustment, peer relations, and family relationships. In a series of studies, Wysocki and colleagues have evaluated the effect of behavioral family systems therapy on a wide range of behavioral, emotional, and medical outcomes in youth with type 1 diabetes (Wysocki et al. 1999, 2000, 2001, 2006, 2007). Behavioral family systems therapy, adapted from the work of Robin and Foster (1989), focuses on the teaching of problem-solving and communication skills in the context of the family system. Wysocki and colleagues have demonstrated that behavioral

family systems therapy results in improved conflict resolution and communication skills, enhanced parent-child relationships, and improved adherence and glycemic control.

Similarly, Ellis and colleagues have adapted multisystemic therapy, a comprehensive family systems–based program originally developed for youth with significant mental health problems and delinquency (Henggeler and Borduin 1990), for the treatment of adolescents with type 1 diabetes who were in poor control (Ellis et al. 2005a, 2005b). Multisystemic therapy targets not only the individual and family system but also the larger community system, which in the case of youth with diabetes also includes the school and health care system. Targeting adolescents with chronic poor metabolic control, Ellis et al. (2005a, 2005b) demonstrated that 6 months of multisystemic therapy resulted in improvements in blood glucose testing, decreased inpatient hospital admissions, reduced direct care costs, and improved metabolic control. With a focus primarily on parental adjustment, Hoff et al. (2005) piloted a randomized clinical trial involving an intervention for parents of children newly diagnosed with type 1 diabetes. This intervention, based on uncertainty in illness theory, was designed to decrease parental uncertainty and distress and to indirectly improve child emotional functioning. Significant reductions in distress were observed for both mothers and fathers in the intervention group, as well as maternal ratings of child behavior problems. These reductions were still apparent for both mothers and fathers at a 6-month follow-up.

Type 2 Diabetes

Type 2 diabetes mellitus is the most common form of diabetes, being found in roughly 20 million Americans and accounting for 80% of cases of diabetes (National Institute of Diabetes and Digestive and Kidney Diseases 2008). Unlike type 1 diabetes, the development of type 2 is typically contingent on lifestyle (particularly dietary consumption and exercise), with obesity being the number one risk factor for this disease (American Diabetes Association 2000). In addition, type 2 diabetes historically has been considered a disease with an adult onset, often not present until an individual was beyond age 30 years. Type 2 diabetes in children was thus considered relatively rare, although children might present with a prediabetic condition. More recently, however, an alarming increase has occurred in the number of children presenting with type 2 diabetes, which is undoubtedly directly related to the increase in childhood obesity (Alberti et al. 2004; American Diabetes Association 2000; Libman and Arslanian 2003). Indeed, by the year 2000, up to 46% of all new cases of diabetes diagnosed in childhood were type 2 (Nesmith 2001).

Type 1 diabetes is characterized by complete or near-complete insulin deficiency. In contrast, type 2 diabetes is characterized by insulin resistance (Copeland et al. 2005), and children with type 2 diabetes present as obese, as insulin antibody negative, and as having acanthosis nigrican (American Diabetes Association 2000). They also present far less often in diabetic ketoacidosis than do children with type 1 diabetes.

When compared with the general population, certain subpopulations may have an increased risk for the development of type 2 diabetes, and the prevalence appears to be increasing fairly dramatically within these subpopulations. Included are children and adolescents of the following ethnic minority groups: Asian American, Native American, Mexican American, and African American (Alberti et al. 2004; Dabelea et al. 1998; Libman and Arslanian 2003; Ramachandran et al. 2006). One group in particular that has received attention is the Pima Indians who reside in southern Arizona and northern Sonora, Mexico. Over the past 40 years, preteen and adolescent Pima Indians have demonstrated a statistically significant increase in diagnoses of type 2 diabetes. One study of this group was helpful in elucidating the relationship between type 2 diabetes and obesity. In this study, Fagot-Campagna et al. (2000) found that the vast majority (85%) of those who met criteria for type 2 diabetes were also morbidly obese. In addition to obesity, other possible risk factors for this disease in children and adolescents include family history of diabetes, female gender, and low birth weight (American Diabetes Association 2000).

Child and Parental Adjustment to Type 2 Diabetes

Research on parent and child adjustment to type 2 diabetes is scant, especially considering the rising incidence of the disease (Naughton et al. 2008). One area of research has focused on health-related quality of life (HRQOL). Quality of life is thought to be an important factor in adjustment to the illness and has consequently been increasingly studied in patients with diabetes (e.g., de Wit et al. 2007). For instance, Pediatric Quality of Life Inventory scores

were used to compare 91 children and adolescents with type 2 diabetes with approximately 300 healthy controls; children with type 2 diabetes were found to have lower total health, psychosocial health, emotional functioning, social functioning, and school functioning scores (Varni et al. 2003). Another study comparing HRQOL in 257 individuals ages 8–22 years with type 2 diabetes and 2,188 same-age individuals with type 1 diabetes also revealed that participants with type 2 diabetes had lower HRQOL (Naughton et al. 2008).

Moreover, compared with individuals with type 1 diabetes, children and adolescents with type 2 diabetes have been shown to have a higher likelihood of being obese, being from an ethnic-minority group, and having lower socioeconomic status (Brody et al. 2008; Degazon and Parker 2007). Therefore, these individuals present with additional challenges beyond their illness. Discrimination and disparities in health care resources for ethnic minorities are well documented (Ahmed et al. 2007). Additionally, individuals who are obese have been shown to have psychological and emotional problems such as depression, low self-esteem, and discrimination (Braet et al. 1997; Miller and Downey 1999; Puhl and Brownell 2001). In a chart review of pediatric patients in Philadelphia, comorbid neuropsychiatric disorders, including attention-deficit/hyperactivity disorder, autism, bipolar disorder, obsessive-compulsive disorder, and depression (among others), were found in 19.4% of children at the initial onset of type 2 diabetes (Levitt Katz et al. 2005). These conditions are likely to further reduce a child's ability to adjust to a diagnosis of type 2 diabetes.

Very little is currently known about parental adjustment to a child's diagnosis of type 2 diabetes. In a study that is not completely reflective of parental adjustment, Allan et al. (2008) found several differences between children's and parents' perceptions of quality of life. Specifically, parents' scores were lower than children's scores on quality of life, physical functioning, psychosocial functioning, emotional functioning, social functioning, and school functioning. The authors posit that this pattern indicates that parents perhaps believe that the illness has a larger negative impact on their children than the children themselves do. More research is needed to determine if the transactional association of parental distress and child distress found in type 1 diabetes (Beardslee et al. 1983; Burge and Hammen 1991) also exists in type 2 diabetes.

Interventions for Children With Type 2 Diabetes and Their Parents

Limited research has been conducted on interventions for children and adolescents with type 2 diabetes. Indeed, the majority of research has been conducted with adults. However, given the connection between obesity and type 2 diabetes, preventive interventions for children and adolescents are becoming more common. These interventions focus on increasing dietary knowledge and promoting physical activity to help reduce the likelihood of type 2 diabetes. For example, a 1-year school-based intervention for students in grades 3–5 in Canada produced gains in dietary knowledge, overall health knowledge, and dietary self-efficacy (Saksvig et al. 2005). Similar interventions are described elsewhere (S.M. Davis et al. 1999; Macaulay et al. 1997). Other interventions that target adults diagnosed with type 2 diabetes have focused on group education programs (Davies et al. 2008) and self-management approaches (Thoolen et al. 2007).

Pharmacological interventions, such as using metformin, have also been shown to be effective. The Diabetes Prevention Program (Knowler et al. 2002) found that for high-risk individuals, metformin reduced the risk of developing diabetes by 31% when compared with the placebo condition after a mean follow-up of almost 3 years. Although that study was the largest randomized medication trial to date, other studies have shown similar effectiveness (Ramachandran et al. 2006).

The largest treatment trial for type 2 diabetes conducted to date is under way in the United States. Sponsored by the National Institutes of Health, the Treatment Options for Type 2 Diabetes in Adolescents and Youth (TOD^{2}AY) trial will examine three different treatments—metformin plus placebo, metformin plus rosiglitazone, and metformin plus lifestyle change—in a sample of 750 youth who are obese. Hopefully, the results of this study will better inform treatment recommendations for youth with type 2 diabetes.

Adherence Issues in Diabetes Care

A comprehensive review of treatment adherence in diabetes is beyond the scope of this chapter; however, the tremendous importance of compliance with the complex medical regimen warrants a brief discussion (for additional information on adherence issues, see Delamater 2000 and Chapter 13, "Treat-

ment Adherence," in this volume). As mentioned previously, diabetes adherence is a multifaceted construct, and children with diabetes face multiple task demands in regard to a complex treatment of a chronic illness. Although low overall adherence levels have been demonstrated in many chronic illnesses (Adams et al. 1997; Epstein and Cluss 1982), adherence levels in diabetes have often been found to be particularly poor (e.g., Johnson et al. 1986; La Greca et al. 1990; Reinehr et al. 2008). A number of types of adherence difficulties have been delineated in the research literature. Poor levels of adherence with young children and adolescents have been shown in self-monitoring of blood glucose (Delamater et al. 1989a; Wing et al. 1985) and dietary intake (Delamater et al. 1989b; Maffeis and Pinelli 2008). Insulin administration has also been shown to be an area of concern (Weissberg-Benchell et al. 1995); however, some studies indicate otherwise (Kyngas 2000). Importantly, these studies also demonstrate that although chronological age is often used as a marker for when a child should be given greater responsibility for self-care, many young individuals are not developmentally mature enough to handle the rigors of adhering to a regimen. Furthermore, problems with adherence have been shown to persist well into young adulthood (e.g., Donnelly et al. 2007; Raum et al. 2008; Schmittdiel et al. 2008).

Although many factors have been linked to adherence, much of the extant research has focused on three primary areas, specifically diabetes knowledge, role of family support, and psychosocial factors that influence adherence. Researchers suggest that diabetes adherence knowledge should be continuously revisited (La Greca et al. 1990; Maffeis and Pinelli 2008), and some studies demonstrate that doing so can positively affect regimen adherence (Christensen 1983); however, research results in this area are mixed (Kyngas et al. 2000; Wysocki et al. 2003).

Many studies have found that parental support, involvement, or cohesion is associated with better adherence, whereas parental conflict can have detrimental effects (Anderson et al. 1997; C.L. Davis et al. 2001; Jacobson et al. 1994; Kyngas 2000; Wysocki and Greco 2006). Parental monitoring specific to diabetes (instead of general warmth) has also been shown to have a positive effect on adherence (Ellis et al. 2007).

Finally, studies have indicated that psychosocial factors such as self-esteem, motivation, and autonomy have been linked with better compliance (Kyngas et al. 1996; Litt et al. 1982). On the other hand, externalizing problems in children and adolescents could lead to lower levels of adherence. In a study conducted by Duke et al. (2008), the researchers discovered a pattern in which the externalizing problems (oppositional defiant behavior, conduct problems) of youth were associated with critical parenting, which consequently led to decreased levels of adherence.

Thyroid Disorders

Major functions of the thyroid gland include promotion of normal growth and development, as well as homeostatic regulation of energy and temperature. These functions are controlled by the thyroid hormones thyroxine (T_4) and triiodothyronine (T_3) (see Figure 19–1). T_4 is a prohormone, and T_3 is physiologically active when not bound to albumin or thyroid-binding globulin in circulation (Greenspan and Gardner 2004). Congenital hypothyroidism and resistance to thyroid hormone (RTH) are diseases of newborns that include adverse behavioral sequelae. Hypothyroidism and hyperthyroidism are acquired thyroid diseases that result in undesirable behavioral features (Rossi et al. 2005).

Congenital Hypothyroidism

The hypothalamic-pituitary-thyroid axis is active by midgestation and mature by birth. Prior to midgestation, fetal development relies on maternal thyroid hormones (Greenspan and Gardner 2004). Congenital hypothyroidism occurs in approximately 1 of 4,000 live births and is usually due to thyroid dysgenesis or deficits in thyroid hormone production. Congenital hypothyroidism is one of the most common causes of mental retardation; however, because maternal thyroid hormones transfer across the placenta, early diagnosis and treatment with L-thyroxine can result in normal cognitive development of affected children (New England Congenital Hypothyroidism Collaborative 1990). Maternal hypothyroidism alone, or in conjunction with fetal hypothyroidism, leads to cognitive impairment in children despite postnatal therapy. This observation illustrates the importance of thyroid hormone exposure during early fetal development for subsequent cognitive function (Haddow et al. 1999; Morreale de Escobar et al. 2000; Vermiglio et al. 2004). A two-to-one incidence of congenital hypothyroidism exists for females compared to males, and the inci-

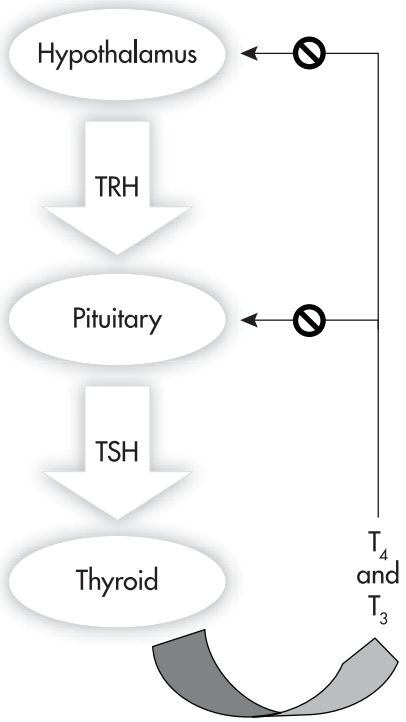

FIGURE 19–1. Hypothalamic-pituitary-thyroid axis.

Thyrotropin-releasing hormone (TRH) secreted by the hypothalamus stimulates the anterior pituitary to secrete thyroid-stimulating hormone (TSH). TSH then stimulates the thyroid gland to produce thyroid hormones thyroxine (T_4) and triiodothyronine (T_3). Thyroid hormones exert negative feedback to the hypothalamus and anterior pituitary to maintain homeostatic regulation of this axis.

dence of congenital hypothyroidism is higher in people with Down syndrome than in the overall population (American Academy of Pediatrics et al. 2006; LaFranchi 1999). Newborn screening for congenital hypothyroidism was instituted in the 1970s and is now ubiquitous throughout North America and other areas of the world. In North America alone, approximately 1,400 cases of congenital hypothyroidism are identified annually (American Academy of Pediatrics et al. 2006).

Prior to newborn screening, individuals with untreated congenital hypothyroidism had poor performance on IQ testing, increased participation in special education programs, and impaired fine motor control. Daily dosages of 10–15 μg/kg levothyroxine (Fisher and Foley 1989) initiated early (within the first 2 weeks of life) to normalize T_4 are associated with normal cognition and social behavior in toddlers (Dubuis et al. 1996) and young school children (Simone-Roy et al. 2004). Regardless of these positive outcomes in young individuals, HRQOL and self-esteem in young adults affected by congenital hypothyroidism lag behind their unaffected counterparts despite recommended T_4 treatment (van der Sluijs et al. 2008). Additionally, young adults with congenital hypothyroidism who received lower than recommended doses of T_4 replacement during development exhibited lower IQ and lower secondary school completion rates, as well as poorer motor function, than their unaffected siblings (Oerbeck et al. 2003). Despite improved detection and treatment of congenital hypothyroidism in newborns and children, increased attention is needed to improve the mental health outcomes in older children and adults.

Resistance to Thyroid Hormone

RTH is a rare disorder that results from target cell insensitivity to thyroid hormones. Newborn screening for congenital hypothyroidism can detect RTH if both T_4 and thyroid-stimulating hormone are measured. The incidence of RTH is the same for males and females. Clinical presentation varies in individuals affected by RTH, and some people are asymptomatic. Behavioral characteristics (and their overall frequency) associated with RTH include emotional disturbances (73%), attention-deficit/hyperactivity disorder (70%), hyperactivity (19%–42%), learning disabilities (21%–32%), and hearing deficits (25%) (Hauser et al. 1993; Weiss and Refetoff 2000). Limited data indicate that supraphysiological treatment with fast-acting thyroid hormone reduces the expression of both hyperactivity and impulsivity in children with RTH (Weiss et al. 1997).

Acquired Juvenile Hypothyroidism

Hypothyroidism occurs in either sex from infancy through adulthood but most commonly presents during pubertal development in girls (LaFranchi 1992). In pediatric populations, acquired hypothyroidism typically results from autoimmune destruction of the thyroid gland. Classic symptoms of acquired hypothyroidism include poor growth, weight gain, poor concentration, depression, and fatigue. Similar to congenital hypothyroidism, acquired hypothyroidism is treated with levothyroxine (Fisher and Grueters 2008).

Data from the Third National Health and Nutrition Examination Survey reveal that adolescents with subclinical hypothyroidism outperform their euthyroid counterparts on reading and block design

tests (Wu et al. 2006). Subclinical hypothyroidism consists of mild elevation of thyroid-stimulating hormone with normal thyroid hormone levels (Biondi and Cooper 2008) (see Figure 19–1). The observation of Wu et al. (2006) agrees with an earlier report of decline in school performance following treatment for acquired juvenile hypothyroidism (Rovet et al. 1993). The authors of these studies speculated that the decreased arousal associated with hypothyroidism may underlie better school performance.

Acquired Juvenile Hyperthyroidism

Acquired hyperthyroidism in childhood results primarily from Graves' disease, an autoimmune disorder that occurs most often in adolescent girls. Hyperthyroidism results from thyroid-stimulating antibodies that affect overproduction and secretion of thyroid hormones. Symptoms of Graves' disease include agitation, hyperactivity, poor memory, and poor concentration (Fisher and Grueters 2008). Treatment options for Graves' disease include antithyroid medications, radioiodine, and surgery (Glaser and Styne 2008).

Adults affected by Graves' disease report more symptoms of depression and anxiety than unaffected individuals, but they do not exhibit impaired cognitive function as measured by standard neuropsychological assessments (Samuels et al. 2008; Vogel et al. 2007). Furthermore, affective symptoms resolve following medical treatment for Graves' disease (Vogel et al. 2007). Similar to the case of acquired hypothyroidism, most information regarding affective and cognitive impairment associated with hyperthyroidism is taken from studies of adult patients.

Adrenal Disorders

The adrenal glands, located above each kidney, produce the steroid hormones cortisol, aldosterone, and androgens when the hypothalamic-pituitary-adrenal axis is intact (see Figure 19–2). Cortisol is necessary for homeostasis and metabolism, aldosterone regulates sodium retention and potassium secretion, and adrenal androgens support pubertal development. Cortisol receptors are ubiquitously distributed throughout the human brain, and the cortex and hypothalamus may be particularly sensitive to excess production of this hormone (Belanoff et al. 2001). Two conditions of the adrenal glands—chronic hypercortisolemia, or Cushing's syndrome,

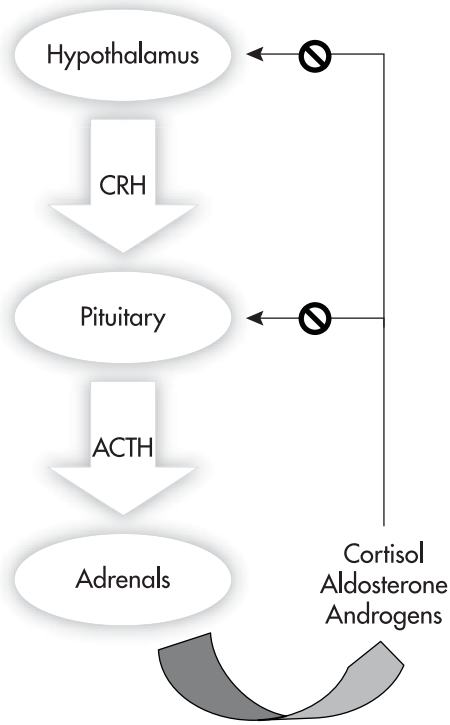

Figure 19–2. Hypothalamic-pituitary-adrenal axis.

Corticotropin-releasing hormone (CRH) secreted by the hypothalamus stimulates the anterior pituitary to secrete adrenocorticotropic hormone (ACTH). ACTH then stimulates the adrenal glands to produce cortisol, aldosterone, and adrenal androgens. Adrenal hormones exert negative feedback to the hypothalamus and anterior pituitary to maintain homeostatic regulation of this axis.

and adrenal insufficiency—have known behavioral sequelae.

Cushing's Syndrome

Cushing's syndrome refers to hypercortisolemia resulting from multiple etiologies, including pituitary and adrenocortical tumors. Treatment for Cushing's syndrome consists of transsphenoidal surgery, radiation, and pharmacological inhibition of adrenal function (Aron et al. 2004). Brain atrophy and impairments in cognition and memory are often observed in adults with Cushing's syndrome (Belanoff et al. 2001; Starkman et al. 2001). The majority of men and women with Cushing's syndrome also experience depressive symptoms, irritability, and insomnia (Arnaldi et al. 2003; Starkman et al. 1981). These cognitive and affective symptoms are ameliorated to varying degrees following reversal of hypercortisolemia (Bourdeau et al. 2002; Dorn et al. 1997; Forget et al. 2002; Kelly et al. 1996). In children, obses-

sive-compulsive behavior is also associated with Cushing's syndrome (Magiakou et al. 1994). Unlike in adults with Cushing's syndrome, cognitive function declines following therapy for hypercortisolemia in children with Cushing's syndrome (Merke et al. 2005; Sonino and Fava 2001).

Adrenal Insufficiency

Adrenal insufficiency refers to impaired secretion of cortisol with or without impaired secretion of aldosterone. Adrenal insufficiency can result from disorders of the adrenal cortex (primary adrenal insufficiency) or of the hypothalamus or pituitary (secondary adrenal insufficiency) (see Figure 19–2). Symptoms of adrenal insufficiency include weakness, abdominal pain, and hyperpigmentation. Chronic primary adrenal insufficiency, or Addison's disease, usually results from autoimmune adrenalitis and can be treated with cortisol and aldosterone replacement.

Adults with Addison's disease exhibit an increased incidence of hospitalizations due to affective disorders, compared with the general population or adults with other serious diseases such as osteoarthritis (Thomsen et al. 2006). Additionally, case reports of psychosis associated with Addison's disease exist (Anglin et al. 2006). Men and women with Addison's disease treated with the weak adrenal androgen dehydroepiandrosterone report improved self-esteem, quality of life, and mood, as well as decreased fatigue (Gurnell et al. 2008; Hunt et al. 2000). Compared with Cushing's syndrome, far fewer studies of behavioral features associated with Addison's disease exist. Similar to Cushing's syndrome and diseases of the thyroid gland (congenital and acquired), most studies of Addison's disease that include cognitive or affective outcomes are performed exclusively in adults.

Gonadal Disorders

Polycystic Ovary Syndrome

A common endocrine disorder in adolescent girls and women with concomitant hyperandrogenism and insulin insensitivity is polycystic ovary syndrome (PCOS). Features of PCOS include obesity, hirsutism, acne, and amenorrhea (Himelein and Thatcher 2006). Additionally, infertility frequently results from PCOS and is thought to be a stressor that contributes to reduced quality of life and increased depressive symptoms for women and girls (Trent et al. 2003; Weiner et al. 2004). However, compared with women with infertility due to other causes, those with PCOS report greater depression and dissatisfaction with their body image (Himelein and Thatcher 2006). Furthermore, depressive symptoms and quality of life do not differ between women with PCOS who desire pregnancy and those who do not (Tan et al. 2008). Clearly, depressive symptoms and poor body image result from aspects other than infertility in girls and women with PCOS.

Increased weight among women with PCOS is the most significant contributor to poor quality of life, and menstrual irregularity is the next greatest contributor (Barnard et al. 2007). Women with PCOS are more likely to exhibit eating disorders and anxiety than are unaffected women (Kerchner et al. 2009). Although most studies of depression, quality of life, and body image in PCOS have included women exclusively, data are beginning to emerge revealing that behavioral treatments such as cognitive-behavioral therapy result in weight loss and fewer depressive symptoms in adolescent girls with this condition (Rofey et al. 2008).

Precocious Puberty

Normal pubertal development requires activation of the hypothalamic-pituitary-gonadal axis (see Figure 19–3). In girls, the first sign of puberty is typically breast development, occurring between ages 8 and 13 years, followed by the appearance of pubic hair and menarche. In boys, the first sign of puberty is usually testicular enlargement, occurring between ages 9 and 14 years, followed by the appearance of pubic hair and penile growth. Generally speaking, pediatricians and pediatric endocrinologists consider the appearance of secondary sex characteristics to be precocious in white girls prior to age 8 years, in black girls prior to age 7 years, and in boys of any race prior to age 9 years (Rodriguez and Pescovitz 2003).

Within the normal range of pubertal onset, early menarche (prior to 11.6 years) was found to be associated with symptoms of depression and substance abuse (Stice et al. 2001). For both girls and boys participating in a national sample study, pubertal development that occurred at the early end of the normal spectrum was associated with undesirable experiences. Among girls who perceived themselves to be early maturing, smoking, dissatisfaction with body image, and early sexual activity were more common compared with their counterparts who considered their pubertal maturation to be

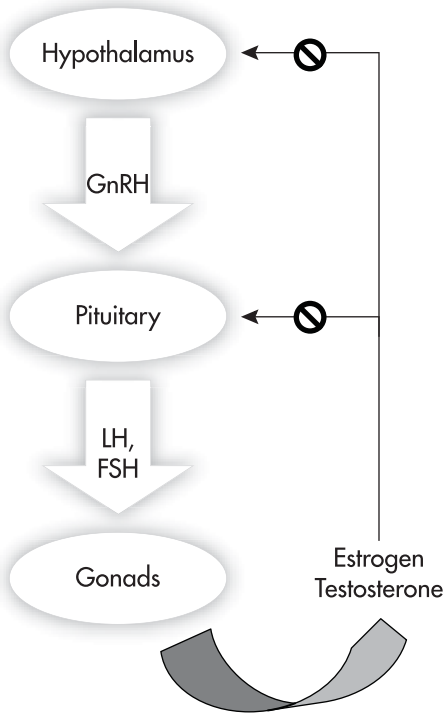

FIGURE 19–3. Hypothalamic-pituitary-gonadal axis.

Gonadotropin-releasing hormone (GnRH) secreted by the hypothalamus stimulates the anterior pituitary to secrete gonadotropins (luteinizing hormone [LH] and follicle-stimulating hormone [FSH]). LH then stimulates the gonads to produce the sex hormones estrogen and testosterone. Sex hormones exert negative feedback to the hypothalamus and anterior pituitary to maintain homeostatic regulation of this axis.

average or late. Boys who considered themselves to be early maturing reported more illicit substance abuse, depression, suicide attempts, eating disorders, and early sexual activity than boys who considered their pubertal maturation to be average or late (Michaud et al. 2006).

In a follow-up study conducted of 16 adolescent girls treated for precocious puberty that included a control group, affected girls reported more psychopathological symptoms than unaffected girls (Ehrhardt and Meyer-Bahlburg 1986). A second controlled study revealed that poor body image was associated with precocious sexual development in girls (Officioso et al. 2000). Although limited information exists about the behavioral consequences of precocious pubertal development in girls, even less information is known about boys with this condition.

Delayed Puberty

Delayed puberty for girls and boys is identified by the absence of breast development by age 13 years or the absence of testicular enlargement by age 14 years, respectively. Testosterone enanthate and conjugated estrogen are used to treat delayed puberty in boys and girls, respectively. In a double-blind, placebo-controlled crossover study of sexual behavior in boys and girls with idiopathic delayed puberty, sex hormone treatment impacted overt behavior and thoughts (Finkelstein et al. 1998). Specifically, boys reported more nocturnal emissions and sexual touching with a partner following testosterone treatment, whereas girls reported more necking. Both sexes reported more sexual thoughts following hormone treatment (Finkelstein et al. 1998). Using the same study design and participants, Finkelstein et al. (1997) also assessed self-reported aggressive behavior. Following sex hormone treatment, aggressive impulses and physical aggression increased for both boys and girls.

Concluding Comments

Endocrine and metabolic disorders present the clinician with numerous challenges in the pediatric psychosomatic medicine context. Adherence to complex medical regimens remains problematic for many children with these disorders, and these children are often at risk for cognitive, emotional adjustment, and academic difficulties. Their parents face numerous stressors as well, secondary to their child's disease status. Assessment, however brief, should take into account the multiple domains of functioning that may be affected, including cognitive, behavioral, emotional, and familial functioning. A number of interventions have the potential to improve the quality of life for these children and their families.

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20

Respiratory Illness

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Construct for Psychosomatic Illness

Psychosomatic phenomena are now fully recognized, accepted, and documented. The term *psychosomatic*, however, does not fully encompass a framework with which to organize the complicated set of interconnections between mind and body as they relate to disease. We propose a model that represents disease as a psychosomatic continuum, which varies according to the relative proportions of psychosocial/emotional and biological/environmental stressors as they impact the disease process (see Figure 20–1). Throughout this chapter, we use the word *disease* to refer to the psychosomatic continuum of the disease process.

Applying the continuum to respiratory diseases, at one extreme are those diseases with relatively strong psychosocial influence, such as vocal cord dysfunction (VCD). At the other extreme are diseases with strong biological contributions, such as cystic fibrosis. Diseases such as asthma range in between, depending on the relative contribution of psychosocial and biological factors in the course of illness for a particular patient, at a particular period in his or her development. For example, a given patient may have asthma that is influenced by both emotional and environmental factors. However, if family conflict becomes intense and prolonged or the patient experiences a significant loss, then the proportionally increased psychosocial contribution to the disease process shifts the disease toward the psychosocial end of the continuum. This recognition of relative influences on the disease is crucial for effective intervention. In the examples described, giving more asthma medications or addressing adherence concerns might not have the desired ameliorative effect. Intervention targeting the identified stressors might more successfully impact the patient's asthma. With similar reasoning, prioritizing biological interventions for VCD or psychosocial ones for cystic fibrosis would be misguided unless the stressors have been clearly identified.

The curved arrows in Figure 20–1 represent the interaction of psychosocial and biological factors as they influence a given disease. They represent mechanisms or pathways of psychobiological influence. The pathways are assumed to be bidirectional, such that having a disease elicits psychosocial and emotional stress, and psychosocial and emotional

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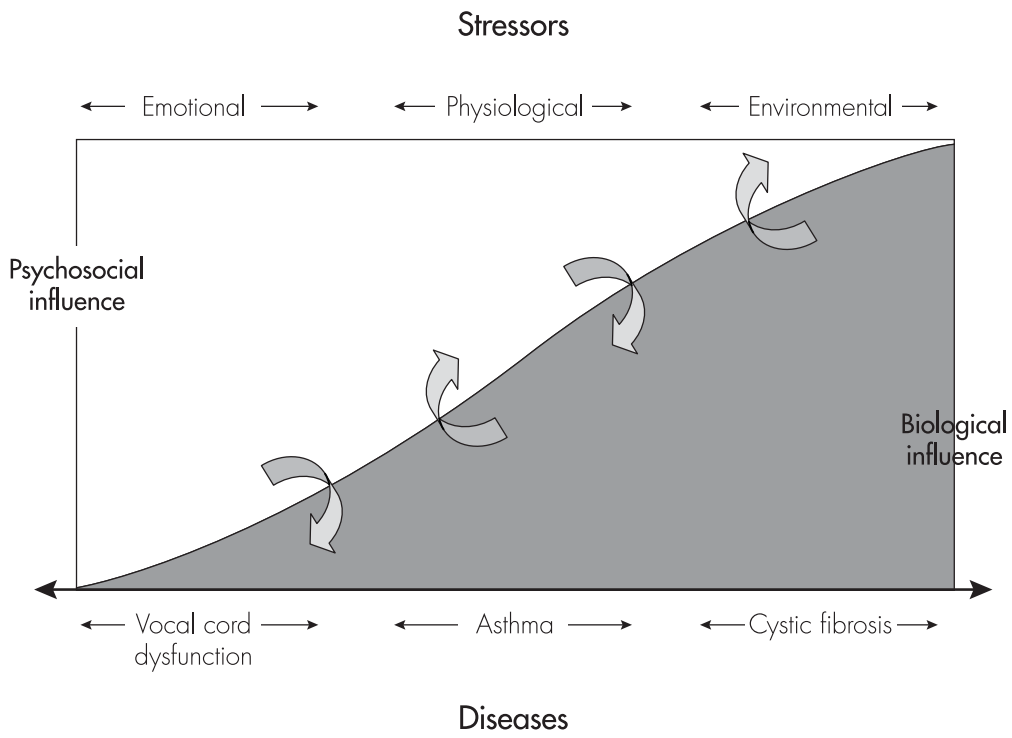

FIGURE 20–1. Psychosomatic continuum of pediatric respiratory disease.

stress evinces the disease process. The advantage of conceptualizing disease in this manner is that the continuum represents a more sophisticated approach to investigating factors influencing illness, and it supports an integrated mind-body approach to the treatment of both the physically and emotionally manifested aspects of disease.

Strong emotions and stress are known to produce physiological changes in the body. Also, these changes are known to be orchestrated by tightly interlinked mutually regulatory afferent and efferent pathways of the autonomic nervous system (vagal/parasympathetic and sympathetic nervous systems), hypothalamic-pituitary-adrenal axis, and sympathoadrenal-medullary system (Sternberg 2000). The specifics of the linkages have not been elucidated; however, one of the most useful organizing models for integrated study of these systems is McEwen's (1998) model of allostasis and allostatic load. When presented with an internal or external (physical, stressful, or emotional) environmental challenge requiring active response, the autonomic nervous system, hypothalamic-pituitary-adrenal axis, and sympathoadrenal-medullary system are activated in a coordinated fashion to ready the organism (i.e., *allostasis*) for adaptive response. Chronic unrelieved or repeated acute challenge or stress may produce cascades of physiological changes, including neurohumoral or end-organ imbalances and dysregulation (i.e., *allostatic load*). These changes may render the organism susceptible to disease or physical disorder. Current scientific advances substantiate these systems as potential pathways by which highly emotional or stressful life events or interpersonal relations may influence physical well-being and illness. Many diseases have been associated with negative alterations in these pathways; however, in this chapter, we focus on the psychosomatic aspects of respiratory disease.

We focus in this chapter on the two major chronic respiratory illnesses of childhood, asthma (including VCD) and cystic fibrosis, emphasizing mind-body mechanisms and pathways of effect and relevant psychosocial interventions. Biobehavioral aspects of disease management, such as adherence to medical treatments, are also addressed because they no doubt have an impact on the disease and often are themselves directly influenced by child or family stress and distress.

ASTHMA

Epidemiology

Asthma is the most common chronic illness facing children in the United States. The prevalence rates for pediatric asthma are at historically high levels

(Moorman et al. 2007). Morbidity and mortality remain inexplicably elevated, despite the considerable advances in the pharmacological management of asthma; this phenomenon is commonly referred to as a "modern health paradox." Prevalence of childhood asthma ranges from 5% to 15%, depending on the country (International Study of Asthma and Allergies in Childhood (ISAAC) Steering Committee 1998), and asthma prevalence in children is increasing (Asher et al. 2006). The current prevalence rate in the United States is 8.5%, with male children having a higher prevalence than females (9.6% vs. 7.4%) and black children having a higher prevalence than white children (12.5% vs. 7.7%) (Moorman et al. 2007).

Morbidity and Mortality

An estimated 6.7 million children are affected by asthma, representing approximately 9% of children in the United States (Bloom and Cohen 2007). Asthma is the most common cause for school absence and hospitalization (Akinbami 2007). In 2005, children with asthma had 12.8 million physician office visits, 1.3 million hospital outpatient visits, and nearly 1.8 million emergency room visits (Cherry et al. 2007). Although a notable increase has occurred in asthma prevalence and morbidity over the past several decades, no explanation has been fully accepted. Some researchers have hypothesized that frequent antibiotic use and decreased exposure to early infections could alter immune balances, which could lead to increased likelihood of asthma onset. This is referred to as the "hygiene hypothesis" (Mattes and Karmaus 1999). Others have proposed that the increase is due to greater exposure to indoor allergens due to changes in lifestyle (Platts-Mills et al. 2000). Another possibility is that increased levels of life stress in the twentieth and twenty-first centuries, due to lifestyle changes, have made significant contributions to asthma morbidity through psychobiological and biobehavioral pathways (e.g., compromised adherence).

Nationally, the asthma mortality rate for individuals under age 19 years increased by nearly 80% between 1980 and 1993, although more recent estimates show a plateau (Akinbami 2007; American Lung Association 2009). Asthma deaths have been linked to certain risk factors, including medication nonadherence and inadequate skills in perceiving symptom severity (Alvarez et al. 2005). Stress and depressive emotions also have been posited as direct psychobiological influences in asthma mortality (B.D. Miller and Strunk 1989; Mitchell et al. 2002; Moss et al. 2003).

Psychosocial and Emotional Complications

Emotional distress is frequently encountered in pediatric patients with asthma. Children with asthma demonstrate more internalizing symptoms relative to normative and control groups (Bender and Zhang 2008; Goodwin and Eaton 2005; Klinnert et al. 2000; Wamboldt et al. 1998). A meta-analysis of behavioral adjustment in children with asthma confirmed that, in general, children with asthma do have more emotional difficulties than their peers and that these difficulties are more pronounced in the internalizing domain (McQuaid et al. 2001). Based on a controlled study of a large sample of children ages 11–17 years with asthma (n=781) and healthy controls (n=598), Katon et al. (2007) reported that 16.3% of youth with asthma, compared with 8.6% of youth without asthma, met *Diagnostic and Statistical Manual of Mental Disorders,* Fourth Edition, Text Revision (American Psychiatric Association 2000), criteria for one or more anxiety and depressive disorders. This finding demonstrates that the increases in emotional disturbance previously noted in children with asthma are severe enough to meet criteria for full clinical syndromes.

Furthermore, the degree of internalizing disorder has been shown to be associated with degree of disease activity (Klinnert et al. 2000; MacLean et al. 1992; McQuaid et al. 2001; Wamboldt et al. 1998; Waxmonsky et al. 2006). Severe disease likely contributes to emotional compromise, but compelling evidence also indicates that chronic stress and distress contribute to disease activity (Sandberg et al. 2000, 2004). Asthma also can impair developmental processes, including development of autonomy, individuation from parents, socialization outside the family, establishment of peer relationships, and development of a positive self-image. Academic achievement can be severely impaired by absences from school. The compromise in these domains likely is affected by the degree of disease severity, with those children who have the most severe and persistent symptoms suffering the most (Fritz and McQuaid 2000).

The impact of pediatric asthma on family function and emotional climate is notable. Asthma is an extremely disturbing disease that can wreak havoc with family patterns of function. It can contribute to economic hardship, demoralize caregivers, cause

family conflict, and disrupt routines. The disruption in family routines not only can cause family dysfunction but also can contribute directly to impaired adherence and poor disease control (Fiese and Wamboldt 2001). The literature has long implicated family function in childhood asthma (Klinnert et al. 1994; Minuchin et al. 1975; Mrazek et al. 1998; Purcell et al. 1969). In a review, Kaugars et al. (2004) reported family and parenting factors in asthma outcomes, positing asthma management as well as psychobiological (i.e., psychosomatic) pathways.

Maternal depressive symptoms are elevated in families in which a child has asthma (Bender and Zhang 2008; Waxmonsky et al. 2006). In a sample of 242 children with asthma, ages 7–17, family observation ratings and self-reports of depressive symptoms indicated that maternal depression was linked to child depressive symptoms by way of negative parenting and to asthma disease activity by way of child depressive symptoms (Lim et al. 2008a). Similar patterns of findings have been identified for paternal depression and marital conflict (Lim et al. 2008b). Thus, family distress and asthma disease activity influence one another in mutual effect. Regardless of where the cycle begins, the reverberating impact of asthma on family disruption/distress, and vice versa, constitutes a downward spiral that requires effective intervention to stem increasing asthma morbidity and mortality.

Health Disparities

Asthma disproportionately affects youth of certain ethnic minorities, in urban communities, and of low-income populations (Federico and Liu 2003). Recent research underscores the complexity of the genetics of asthma and indicates that certain subgroups of ethnic minorities (e.g., African Americans, Puerto Ricans) have greater risk for asthma onset (Hunninghake et al. 2006). Individuals in urban communities and low-income populations may experience higher levels of exposure to indoor and outdoor allergens and poor access to health care services (Rosenstreich et al. 1997). Ethnic minorities have higher observed rates of asthma, more frequent health care utilization, poorer quality of care, and more fatalities than European Americans (Inkelas et al. 2008; Lozano et al. 1995). African American youth with asthma are at increased risk of emergency health care use and death (Akinbami 2007). More poorly controlled symptoms have been identified among Puerto Ricans (Canino et al. 2006). Although some researchers caution that the disproportionate impact of asthma on ethnic minorities may reflect health disparities associated with poverty and urban communities, higher asthma rates and risks have been identified among ethnic minorities after controlling for these factors (Joseph et al. 2000).

Pathophysiology

Asthma is a clinical syndrome characterized by variable airflow obstruction, airway hyperresponsiveness, and cellular inflammation (Busse et al. 2003). The pathophysiology of asthma involves physiological, neural, cellular, and immune pathways and is manifest by many processes including chronic inflammation, airway hyperresponsiveness, bronchoconstriction, swelling of the airways, and mucus plugging. Mechanisms of airway constriction include immune/inflammatory and cholinergic/vagal pathways, which are complexly interrelated (Bowerfind et al. 2003; Undem and Canning 2003). During an asthma exacerbation, many processes may contribute to symptoms, including constriction of the bronchial smooth muscles, swelling of bronchial tissues, and increased mucus secretion. Asthma symptoms vary from person to person, and from one exacerbation to another but characteristically include coughing, wheezing, breathlessness, chest tightness, and mucus production (National Heart, Lung, and Blood Institute and National Asthma Education and Prevention Program 2007). Although the airway obstruction is typically reversible, more permanent "remodeling" of the airways may be a consequence of the disease, impacted in part by poor asthma management and control (Bibi et al. 2006).

Asthma frequently occurs in patients with atopy (i.e., increased sensitivity to allergens). Asthma triggers are varied and often include allergens that elicit symptoms among individuals with specific immunological hypersensitivity (e.g., peanut allergy, animal dander). Other types of asthma triggers include exposure to common environmental irritants (e.g., dust, mold, cigarette smoke), seasonal variants (e.g., pollens, cold or damp weather), exercise, infections (e.g., viral or bacterial upper respiratory and sinus infections), and emotions (e.g., excitement, sadness, fear). Triggers may vary by individual, and sensitivity can change over the course of the illness depending on many factors, including developmental, hormonal, physiological, and immune system influences as well as emotional stress.

Asthma Etiology: An Epigenetic Framework

In a genetics review, Wills-Karp and Ewart (2004) reported evidence of asthma susceptibility genes, which call to the fore the importance of identifying developmentally relevant environmental factors that through gene-environment interaction may promote gene expression and perhaps influence the course of asthma (Mrazek 2003). Onset of asthma in a genetically vulnerable child is likely determined by some complex interaction of genetic vulnerability (Wills-Karp and Ewart 2004); environmental exposure to respiratory infections, allergens, irritants, or environmental smoke (Busse and Lemanske 2001; Environmental Protection Agency 1992); and psychological influences such as maternal distress (Kozyrskyj et al. 2008) and stress (Wright et al. 2005).

Problematic parenting appears to increase risk of asthma onset in children at genetic risk (Klinnert et al. 1994, 2001). Developmentally relevant stressful events and/or the quality of caregiving may alter the emotional and physiological regulation of the infant in the direction of increased allergic response. Klinnert et al. (2007) reported that the development and onset of asthma may be affected by genetic risk, environmental exposure, and psychological factors such as parent-child interactions. This suggestion is consistent with early observations of association between family dysfunction and childhood asthma (Minuchin et al. 1975; Purcell et al. 1969).

Effects of Stress and Depression on Asthma

The effect of emotional distress on asthma has been controversial over the years. Although emotional compromise has an effect on adherence to appropriate medical management, robust evidence also indicates that direct psychobiological pathways and mechanisms link stress and emotions with disease activity (Chen and Miller 2007; B.D. Miller and Wood 2003; G.E. Miller and Chen 2006; Wright et al. 1998). Evidence links negative family emotional climate to child depression, emotional triggering of asthma episodes (Wood et al. 2007), and worse disease activity (Wood et al. 2006).

Mounting evidence indicates that chronic and acute extreme stress contributes to the worsening of pediatric asthma (Chen and Miller 2007; Sandberg et al. 2000, 2004). The most significant stressors are family-related circumstances and relational processes. A series of multimethod (self-report, clinician report, family observation) studies has demonstrated that the chronic stress of negative family emotional climate, marital conflict, and negative parent-child relationship contributes to child anxiety and depression, which in turn are associated with increased asthma disease activity (Lim et al. 2008; Wood et al. 2006, 2008). These findings are consistent with a longitudinal study in which Klinnert et al. (2008) reported that a negative emotional environment was associated with active asthma and adjustment problems at age 4 in a high-risk population of children whose parents have asthma.

Before the psychobiological pathways contributing to asthma disease activity can be traced, the biological mechanisms by which stress and emotions influence asthma airway function need to be established. The two mechanisms of airway compromise in asthma (immune/inflammatory and cholinergic/vagal) point to two possible psychobiological pathways with associated mechanisms: 1) psychoneuroimmunological and 2) psychophysiological (autonomic).

Greg Miller and Edith Chen are developing and examining a model focusing on immunological pathways. The premise is that psychological stress operates by altering the magnitude of the airway inflammatory response that irritants, allergens, and infections bring about in persons with asthma. The asthma-relevant biological stress pathways they have examined include the hypothalamic-pituitary-adrenal axis and the sympathoadrenal-medullary system (Chen and Miller 2007; Chen et al. 2006; G.E. Miller and Chen 2006). Chronic stress is believed to alter the hypothalamic-pituitary-adrenal axis, sympathoadrenal-medullary system, and autonomic nervous system pathways in ways that reduce their regulation of immune system function. The proximal (to the airway) elements in this cascade of effects are specific cytokines that promote airway inflammation and obstruction.

Bruce Miller's autonomic nervous system dysregulation model is similarly a potentiating model. However, this model focuses on the effect of depressive emotional states on airway function, mediated by a preponderance of vagal/parasympathetic over sympathetic activation (i.e., vagal bias) (B.D. Miller and Wood 1997). This relatively high level of vagal activation and reactivity is proposed to potentiate the effect of irritants, allergens, infections, and emotional distress on vagally (i.e., cholinergically) mediated airway constriction.

Studies from both laboratories provide support for both models, which together provide a comprehensive paradigm including both major mechanisms of airway compromise—that is, cholinergically mediated airway constriction (B.D. Miller et al. 2009) and immune-mediated airway inflammation (Wolf et al. 2008a, 2008b). Of note, both laboratories demonstrate the impact of family relational stressors as critical sources of chronic stress. Although compelling, this research is still in early stages, and many questions remain to be answered in the realm of psychobiological pathways and mechanisms in asthma.

Interventions for Problems in Management

Problems in Asthma Knowledge and Adherence

Compliance with medical regimens and asthma management play an important role in the course of illness (Bender 2006; Bender and Zhang 2008; Bender et al. 1998; McQuaid et al. 2003). Various factors, including emotional compromise in the child patient or the parent, may compromise adherence (Bender and Zhang 2008). Current asthma practice guidelines emphasize the importance of daily and regular monitoring of asthma symptoms and detailed action plans in the event of an attack (National Heart, Lung, and Blood Institute and National Asthma Education and Prevention Program 2007). Many of the recommendations include daily or weekly family routines, such as vacuuming the house once per week, monthly cleaning of duct systems, and monitoring airway peak flows. Families that are more capable of the organization of family routines have more effective management strategies (Fiese et al. 2005). Thus, families compromised by parental emotional disorder or marital distress are less likely to provide support and guidance in the realm of adherence and asthma management. Furthermore, family daily management skills and emotional climate are emerging as factors in medical adherence (Fiese and Everhart 2006).

Patient and caregiver deficits in knowledge and information clearly play a limiting role in adherence to recommended asthma management. Poor understanding of medication usage, incorrect beliefs about management and asthma triggers, and lack of planning for asthma exacerbations are common. Several educational programs have failed in the past to make significant gains, probably because they failed to address the psychosocial obstacles to the patient and caregiver acquiring the necessary information and knowledge. Educational approaches that emphasize self-management are now recognized to yield a number of positive effects, including reduction in health care utilization (Bartholomew et al. 2000; DePue et al. 2007) and improved symptom control (Bonner et al. 2002; Clark et al. 2004). Interventions designed to bring about behavior change are more likely to be efficacious than merely providing information (Gibson et al. 2002).

Stress Reduction Programs and Psychosocial Intervention

Chronic stress, acute trauma, and emotional compromise in the child, caregivers, or family affect asthma outcomes through impairment of adherence and direct psychobiological pathways. Therefore, interventions that target stress, emotional compromise, and family relational distress are likely to improve adherence- and stress-compromised asthma disease. Despite the lack of truly evidence-based psychosocial treatments for asthma, several avenues of intervention are promising.

Psychophysiological treatment interventions, including relaxation training and biofeedback, have promise, but little research to date has evaluated their use with children (McQuaid and Nassau 1999). These treatments are based on targeting psychobiological mechanisms, such as autonomic dysregulation, that contribute to airway constriction through vagal/cholinergic pathways (Lehrer et al. 2004). More research is needed on interventions targeting specific asthma-relevant psychobiological stress responses.

Researchers are beginning to empirically test family-based interventions. Given that the family provides the main caregiving, problem-solving, stress-buffering (or stress-exacerbating), and developmental relational contexts for the child, the most effective treatments will likely have at least some family-based component. Family interventions based on improving problem solving (Walders et al. 2006), family empowerment for optimal illness management (Canino et al. 2008; Warman et al. 2006), and developmentally sensitive management interventions (Tal et al. 1990) have all shown promise. Incorporating family therapy into asthma group interventions has also had positive results in a randomized waitlist-controlled trial (Ng et al. 2008).

Increasing work is being done to tailor interventions to specific cultures, both socioeconomic and

ethnic. This specificity is of particular significance in high-risk populations (Weiss 2007). For example, a Web-based asthma management program targeting urban black high school students demonstrated decreased symptoms and missed school days (Joseph et al. 2007). In a randomized pilot trial, a school-based education and self-management intervention for families of urban adolescents demonstrated improved family relations, asthma management, and health status (Bruzzese et al. 2008).

Vocal Cord Dysfunction

VCD is most often misdiagnosed as asthma and therefore ineffectively treated with asthma medications. First described by Christopher et al. (1983), VCD was recognized when patients presenting with asthma-like symptoms did not respond to the standard asthma therapies. The syndrome of VCD manifests with asthma-like signs and symptoms but is distinct from asthma in that the pathophysiology involves paradoxical vocal cord closure during inspiration (the obstruction being outside of the chest), in contrast to the hyperreactive airway response found in the asthmatic spectrum of disease. In addition to the classic wheezing heard in patients with asthma (difficult to differentiate by auscultation), patients with VCD have other symptoms, including dyspnea, chest or throat tightness, and cough, all of which simulate asthma symptoms. Most authors recognize VCD as having a strong psychological component, which would place the syndrome on the extreme end of the spectrum of psychosomatic diseases (see Figure 20–1).

Although first described in four adults and one adolescent, VCD is now well recognized in children as well as adults (for a review, see Noyes and Kemp 2007). VCD is more likely to be seen in preadolescents and adolescents than in younger children and occurs far more commonly in female than male patients. In a report of 95 patients admitted to the National Jewish Medical Center over an 8-year period, Newman et al. (1995) characterized typical patients with VCD as overweight, unmarried young women who tended to be employed in health care–related jobs. Roughly half of the patients in their series were diagnosed with both VCD and asthma. Virtually all the reports and studies of VCD patients emphasize the high prevalence of comorbid psychiatric problems, with frequent references to somatoform illness, conversion disorder, factitious asthma, hysterical stridor, and psychogenic wheeze (Noyes and Kemp 2007). Other authors emphasize that adolescent patients with VCD are high academic achievers, participating in competitive organized sports and other high-profile extracurricular activities (Noyes and Kemp 2007). Depression has been frequently noted as a co-occurring psychiatric condition with VCD (Noyes and Kemp 2007).

Treatment recommendations for VCD are varied. Speech therapy has been helpful for some patients, often in combination with some form of psychological counseling or psychotherapy. Hypnosis and biofeedback have been used with varying success rates. Some authors have reported benefits from sedative anxiolytic medications, and inhaled helium has been used to abort symptoms in acute attacks of laryngeal obstruction. In a report by Doshi and Weinberger (2006), ipratropium bromide was prescribed and used successfully to prevent symptoms of exercise-induced VCD. Although many types of treatment have been recommended and attempted in pediatric patients with VCD, none has been found to be uniformly and reliably effective. However, the consensus of nearly all experts is that some form of psychotherapeutic modality, along with speech therapy and/or pharmacotherapy, is most likely to be beneficial. The natural course of this syndrome and the prognosis are not known.

Cystic Fibrosis

Cystic fibrosis is a chronic multisystem disorder that results in lifelong morbidity and premature mortality. The disease is manifested by dysfunction of exocrine glands and is associated with excessively viscous secretions in nearly all mucus-secreting organs of the body. The lungs and pancreas are the main organs affected and the primary contributors to morbidity and mortality. Lung disease, the primary cause of morbidity and mortality in cystic fibrosis, is characterized by cycles of infection and inflammation that slowly damage the lungs, culminating in respiratory failure. When the pancreas is affected, it becomes obstructed, which prevents enzymes from breaking down and absorbing food. The individual then has difficulty growing normally and maintaining a healthy weight and experiences painful, unpleasant gastrointestinal symptoms. In addition, as patients with cystic fibrosis live longer, progressive destruction of pancreatic tissue results in cystic fibrosis–related diabetes, which is becoming more common (Cystic Fibrosis Foundation 2008). Treatment regimens vary according to specific clinical manifestations, but core treatment regimens include airway clearance therapies, antibiotics, nebulized

medications, replacement of pancreatic enzymes, and dietary modifications.

Epidemiology

Cystic fibrosis is the most common genetically inherited lethal disease in the white population. It is caused by the autosomal recessive mutation of the gene on chromosome 7 that codes for the cystic fibrosis transmembrane conductance regulator (CFTR), a membrane glycoprotein found in secretory and absorptive epithelial cells. Approximately 1 in 3,500 children in the United States is born with cystic fibrosis (Cystic Fibrosis Foundation 2008), and the disease affects 1 in 2,500 live births worldwide (Lewis 2000). Approximately 30,000 people in the United States and about 70,000 people worldwide have cystic fibrosis (Cystic Fibrosis Foundation 2008). The incidence varies by ethnic group: 1 in 3,200 Caucasians, 1 in 9,500 Hispanics, 1 in 15,000 African Americans, and 1 in 31,000 Asian Americans (Flotte 2009).

Improvements in treatments are advancing the lives of patients with cystic fibrosis. The median age of survival of a person with cystic fibrosis is now 36.9 years, and more than 40% of all people with cystic fibrosis in the United States are now age 18 years or older (Cystic Fibrosis Foundation 2008). Survival is influenced by genetic factors (the specific cystic fibrosis mutation), environmental factors, and treatment patterns (Strausbaugh and Davis 2007). Despite advances, cystic fibrosis continues to be a chronic and debilitating illness that imposes extensive treatment demands on patients and their families.

Psychosocial Adjustment

Growing up with a chronic illness such as cystic fibrosis can be a challenge for children and adolescents and may place them at risk for psychosocial adjustment problems. Research studies present conflicting findings as to whether patients with cystic fibrosis have psychological functioning that differentiates them from healthy peers. Some evidence, however, indicates that patients have an increased likelihood of psychiatric problems, such as depression, anxiety, oppositional disorders, and eating disorders (Pumariega et al. 1986; Quittner et al. 2008; Smith and Wood 2007). More research is needed to clarify whether mental health problems are more prevalent in patients with cystic fibrosis. Currently a national epidemiological study of depression in patients with cystic fibrosis and parent caregivers is under way to gather data on the prevalence of these symptoms (see www.tides-cf.org). Nevertheless, even if mental health problems are not more prevalent, when they are present, these problems can significantly impact health outcomes.

Understanding issues that can arise during various stages of psychological development can enhance therapeutic interventions. For example, with newborn screening and early diagnosis, a child and family need to learn early to cope with the illness; related symptoms; and complex, time-consuming treatment regimens. Discovering a sense of difference was a central phenomenon described in one study of children with cystic fibrosis during middle childhood years (D'Auria et al. 1997). In adolescents, delayed physical development due to cystic fibrosis may lead to poor body image, low self-esteem, and isolation. They may experience their physical symptoms as being intrusive and having negative impacts on peer activities. In young adulthood, long-term relationships are burdened with fears about prognosis and fear of rejection if the patient becomes ill.

When working with the family, a clinician needs to examine how cystic fibrosis affects family functioning and how family functioning influences the child's adjustment and adherence to the treatment regimen. Cystic fibrosis imposes incredible demands on the family's time and emotional and financial resources, over and above the inherent stresses that arise when a child has a chronic nonlethal illness. Commonly cited parental concerns include the difficulty of the treatment regimen, the terminal nature of cystic fibrosis, and the disruption of intrafamilial relationships (Ievers and Drotar 1996).

Siblings of children with cystic fibrosis are likely at an increased risk of having depression, anxiety, and behavioral problems (Breslau et al. 1981; Cowen et al. 1986; Derouin and Jessee 1996; Foster et al. 1998; Phillips et al. 1985). Parents of children with cystic fibrosis have an increased risk of psychological distress, particularly anxiety and depression (Quittner et al. 2008). In a longitudinal study of children with cystic fibrosis that controlled for baseline psychological functioning, maternal anxiety was related to increases in child self-reported psychiatric symptoms (Thompson et al. 1994). Parents can experience strain due to balancing their caregiving roles in tasks generic to all families (e.g., household tasks, recreation) and illness-specific tasks such as mealtime and physiotherapy (Hodgkinson

and Lester 2002; Quittner et al. 1998). A meta-analysis found evidence that parents of children with cystic fibrosis have decreased marital satisfaction, which was related to reduced time together, decreased communication, decreased sexual intimacy, and the strain between caregiving and parenting (Berge and Patterson 2004).

Psychological Factors

Adherence

Although adherence to the treatment regimen is largely responsible for the extended life expectancy of children with cystic fibrosis, nonadherence remains a significant problem for patients. Factors such as age, gender, intellect, complexity of treatment regimen, and patient-provider communication are importantly related to adherence. Additionally, psychiatric comorbidity, poor self-esteem, poor family support, and child and family stress factors all negatively impact treatment adherence. Rates of adherence to treatment for cystic fibrosis vary greatly depending on which components of the regimen are measured and which method is used to assess adherence. In one study, 50% of adolescents with cystic fibrosis indicated that they were doing less than 50% of their prescribed therapies, and 30% indicated that they were doing none (DiGirolamo et al. 1997). In a multimethod assessment of adherence in children with cystic fibrosis, the overall mean rate of adherence for treatment, based on refill history, daily phone diary data, and electronic monitoring, was demonstrated to be below 50% (Modi et al. 2006).

Rates of adherence for chest physiotherapy for children with cystic fibrosis are estimated to be 40%–47% (Passero et al. 1981; Quittner et al. 2000). Even when hospitalized and in a structured setting, 35% of teens showed significant nonadherence to ordered chest physiotherapy regimens (Czajkowski and Koocher 1986). Rates of adherence are lowest for dietary recommendations and have been estimated to be 16%–20% (Anthony et al. 1999; Passero et al. 1981; Stark et al. 1995). Recombinant human dornase alfa is a mucolytic agent administered through a nebulizer, which takes about 15 minutes. In children and adolescents, one study found that the overall mean adherence rate to dornase alfa was 66% (Zindani et al. 2006). Another study found general adherence rates to range from 57% to 90%, with adherence to pancreatic enzymes as low as 27%–43% (Modi et al. 2006).

Quality of Life

Clinical and demographic factors are known to be associated with health-related quality of life (HRQOL) in patients with cystic fibrosis. Females with cystic fibrosis have reported poorer quality of life than age-matched males on several HRQOL domains (Gee et al. 2003; Modi and Quittner 2003). Despite conflicting evidence as to whether a relation exists between clinical health measures and quality of life, those patients with better lung function tend to report better HRQOL. One study found inverse correlations between HRQOL and forced expiratory volume at 1 second, as well as between HRQOL and body mass index (Gee et al. 2003). Depressive symptoms in adults with cystic fibrosis were associated with poor HRQOL, even when the researchers controlled for disease severity (Riekert et al. 2007). These results suggest that recognizing and treating depression may improve health functioning and HRQOL for persons with cystic fibrosis.

Lung Transplantation

Lung transplantation, a treatment option for progressive respiratory failure, is the only therapeutic option that is likely to improve survival and HRQOL for patients with advanced lung disease and declining lung function (Spahr et al. 2007). However, the supply of donor lungs for transplant is limited, and lung transplantation is associated with significant morbidity. Data from the Cystic Fibrosis Foundation's patient registry showed that more people with cystic fibrosis received a lung transplant in 2006 than in previous years (Cystic Fibrosis Foundation 2008).

Psychological evaluations are a key part of the extensive workup in preparation for lung transplantation. Among the absolute contraindications for lung transplant are psychiatric illness that precludes adherence to required medical regimen, inability to adhere to complex medical treatment plans, lack of an adequate social support system, and substance addiction within the previous 6 months (Orens et al. 2006). In considering pediatric lung transplantation, treatment teams need to take into account psychosocial issues, not only for the child, but also for parents (Sweet 2003). One study found that 20% of children on the transplant waiting list had a psychiatric disorder, and 60% of the parents scored within the psychiatric disorder range; 20% of these families scored within the range of chaotic functioning (Serrano-Ikkos and Lask 2003).

After transplantation, patients have to cope with the rigors of posttransplant immunosuppression regimens, frequent surveillance, worry about graft rejection, and adjustment to a new lifestyle. Despite these complex demands, most patents with cystic fibrosis who undergo lung transplantation report significant improvements in HRQOL (Durst et al. 2001; Vermeulen et al. 2004). Psychiatric or psychological interventions may enhance the suitability of a potential recipient and may be important to good transplant outcomes.

Transition to Adult Care

Because more children with cystic fibrosis are growing into young and middle adulthood, adolescents need to receive help with the transition from relative dependence to independence in managing their own health care. In a survey of U.S. cystic fibrosis programs, although transfer of care occurs at a median age of 19 years, the initial discussion of transition does not occur until a median age of 17 years, thus limiting time to foster self-care skills (McLaughlin et al. 2008). Essential components of the transition process include introducing the transition concept to patients earlier in the teenage years; having contact with an adult treatment team prior to transfer; avoiding transfer at times of stress, such as during an illness exacerbation; providing education about adult cystic fibrosis issues (e.g., sexuality); and working with parents through the transition process (Boyle et al. 2001; Bryon and Madge 2001; McLaughlin et al. 2008).

Evidence-Based Treatments

Limited studies have been reported on psychiatric interventions in children and adolescents with cystic fibrosis. Glasscoe and Quittner (2008) compiled a meta-analysis of all available psychological treatments for children with cystic fibrosis. Their review was based on findings from eight studies. The interventions fell into four conceptually similar categories: 1) gene pretest education counseling; 2) biofeedback, massage, and music therapy to assist physiotherapy; 3) behavioral interventions to improve dietary intake in children; and 4) education regarding self-administration of treatment to promote independence and improve quality of life. These interventions were found to be largely educational. The investigators concluded that not enough evidence was available to show that the interventions improved clinical outcomes (Glasscoe and Quittner 2008). No authors have reported the effectiveness of psychotropic medications in patients who have cystic fibrosis with emotional and behavioral problems. In one case series addressing the treatment of depression in three children and adolescents with cystic fibrosis, results suggested that treatment with antidepressant medication had a positive influence on psychological outcomes (Elgudin et al. 2004).

Concluding Comments

The major task of childhood is to achieve healthy growth and development. This process must occur not only in the biological realm but also in the psychological and social realms. Research demonstrates that these realms interact with and influence one another, so that if one is compromised, it challenges the child's functioning and development in the others. To optimize treatment of children with chronic respiratory illnesses, good medical care must attend to the full spectrum of biopsychosocial functioning (see Figure 20–2).

No proven evidence-based approaches exist for the psychosocial and psychiatric management of children (and their families) with chronic psychosomatic respiratory diseases. Nevertheless, effective collaboration among medical psychosocial practitioners, who together provide coordinated care to the patient in his or her psychosocial context, will provide the optimal setting for comprehensive and effective care.

We offer the following goals as suggestions: 1) minimize the impact of the disease on the physical and emotional development and functioning of the child; 2) achieve optimum balance between disease management and HRQOL for the child and family; 3) facilitate the integrated functioning of the chronically ill child with his or her psychosocial surround; 4) appreciate and facilitate the developmentally synchronized shift toward self-care of the illness and its social and emotional aspects; and 5) be aware of warning signs that the balance of the child's well-being may be challenged (e.g., change in functioning in any of the three realms—biological, psychological, and social; onset of stressful life events or developmental transitions). Table 20–1 lists general guidelines for psychosomatic care.

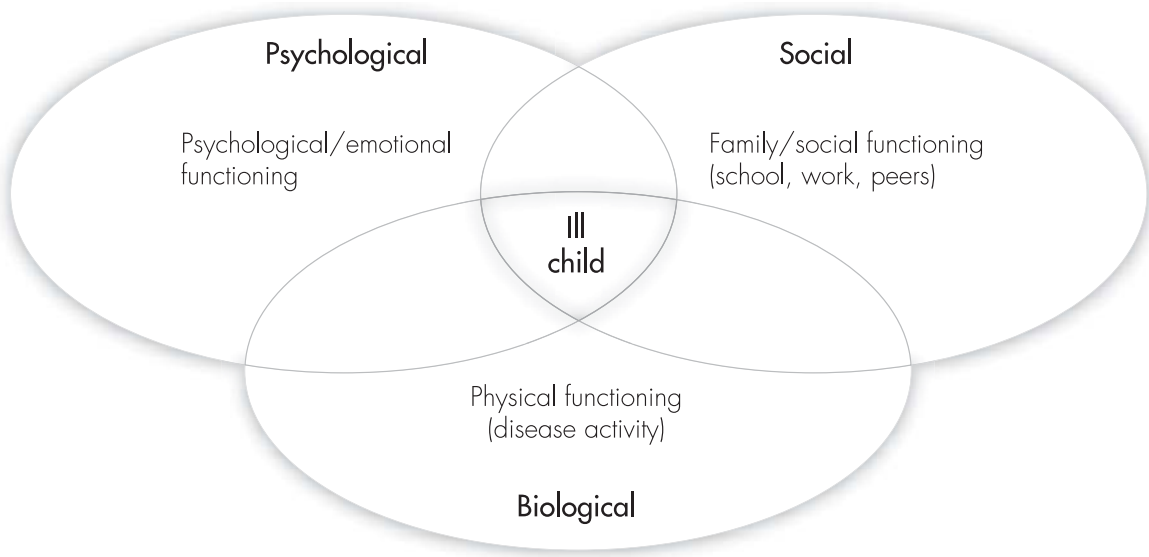

FIGURE 20–2. Balance of well-being in children with chronic respiratory illness.

TABLE 20–1. Establishing adaptive interactions among family, school, peer group, and health care system: a general guide for psychosomatic care

Step 1. Open channels of communication.

Family: Encourage both parents to come to appointments; if parents are divorced, obtain permission from custodial parent to keep noncustodial parent involved if possible.

School: Identify one school person to coordinate communication with family and health care provider.

Peers: Have parents communicate with parents of patient's friends, and have patient or parents (depending on age of patient) communicate with peers regarding the illness.

Step 2. Provide education regarding the illness.

Family: Provide information about the illness to all parental figures and to siblings; assist and encourage family to share information with extended family members.

School: Have meeting at school with parents, patient, and relevant school personnel (nurse, homeroom teacher, gym teacher, bus driver). Outline characteristics of the illness, specific for that child. Devise written plan for medical treatment and for what to do in the event of an illness episode.

Peers: Have family educate peers and their parents as to nature of patient's illness.

Step 3. Emphasize balance between medical management of the disease and quality of life and developmental demands.

Family: Help family not to neglect psychosocial and developmental needs in favor of child's physical well-being and growth.

School: Assist school in achieving balanced expectations of child with regard to disease management and participation in academics and extracurricular activities.

Peers: Encourage patient to be involved with informal neighborhood peer activities. Emphasize to parents the critical nature of peer relationships for psychosocial development.

Step 4. Initiate age-appropriate self-care and facilitate increases in self-care in accordance with child's development.

Family: Guide family in home care routines that maximize patient's active participation in management of the illness and its psychosocial concomitants.

School: Prepare child for self-care activities at school and obtain school's coordination.

Peers: Encourage family to inform peers and their parents as to the care the patient will need to provide for himself or herself and any assistance that might be needed from adults.

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21

Heart Disease

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Pediatric heart disease is not one disorder or defect but rather a constellation of heart disorders, which can range from those that spontaneously resolve to those that are life threatening (Chang et al. 1998; Keane et al. 2006). Congenital heart defects are reported to be present in 5–8 of every 1,000 live births (Clark 1995). Heart disease can also be acquired later in childhood or adolescence. Innovative medical and surgical techniques have allowed countless numbers of youngsters not only to survive but to resume healthy and active lives (DeMaso 2004); however, many pediatric heart abnormalities require chronic medications and/or surgical repair and in severe instances even heart transplantation. Despite greatly improved medical outcomes, pediatric heart disease can place substantial cognitive and emotional burdens on young patients and their families. This chapter serves as a guide for understanding and managing children and adolescents facing these disorders.

Medical Overview

Congenital Heart Disease

Congenital heart disease (CHD) refers to a diverse grouping of heart defects, including acyanotic (left-to-right shunt) lesions, cyanotic (right-to-left shunt) lesions, and obstructive lesions (see Table 21–1). The clinical effects of these disorders can differ significantly between and within the diagnostic groupings. Whereas some children affected by CHD display only subtle symptomatology with few consequences, others can face reduced physical functioning, extended hospital stays, repeated surgical interventions, and even death.

Acyanotic (Left-to-Right Shunt) Lesions

During prenatal development, shunts between the left and right atria and ventricles allow for efficient gas exchange between the placenta and fetus. These shunts, the foramen ovale and ductus arteriosus, normally close at birth, allowing the lungs to become the primary center for gas exchange. Atrial septal defects occur when the shunt between the atria does not close and blood is allowed to flow from the left to right atrium, whereas ventricular septal defects occur when the interventricular septum does not close and blood is allowed to flow from the left to right ventricle. A patent ductus arteriosus occurs when the embryological connection between the aorta and the pulmonary trunk persists after birth. Treatment is varied due to the wide

TABLE 21–1. Selected congenital heart disease types

Acyanotic (left-to-right shunt) heart lesions
Atrial septal defects
Patent ductus arteriosus
Ventricular septal defects
Cyanotic (right-to-left shunt) heart lesions
Double outlet right ventricle
Ebstein's anomaly
Pulmonary atresia
Persistent truncus arteriosus
Single-ventricle physiology
Tetralogy of Fallot
Total anomalous pulmonary venous return
Transposition of the great arteries
Tricuspid atresia
Obstructive heart defects
Aortic valve stenosis
Coarctation of the aorta
Mitral valve stenosis
Pulmonary valve stenosis

range of severity present, with some acyanotic lesions closing spontaneously without intervention and others requiring medical and/or surgical intervention. With correction, children with these lesions can generally function normally and without significant physical limitations. Together, these defects represent 37%–46% of all congenital heart defects (Bernstein 2000).

Cyanotic (Right-to-Left Shunt) Lesions

Although cyanotic lesions, also known as right-to-left shunt lesions, are less common than their left-to-right counterparts, they are more complex, severe, and disabling for patients. The shunting of blood from the right to the left side of the heart reduces blood to the lungs, preventing proper oxygenation. This lack of oxygenation can lead to cyanosis, a blue coloration of the lips and fingernails. Cyanotic lesions include tetralogy of Fallot, transposition of the great arteries, pulmonary atresia, persistent truncus arteriosus, total anomalous pulmonary venous return, tricuspid atresia, Ebstein's anomaly, single ventricle physiology, and double outlet right ventricle. These defects require surgical correction at or near birth. Although surgical advances have greatly increased survivability and quality of life for affected youngsters, some of these patients do not survive beyond infancy and others suffer from limited physical abilities and shortened life span (DeMaso 2004). Together, these lesions account for 15%–28% of childhood heart defects, with tetralogy of Fallot being the most common at 5%–7% (Bernstein 2000).

Obstructive Heart Defects

Depending on the specific lesion, left (to the body) or right (to the lungs) ventricular blood flow is blocked or inhibited in obstructive heart defects. Obstructive lesions, which include coarctation of the aorta, aortic valve stenosis, mitral valve stenosis, and pulmonary valve stenosis, may also occur in conjunction with other congenital heart defects. Obstructive lesions usually require cardiac catheterization and/or surgical intervention. With correction, children and adolescents generally function with no significant physical limitations, other than the common recommendation against participation in competitive athletics. Coarctation of the aorta and aortic valve stenosis account for 9%–14% of childhood heart defects, and pulmonary valve stenosis accounts for 5%–7% (Bernstein 2000).

Cardiomyopathies and Myocarditis

Cardiomyopathies are diseases associated with the mechanical and/or electrical dysfunction of the heart muscle (Maron et al. 2006). In children and adolescents, they are often idiopathic, although they may also be complications of CHD, infections, drug toxicity, or genetic disorders (Kipps et al. 2007). The enlarged heart of a dilated cardiomyopathy is the most common cause of heart failure in pediatric patients without other known cardiac defects. Hypertrophic cardiomyopathy, a heritable condition marked by thickening of the heart wall, is the leading cause of sudden death in children (Daubeney et al. 2006; DeMaso 2004; Maron et al. 2006).

Myocarditis is an acquired cardiomyopathy that is due to an inflammation of the heart with either an infectious (e.g., viral, bacterial, fungal), parasitic (e.g., Chagas' disease, toxoplasmosis), or autoimmune (e.g., systemic lupus erythematosus, rheumatoid arthritis, acute rheumatic fever, Kawasaki syndrome) etiology (DeMaso 2004; Maron et al. 2006).

Although spontaneous improvement and full recovery are possible, progression to persistent heart

failure may occur in severe cases (DeMaso 2004). Cardiomyopathies can result in progressive heart failure, multiorgan dysfunction, arrhythmias, failure to thrive, and/or cardiovascular death (Kipps et al. 2007; Maron et al. 2006). Management of these disorders involves the administration of medications that enhance heart functioning (DeMaso 2004). Approximately 40% of children with symptomatic cardiomyopathies receive a heart transplant or die within the first 2 years of diagnosis (Lipshultz et al. 2003).

Arrhythmias

Arrhythmias are irregular heart rhythms related to disturbances in the heart's electrical conduction system that can occur in individuals with structurally normal hearts (DeMaso 2004). Bradyarrhythmias (slow heart rate) and tachyarrhythmias (fast heart rates) are the primary rhythms of concern (DeMaso 2004; O'Connor et al. 2008). Although arrhythmias are more likely to occur with serious pediatric heart disease, only in rare cases does an irregular heartbeat indicate serious heart disease (DeMaso 2004). Treatments for cardiac arrhythmias include pharmacological agents, pacemaker and cardioverter-defibrillator implantation, radiofrequency catheter ablation of ectopic heart muscle foci and pathways during cardiac catheterization, and heart transplantation in cases of life-threatening disease (DeMaso 2004; Epstein et al. 2008).

Cognitive Functioning

Neuropsychiatric impairment in CHD has been well documented since the first assessments over 50 years ago (Bret and Kohler 1956). Assessments using a variety of standardized cognitive tests (e.g., Bayley Scales of Infant Development, Cattell Infant Intelligence Scale, McCarthy Scales of Children's Abilities, Stanford-Binet Intelligence Scale, Wechsler Intelligence Scale for Children—Revised) have shown lower mean IQ scores for youngsters with cyanotic heart lesions compared with physically healthy children and those with acyanotic heart lesions (DeMaso et al. 1990; Gonzalez-Pardo et al. 1981; Kramer et al. 1989; Morris et al. 1993; Silbert et al. 1969). Cyanotic heart lesions have been associated with developmental and neurological abnormalities in as many as 25% of child survivors of cardiac surgery (Ferry 1987).

The current trend of early surgical correction of heart lesions in infancy is strongly supported by studies showing that IQ scores were inversely associated with age at surgical intervention (Newburger et al. 1984; O'Dougherty et al. 1983). Despite improved surgical techniques and repairs in children under age 3 months, children with transposition of the great arteries continue to demonstrate mean IQs that are below population norms (Bellinger et al. 1999). Of note, lower mean IQ scores found in all of the above studies were consistently within the normal range of intelligence.

Neuropsychiatric deficits in motor, speech, and language functioning have been identified as particularly problematic in children with cyanotic heart disease. Perceptual motor and gross motor abilities are significantly lower in children with cyanotic lesions than in children with acyanotic abnormalities (Newburger et al. 1984; Silbert et al. 1969). Children with transposition of the great arteries have performed below expectation on visual-motor integration, motor function, oromotor control, and expressive language measures (Bellinger et al. 1997, 1999). Similar neuropsychiatric deficits have been found even with the innovative development of the Fontan repair of complex heart defects (Uzark et al. 1998; Wernovsky et al. 2000). Overall, children with heart disease, particularly those with cyanotic heart lesions, are at significant risk for adverse motor and language deficits that may lead to adverse academic performance and the need for assessment and intervention in the school setting (Bellinger et al. 1995, 1999; Miatton et al. 2007; Newburger et al. 1984; Wray and Radley-Smith 2006).

Psychosocial Adjustment

Emotional Functioning

The literature describing emotional functioning in children and adolescents with heart disease is often contradictory. Several reviews of the relevant literature have been unable to achieve a consensus on the psychiatric outcomes in youngsters with CHD (Griffin et al. 2003; Samango-Sprouse and Suddaby 1997; Shillingford and Wernovsky 2004). Historically, the earliest studies found generally poorer psychiatric functioning in children and adolescents with CHD (Aurer et al. 1979; Green 1962; Myers-Vando et al. 1979). As studies progressed and began to account for confounding variables, such as coexistence of neurological or genetic disorders and age at assessment, many found that youngsters with CHD demonstrated overall healthy adjustment (DeMaso et al. 1990, 1991).

Limited research is available on the long-term impact of childhood heart disease into adulthood, although the available studies do report emotional vulnerabilities (Hulser et al. 2007; Miatton et al. 2007). One review has suggested that significant psychiatric difficulties surface in adolescence and generally only in patients with the most severe heart lesions (Karsdorp et al. 2007). In another review comparing the outcomes of the more advanced contemporary surgical interventions (after 1980) with outcomes determined prior to 1980, Spijkerboer et al. (2008) identified similar levels of behavioral and emotional problems.

The type or severity of pediatric heart disease does not readily predict a patient's emotional functioning (DeMaso 2004). For example, poorer psychological functioning was found to be accounted for primarily by IQ and central nervous system impairment as opposed to the heart lesion itself (DeMaso et al. 1990). Medical severity is less critical to successful adaptation than the quality of the mother-child relationship (DeMaso et al. 1991). In contrast, adolescents with cyanotic heart defects have been reported to have higher rates of depression and anxiety than those with acyanotic lesions (Spurkland et al. 1993).

Transplantation

Transplantation is now a standard treatment option in end-stage pediatric heart disease. More details on transplantation are provided in Chapter 22, "Organ Transplantation." Children and adolescents who have undergone transplantation continue to face challenges from having a chronic physical illness requiring a lifelong course of immunosuppressive therapy to prevent organ rejection (DeMaso et al. 2004).

Although many youngsters show resiliency and adapt well to heart transplantation, a significant number of others experience difficulties following transplantation, including neurodevelopmental delays, poor adherence to treatments, behavior problems, difficulty in school, and depression (Wray and Radley-Smith 2005). In a longitudinal study of 23 pediatric patients who underwent heart transplantation, 27% demonstrated emotional adjustment difficulties at some point during their medical care (DeMaso et al. 2004). Medical severity and posttransplant psychological functioning were not correlated, but family functioning during the first 2 years after transplantation and posttransplant emotional adjustment were significantly correlated (DeMaso et al. 2004). Given the enhanced risk of psychological difficulties following pediatric heart transplantation, recommendations have been made to add psychological care to a child's ongoing medical and cardiology care to help prevent the development of serious emotional and behavioral difficulties, such as nonadherence, that could potentially interfere with the child's posttransplant survival (DeMaso et al. 2004).

Implantable Cardioverter Defibrillator

Implantable cardioverter defibrillator (ICD) therapy is increasingly a top-choice intervention for life-threatening arrhythmias in pediatric patients. Children undergoing ICD treatment face the challenge of adjusting to a device that emits both appropriate and inappropriate shocks, the latter of which occur at a higher frequency in children than adults (Costa et al. 2007). In addition, these children encounter obstacles familiar to any child who copes with a chronic physical illness, such as school absences, physical limitations, and body scars (DeMaso et al. 2009). The literature is sparse, however, regarding the psychological impact of ICDs on children and adolescents (Blom 2008; DeMaso et al. 2004).

In a study of 16 youngsters who received ICD devices, half of the sample demonstrated symptoms of depression and anxiety (Eicken et al. 2006). Although the ICD devices in this study were successful in preventing sudden cardiac death, a significant occurrence of device complications may have impacted the findings. In contrast, a study of 20 pediatric patients with ICD devices did not find significant depressive and anxiety symptoms, although the patients did experience a significantly lower overall quality of life. Interestingly, the quality of life in this study was more strongly correlated with family functioning and feelings of anxiety and depression than with illness severity (DeMaso et al. 2004).

Radiofrequency Catheter Ablation

Radiofrequency catheter ablation (RCA) of ectopic myocardial foci is another treatment performed on children with cardiac arrhythmias (DeMaso et al. 2000). This procedure involves the removal of ectopic electrical heart pathways during cardiac catheterization (DeMaso 2004). In the only study of children and adolescents, patients who underwent RCA resembled a healthy population without elevated rates of anxiety and depression (DeMaso et al. 2000). Youngsters who underwent curative ablation (i.e., no recurrence of arrhythmias) showed better

emotional functioning than those who did not show any improvement in cardiac status following ablation.

In sum, the emotional functioning of children and adolescents with pediatric heart disease generally is not in the psychopathology range (DeMaso 2004). These youngsters appear to have the capacity for healthy psychological functioning even though they face exceptional challenges. Although many of these children display a level of vulnerability to emotional and behavioral difficulties, they generally have confounding risk factors, such as poor cognitive or family functioning (DeMaso et al. 1990). Psychological intervention and treatment are warranted to prevent emotional and adjustment difficulties that may arise (DeMaso et al. 2004).

Family and Social Functioning

Pediatric heart lesions can require complex and invasive treatment, including hospitalizations, cardiac catheterizations, surgeries, medications, and/or long-term monitoring. These factors, combined with the prognostic uncertainty that may be associated with serious heart lesions, often place significant stress on affected families (Peterson and Harbaugh 1995). Even with the many treatment innovations that have significantly increased the rate of survival, parents naturally continue to have concerns regarding their children.

An investigation of the concerns reported by parents of adolescents and young adults with heart disease identified seven areas of concern: 1) the dilemmas of normality, 2) disclosure dilemmas, 3) the challenge of uncertainty, 4) illness management dilemmas and strategies, 5) social integration versus social isolation, 6) the impact of the illness on the family, and 7) coping (Sparacino et al. 1997). In a larger sample of mothers of young children with CHD, the mothers' concerns were reliably grouped into five categories: 1) medical prognosis, 2) quality of life, 3) psychosocial functioning, 4) effects on the family, and 5) financial issues (Van Horn et al. 2001). These concerns, as well as maternal anxiety and depression, decreased after children were released from the hospital.

High levels of illness-related parental stress have been associated with poor behavioral outcomes in children. Interestingly, the medical severity of cardiac illness has appeared to be less influential on a child's emotional functioning than maternal perceptions of illness severity (DeMaso et al. 1991). In another study, parents of children with CHD reported lower stress levels than normative samples, although high levels of illness-related parental stress were associated with poor behavioral outcomes in the children (Visconti et al. 2002). Maternal anxiety and distress have been associated with increased rates of behavior problems and child-reported symptoms (Thompson et al. 1992, 1994). Maternal depressed mood has also been linked to behavior problems in children with chronic physical illness (Walker et al. 1989).

The effect of pediatric heart disease on mothers appears to vary depending on the level of reported stress and the type of coping used to address these stressors (Davis et al. 1998). A stressful component of parenting a child with a heart defect is the decision-making process associated with the heart surgery, which may cause caregivers and families to experience significant psychological distress, role reorganization, and remodeling of functioning (Lan et al. 2007). Maternal attachment style has been associated with maternal and child psychiatric outcomes. For example, maternal avoidant attachment has been associated with the deterioration of maternal mental health and marital satisfaction, as well as child emotional difficulties and poor self-image at age 7 years (Berant et al. 2008).

For many youngsters, facing heart disease appears not to interfere with social functioning, yet the impact of having a chronic physical illness remains (DeMaso 2004). In a review of the social correlates of chronic physical illnesses, Schuman and La Greca (1999) drew the following conclusions: 1) chronic illness may be a risk factor for adjustment problems with peer relations; 2) physical limitations, altered physical appearances, lifestyle modifications, and cognitive impairments have been linked to poor peer relationships; 3) peers may be a source of support and acceptance; and 4) intervention programs are being developed to address the challenges faced by children with chronic disease.

Unfortunately, little research has been done on the social functioning of children and adolescents with heart disease. School-age children with complex heart disease were rated by their teachers as more withdrawn than those with benign heart murmurs (Casey et al. 1996). This study also found family strain to be a critical factor in the school adjustment of these children, more so than the physical limitations. Another study reported that the added burdens of low IQ, poor self-esteem, and high depression increased the risk of school adjustment problems (Youssef 1988).

Mental Health Treatment Considerations

Despite the burdens of heart disease and its associated treatments, children and adolescents have the capacity for healthy functioning and resiliency. Nevertheless, many youngsters with these illnesses may present with developmental, social, and/or emotional vulnerabilities. Due to a lack of literature on psychotherapy and psychopharmacological interventions related to heart disease, child mental health clinicians responding to these vulnerabilities must rely on the general mental health treatment considerations for youngsters with physical illness. Comprehensive reviews of individual psychotherapy, family therapy, and psychopharmacological treatments for youngsters who are physically ill can be found in Chapters 28, 29, and 30, respectively.

The course of medical treatment for heart disease can be difficult, because many youngsters require continued invasive procedures, such as catheterizations or surgical repairs. Preparatory interventions prior to these invasive procedures include cognitive strategies providing families with educational information and strategies for responding to their child's illness. Through these interventions, children are allowed to experience the adverse feelings associated with their illnesses and/or their treatment, such as fear and anger, and clinicians can model appropriate ways for handling these emotions. In general, these preventive interventions are viewed as helpful for families (Campbell et al. 1995; Kain et al. 1996; Rasnake and Linscheid 1989; Schmidt 1990; Van Horn et al. 2001; Vernon and Thompson 1993). A comprehensive review of procedural preparation can be found in Chapter 31.

Academic Considerations

As discussed in previous sections of this chapter, children and adolescents with CHD may present with significant vulnerabilities in the cognitive realm that have direct relevance to the school setting. Table 21–2 outlines recommendations that can prove useful to approaching the academic needs of youngsters facing pediatric heart disease.

Psychopharmacology Considerations

Preexisting heart disease may influence the pharmacokinetics of medications (Shaw and DeMaso 2006). Patients with congestive heart failure may experience a decreased perfusion of drug absorption sites in both the gastrointestinal tract and skeletal muscle, thus affecting drugs given orally and by intramuscular injection (Beliles 2000b; Shaw and DeMaso 2006). Additionally, sympathetic activity and local edema may affect drug distribution and increase drug absorption, respectively. Some patients may be administered anticoagulant medications (e.g., warfarin) that are highly protein bound. In these cases, the dosage of highly protein-bound psychotropic agents may need to be reduced to lower the risk of elevated levels of anticoagulants (Shaw and DeMaso 2006).

Considerable concern has been shown regarding the use of stimulant medications to treat attention-deficit/hyperactivity disorder in the context of preexisting structural heart defects (Wilens et al. 1999). Although the risk of sudden death is thought to be greater while children with structural defects are taking a stimulant regimen, sudden death in children and adolescents is very rare, and the risk of sudden death may not be higher in children on stimulants than in the general population (Wilens et al. 1999).

Psychotropic agents, including tricyclic antidepressants and certain atypical antipsychotic medications, have been known to increase the QTc interval and, as a result, increase the risk of torsades de pointes, a life-threatening ventricular arrhythmia (Gutgesell et al. 1999; Labellarte et al. 2003; Shaw and DeMaso 2006). Intravenous haloperidol has been associated with the development of a prolonged QTc interval and torsades de pointes and may depress cardiovascular function (Beliles 2000a). A comprehensive review of psychopharmacology can be found in Chapter 30.

Concluding Comments

Pediatric heart disease is a complex and diverse constellation of congenital and acquired illnesses. These illnesses can vary in severity from those with few symptoms requiring little medical care to devastating diseases that require complex surgical interventions. Beyond the physical illness, heart disease has the potential for significant developmental comorbidities. This is especially true in patients with congenital cyanotic lesions, in whom "normal" but often below average IQs have been observed. Children and families affected by heart disease must often endure extended hospital stays, social stigma, and increased emotional burden. Time spent in the intensive care unit can be especially stressful as fam-

TABLE 21–2. Guidelines for approaching academic needs in patients with pediatric heart disease

Treat as "children with cardiac illness," not "cardiac children"

- Others should view the child as having a pediatric heart problem rather than responding as if the illness defines the child.
- Child should be treated as "normally" as possible within the constraints of his or her illness.

Clarify the specific type of heart disease

- Clinician can guide the school in providing reasonable accommodations to child's physical limitations.

Remember that pediatric heart disease is different from adult heart disease

- Chest pain is an uncommon symptom of pediatric cardiac disease.
- Chest discomfort or awareness (e.g., fluttering, skipping beat, turning sensation) related to arrhythmias is a much more likely pediatric heart disease complaint and is not the symptom of a heart attack.

Be alert for potential school fear

- Occasionally, parents report that a school is afraid of having responsibility for a student with cardiac illness. Helping school staff to understand the type of heart disease is one approach to reducing this worry.

Be alert to learning problems

- Children with cyanotic heart lesions are at significant risk of motor and language problems.
- Psychological testing should be considered.

Consider classroom education

- Child's classmates can benefit from educational information regarding heart illness, particularly if child needs to be hospitalized during school year.
- Parental permission and review of "what will be said" to class is critical.
- Classroom education is generally most useful for younger children.

Consider support for coping

- Preparatory interventions include cognitive strategies (e.g., hospital preadmission programs) designed to provide families with educational information regarding their children's illnesses combined with modeling of and permission for adverse affective responses (e.g., fear, anger).
- Children often need graduated transitioning back into school after surgeries or hospitalizations.
- Tutoring or assistance for children who have fallen behind on schoolwork can be immensely helpful.
- Individual counseling or peer groups can be helpful for children and adolescents struggling with longer-term issues related to heart problems.

Source. DeMaso 2004.

ilies face critical treatment decisions. Despite these mounting risk factors, however, much of the contemporary research suggests an impressive level of psychiatric resiliency in this population. Although some children and adolescents display psychiatric difficulties, factors secondary to their medical condition are likely responsible. Neuropsychological deficits, maternal stress, and poor family functioning have been shown to predict psychiatric outcomes more accurately than the severity of the illness. Thus, the clinician should approach any case using a biopsychosocial model that takes all of these factors into account.

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22

Organ Transplantation

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Transplantation has increasingly become an accepted treatment modality for children with end-stage organ disease. According to the American Society of Transplant Physicians, indications for renal transplantation in childhood include symptoms of uremia and metabolic abnormalities that are unresponsive to standard therapy, failure to thrive due to dietary limitations, delayed psychomotor development due to renal impairments, and significant bone disease resulting from renal osteodystrophy (Davis et al. 1998). The most common disease indications for pediatric kidney transplantation include glomerulonephritis, chronic pyelonephritis, and hereditary conditions, such as polycystic kidneys (Rodrigue and Sobel 2003).

Pediatric heart transplantation is a treatment option for patients with end-stage heart failure who do not respond to standard drug therapy, the use of mechanical assist devices, or cardiac surgical procedures. The two leading causes of pediatric heart transplantation are complex congenital heart disease and end-stage cardiomyopathy (Rodrigue and Sobel 2003). Congenital heart diseases, such as hypoplastic left heart syndrome, account for approximately 75% of cardiac transplants in the infant population (Tjang et al. 2008). However, the most common cause of cardiac transplantation across pediatric patients is dilated cardiomyopathy (Towbin et al. 2006). According to records and multicenter reviews of the United Network for Organ Sharing (UNOS), graft vasculopathy was the primary indication for retransplantation among children (Canter et al. 2007).

Irreversible liver failure is an indication for liver transplantation among pediatric patients. Although biliary atresia, an absence or closure of liver bile ducts, is the most common reason for liver transplantation in children (Kerkar and Emre 2007), other common childhood reasons for liver transplantation include hepatocellular dysfunction (acute hepatic failure, autoimmune liver diseases, hepatitis, polycystic liver disease), metabolic disorders (Wilson's disease, inborn errors of metabolism, enzyme deficiencies), and liver neoplasms (hepatoblastoma and hepatocellular carcinoma).

Lung transplantation is a surgical option for pediatric patients with end-stage lung disease or life-threatening pulmonary vascular disease. Congenital heart disease is the most common reason for lung transplantation in infants (Faro et al. 2007). Although cystic fibrosis is the most common indication in children older than age 6 years and in young adults (Aurora et al. 2007), other common diagnoses that may culminate in pediatric lung transplantation include pulmonary vascular disease, interstitial lung disease, and bronchiolitis obliterans (Faro et al. 2007).

UNOS was established in 1984 with the goal of setting standards for transplantation and the accreditation of transplant centers. UNOS directs the U.S. Organ Procurement and Transplantation Network and the Scientific Registry of Transplant Recipients. Given the shortage of available organs, one of the main functions of UNOS is to oversee the allocation and distribution of organs in an unbiased manner. Each organ type has its own specific criteria, including, for example, blood type, tissue match, organ size, illness severity, length of time on waiting list, geographic location, and immune status (Slater 2002).

EPIDEMIOLOGY

Patient Survival

Overall, 1-year patient survival rates are highest for kidney (98.2% living related donor; 95.0% deceased donor), followed by liver (89.9% living related donor; 87.1% deceased donor), heart (87.6%), lung (83.6%), intestine (81.4%), and heart-lung (73.8%). At 5 years, survival rates are still highest for kidney (90.6% living related donor; 81.0% deceased donor), followed by liver (77.3% living related donor; 73.3% deceased donor), heart (73.9%), intestine (56.2%), lung (53.4%), and heart-lung (46.5%) (U.S. Organ Procurement and Transplantation Network and the Scientific Registry of Transplant Recipients 2008). Table 22–1 shows 3-month and 1-, 5-, and 10-year survival rates by age group.

Transplant Waiting List

At the end of 2007, approximately 97,250 individuals were on the transplant waiting list (U.S. Organ Procurement and Transplantation Network and the Scientific Registry of Transplant Recipients 2008), and this number had grown to approximately 104,250 patients awaiting transplantation as of October 2009. Children make up a small percentage of waiting patients, and the percentage of children declined from 3.3% in 1997 to 2.3% in 2006 (U.S.

TABLE 22–1. Patient survival rates for transplants performed 1996–2006

Organ	Child age at transplant	3-month survival	1-year survival	5-year survival	10-year survival
Heart	1–5	90.7	84.9	75.0	64.7
	6–11	99.0	95.9	80.6	61.6
	12–17	95.3	89.7	71.2	51.4
Intestine	1–5	93.9	78.0	54.6	49.3
	6–11	100.0	81.3	54.5	51.0
	12–17	91.7	83.3	79.6	55.1
Kidney					
Deceased donor	1–5	99.4	96.8	94.0	87.6
	6–11	99.1	98.6	95.8	89.3
	12–17	99.6	98.7	93.6	84.8
Living donor	1–5	98.4	98.4	96.0	93.1
	6–11	—	—	96.9	94.9
	12–17	100.0	99.3	96.0	90.0
Liver					
Deceased donor	1–5	93.7	90.5	82.5	78.7
	6–11	93.2	89.8	83.0	81.4
	12–17	94.3	91.4	82.0	66.4
Living donor	1–5	97.6	83.5	79.9	79.5
	6–11	—	—	80.8	83.4
	12–17	—	—	79.1	77.7
Lung	1–5	89.6	89.6	55.4	37.0
	6–11	100.0	94.4	59.0	52.2
	12–17	96.9	89.1	25.2	20.7

Note. — = Values not determined due to insufficient follow-up.
Source. Organ Procurement and Transplantation Network Data as of October 10, 2008.

Organ Procurement and Transplantation Network and the Scientific Registry of Transplant Recipients 2007). The amount of time spent on the waiting list is influenced by factors such as the type of organ needed, patient blood type, and illness severity. Up-to-date information about waiting lists and survival rates can be found at http://www.OPTN.org.

Pretransplant Psychiatric Assessment

Research has demonstrated a strong association between certain psychosocial factors and posttransplant outcomes (Goetzmann et al. 2007). Thus, the pretransplant psychosocial assessment plays an important role in evaluating the psychological preparedness of potential solid organ transplant recipients. Assessments of readiness for organ transplantation often include an exploration of difficulties in coping and of factors that may compromise adherence in the postoperative period (Phipps 1997). Reviews exploring the clinician's role in evaluating candidates for organ transplantation suggest that pretransplant assessments include an appraisal of the patient's psychosocial strengths and limitations and provide recommendations for interventions to optimize a patient's candidacy for transplantation (Klapheke 1999).

Most pediatric solid organ transplant centers in the United States review psychosocial vulnerabilities when assessing the suitability of potential transplant candidates. Despite the increasing numbers of children and adolescents undergoing transplantation, however, research into the psychological impact of transplantation has remained predominantly focused on adults, with comparatively little attention paid to children who receive transplants (Fung and Shaw 2008). To help identify areas of psychosocial vulnerability in the pediatric transplant population, the Pediatric Transplant Rating Instrument (P-TRI; Fung and Shaw 2008), a 17-item pretransplant rating instrument, has been introduced as an adaptation to adult scales (Olbrisch et al. 1989; Twillman et al. 1993). The P-TRI incorporates a developmental perspective and was designed primarily to identify psychosocial susceptibilities that may be associated with poor treatment adherence and outcomes in the pediatric transplant population. Clinicians need to keep in mind the additive effect for psychological risk factors, in that the more risk factors a patient has pretransplant, the more likely he or she is to have adherence difficulties posttransplant (Dew et al. 1996). Key areas to evaluate are discussed below.

Cognitive and Developmental Assessment

Several studies have documented a link between end-stage organ illnesses and cognitive impairment, suggesting that cognitive functioning should be evaluated as a key outcome measure in determining the impact of surgical interventions (Gerson et al. 2006; Tarter et al. 1990). Additional studies have demonstrated a correlation between impaired cognitive abilities in adolescent renal transplant recipients and decreased adherence to complex posttransplant treatment regimens (Feinstein et al. 2005). Impairments in cognitive skills have been described as particularly hazardous in adolescents with chronic illnesses, because their difficulties foreseeing future consequences of their actions place them at greater risk for unsafe behaviors, including nonadherence with medical treatments (Rianthavorn et al. 2004).

Comprehension and Expectations

An assessment of the patient's and family's knowledge of the transplant procedure, attitude toward transplant, and level of motivation for transplant is crucial to evaluating psychological preparedness for transplantation. Factors such as knowledge about the illness and its medical treatment, belief in its treatment, positive personal meaning attributed to the illness, and therapeutic motivation for treatment have been correlated with improved adherence rates in adolescents with chronic illnesses (Kyngas et al. 2000). A study comparing self-regulation predictors of medication adherence demonstrated that a subset of pediatric renal transplant recipients who were motivated to be medication adherent and perceived control over their own adherence were more likely to adhere to their therapeutic treatments (Tucker et al. 2001). In an early study that investigated the association between hope and emotional adjustment in children with chronic illness, higher levels of self-reported hope were correlated with improved coping strategies and ultimately with improved adjustment to illness (Lewis and Kliewer 1996). More recently, the association between hope and rates of treatment adherence was found to be mediated by symptoms of depression in pediatric renal and liver transplant recipients (Maikranz et al. 2007).

Psychiatric Comorbidity

A detailed review of patients' and their parents' current and past psychiatric illnesses and treatment,

with particular attention to the recurrence risk of these illnesses during the transplant process, is essential. Research with pediatric renal transplant patients indicates an association between the presence of psychiatric illness and nonadherence (Shaw et al. 2003). In fact, a recent investigation of predictors of treatment nonadherence revealed that the presence of a comorbid psychiatric condition had one of the highest correlations to nonadherence among pediatric transplant patients (Kahana et al. 2008). The severity of preexisting psychiatric disorders was also cited as highly associated with lower adherence in cancer patients who were assessed using a transplant evaluation rating scale (Grube 2006).

Decreased pretransplantation emotional functioning is correlated with psychological functioning and increased number of hospitalizations following transplantation in the pediatric transplant population (DeMaso et al. 1995). Not surprisingly, rates of psychological distress are high prior to transplantation. For example, pediatric heart-lung transplant patients have been found to have significantly elevated scores on measures of behavioral and psychological distress (Wray and Radley-Smith 2007). Self-reported levels of depression also have been found to be higher in this pediatric population than in the general population (Wray and Radley-Smith 2004). While screening for psychiatric symptoms, the clinician should routinely evaluate for childhood exposure to traumas or abuse, which have been described as significant risk factors for poor outcome following transplant surgery (Shemesh et al. 2007).

Parental psychiatric history is particularly essential to assess among pediatric transplant candidates because parental psychopathology may adversely affect the parents' ability to support and supervise their children's treatment. For example, a study examining the mental health, stress, and quality of life of parents of pediatric liver transplant patients suggests that significant parental distress may negatively impact the patients during the perioperative period (Tarbell and Kosmach 1998).

Substance Abuse

The clinician should obtain a detailed history of a patient's use of alcohol, recreational drugs, and tobacco in a pretransplant psychosocial evaluation for the purposes of assessing the potential toxic effects of these substances before transplantation and evaluating their potential impact on medication adherence following transplantation. A retrospective study of pediatric liver transplant recipients revealed a strong correlation between history of substance abuse and poorer treatment adherence (Lurie et al. 2000). In addition, parental history of substance use should be carefully assessed, because recent studies have suggested that this may impact the ability of the family to adequately supervise the posttransplant treatment regimen for the child (Fung and Shaw 2008).

Family Functioning

With pediatric transplant recipients, the primary responsibility for treatment adherence rests on the parents or primary caregivers. According to physician ratings, lack of parental supervision was identified as one of the primary factors contributing to decreased medication adherence in pediatric renal transplant patients, and parent-child conflict also played a role in influencing treatment adherence (Shaw et al. 2003). In a study investigating potentially modifiable psychosocial risk factors in pediatric renal transplant recipients, Gerson et al. (2004) discovered that elevated parental stress, dysfunctional parent-child interactions, and child behavioral problems were factors associated with decreased medication adherence.

Due to the significant role of parents and caregivers, an exploration regarding their availability and willingness to provide supervision over a child's medical treatment is crucial. A recent study revealed an association between increased parental risk classification and increased morbidities in the pediatric patient following cardiac transplantation (Stone et al. 2006).

Treatment Adherence

The posttransplant treatment regimen is complex and often includes lifelong immunosuppression, dietary modifications, frequent clinic visits, and numerous blood tests. Decreased adherence to such complex medical treatment has been identified as one of the leading risk factors for acute and chronic graft rejection episodes in pediatric renal transplant recipients (Shaw et al. 2003). A study exploring barriers to medication adherence among adolescent renal transplant candidates demonstrated that enhanced knowledge of medication regimen, implementation of a medication organizational system, and parental supervision of administration were factors associated with increased likelihood for adherence in this patient population (Zelikovsky et al. 2008). These studies underscore the importance of evaluating the patient's family environment and

knowledge of treatment as potentially modifiable predictors for future adherence.

Relationship With Care Providers

The ability of patients and their families to create a positive treatment alliance with their physician has been associated with improved adherence to treatment among adolescents with chronic medical conditions (Gavin et al. 1999). Clinicians completing a psychosocial assessment for transplantation are encouraged to inquire about any history of problematic behaviors in the working alliance with treatment providers and explore factors such as a patient's level of coping, impulse control, and frustration tolerance, which may impact the patient's ability to work collaboratively with the treatment team (Klapheke 1999). Rapid identification and resolution of conflict between the family and transplant team can have an enormous impact on enhancing the therapeutic alliance and avoiding communication obstacles.

Living Donor Assessment

The number of patients deemed eligible for transplant following a comprehensive medical and psychosocial pretransplant evaluation has been steadily increasing, which is exacerbating the shortage of organs. Living donation first occurred with kidney transplantation (Merrill et al. 1956) and is now frequently used for renal and liver transplants (by donating a liver section) and less frequently for lung and other organ transplants. An advantage to having a living donor is that the transplant can be planned. However, living donation places an otherwise healthy individual at risk of bleeding, infection, development of other health problems, psychological distress, and even death during and after surgery.

Given these potential risks, psychosocial screening before and after live donation is recommended, and a careful evaluation of living donors from both medical and psychological standpoints is essential (Sajjad et al. 2007). In fact, the Live Organ Donor Consensus Group (2000) stressed the importance of psychological evaluation of donors. Several authors have outlined important issues to assess in potential living donors (Rodrigue and Sobel 2003; Sterner et al. 2006). Obviously, the donor's ability to provide informed consent and lack of coercion in the decision to donate are vital first steps. Donor safety is an important basic issue that includes both medical risks and possible psychological risks (Russell and Jacob 1993). Medically, the donor must be free of health problems (e.g., obesity) that could negatively impact surgery. Psychological symptoms or disorders, such as depression, anxiety, and substance abuse, should be treated prior to donation (Rodrigue and Sobel 2003). The financial burden should also be considered, especially in light of possible postsurgical pain and complications that may delay return to work and normal daily functioning (Sterner et al. 2006). In summary, the evaluation of the prospective donor should include the donor's ability to provide informed consent based on comprehensive information regarding transplant and potential risks, motivation to donate, relationship with the recipient, mental health, substance use, and support system and financial resources. Other important areas to explore include the donor's expectations for child health and behavior as well as family functioning posttransplant (Streisand and Tercyak 2001). For example, the donor's potential reaction to recipient nonadherence may be a particularly relevant issue, especially when a parent donates to an adolescent. Additional information about a protocol for donor evaluation that was developed at the Children's Hospital of Philadelphia is presented in an editorial commentary by Sterner et al. (2006).

Donation from living unrelated donors often raises concerns among medical professionals regarding donor psychological status, motivation, and understanding of donation. As a result, Dew et al. (2007) have outlined guidelines for psychosocial screening of unrelated donors. Whether a living donor is related or unrelated, postdonation follow-up is important and recommended, although this is not always routine care (Rodrigue et al. 2001). A couple of common issues include pain and distress after donation. Additionally, if recipients have poor outcome posttransplantation, the donors may experience significant psychological distress, such as depression or trauma-related symptoms (Russell and Jacob 1993).

Listing and Ethical Issues

The shortage of organs has given rise to ethical issues around who should have priority for transplant (Rodrigue and Sobel 2003; Veatch 2000). These issues include questions about allocation of organs—for example, whether pediatric patients should receive preference over adults and to what extent the high rates of nonadherence in adolescents should be taken into consideration. Other complicated issues

involve transplantation in patients who have lost their graft due to nonadherence, such as whether these patients should be relisted or what to do when patients become adherent after a period of nonadherence. Some ethical questions revolve around informed consent—for example, if a potential parent donor can give informed consent when the alternative is to wait for a donor while the child suffers potential severe medical complications, including death. Additionally, can a related living donor really filter out overt and/or inadvertent pressure from family to be a donor? Difficult issues also arise when a young child or child with disabilities needs an organ to survive, but the parents have demonstrated problematic caretaking behaviors. These challenging issues represent only a few of the myriad ethical concerns faced by transplant teams.

Transplant Process

In addition to understanding psychosocial risk factors and ethical concerns, mental health and medical professionals need to understand how potential pediatric patient and parent/family issues during the transplant process itself may impact patients and their families. The stages that families undergo during the transplant process have been categorized into three transitional periods: preoperative stage (diagnosis, decision, and preparation for transplantation), perioperative stage (listing and waiting), and postoperative stage (recovery from transplantation and transition to school and home life) (Gold et al. 1986).

Preoperative Stage

Whether the patient's diagnosis is made before birth, at birth, or after acute onset of symptoms, learning of the need for transplant is a stressful and often overwhelming experience for patients and families. A pilot study evaluating psychological distress in parents of pediatric transplant candidates indicated that mothers were significantly more likely than fathers to report greater distress compared with norms (Simons et al. 2007). Both the parents' and the child's initial reactions can be a combination of shock, denial, and anger, especially related to physical disability, loss of functioning, or restrictions in activity (e.g., dietary restrictions, reduced participation in sports or school). Family members often undergo significant alterations in their family roles to care for an ill child. Extended family and friends may be solicited to take a more active role in assisting in care for siblings, helping with patient care, and providing additional social or financial support. Siblings are directly affected and may exhibit a range of concerns regarding the health of their sibling, the separation from parents, and the increased attention that the ill sibling receives (Batte et al. 2006).

During this initial phase, the medical team often focuses on educating the family about medical issues. Team members, including physicians, surgeons, nurses, social workers, psychologists, and child life specialists, are introduced to the family, and each team member's role is explained. Parents should be encouraged to be open and honest with their child about his or her illness and may need guidance about how to do this in an age-appropriate manner. Age-appropriate developmental milestones and a child's overall psychological development are important considerations when exploring a child's understanding of the transplant process (Bagner et al. 2005).

Perioperative Stage

After the medical workup and psychosocial evaluations have been completed and the family has given informed consent for transplantation, the patient is placed on the transplant waiting list, or a potential related living donor is found. Waiting for a donor organ to become available can be an anxiety-provoking time for patients and families. Patients may go through what can be described as a grieving process for their "normal" life, school, and activities. Some patients exhibit regression in their behavior (e.g., extreme clinginess to parents, loss of developmental milestones), whereas other patients may exhibit anger and oppositional behavior, especially in regard to medical treatment and hospitalization. A prospective study of pediatric transplant candidates evaluated at the time of placement on the waiting list for heart or heart-lung transplantation demonstrated significant impairments, with 25% of patients meeting criteria for a psychiatric disorder and approximately 60% of patients exhibiting impairments in psychosocial functioning (Serrano-Ikkos et al. 1997).

Placement on the transplant waiting list can create disruption in family functioning. Like patients, their parents may go through a grieving process for the life that their family had prior to diagnosis and may be highly attuned to physical, emotional, and behavioral changes in their children. If the patient is hospitalized during the waiting period, typically one parent is primarily responsible for staying with the patient, which can be highly disruptive to the family

as a whole. Depending on the location of their home in relation to the hospital, family members staying with the hospitalized patient (or living near the hospital prior to transplant if their home is too far away) will be geographically isolated from their support network and may incur unwanted financial burdens due to being unable to work and trying to support the family in two different locations. Given the high levels of stress associated with balancing medical needs with family routines, caregivers can suffer from burnout, which can compound their feelings of alienation and guilt. With these overwhelming stressors and demands, caregivers of pediatric organ transplant recipients have been demonstrated to exhibit significantly increased posttraumatic stress disorder (PTSD) symptoms during the transplant process (Young et al. 2003).

Parents sometimes voice feelings of guilt that another child will need to die for their child to live (Gold et al. 1986). At times, families may become angry about the organ allocation process or concerned about competition for organs. This anger and frustration may be directed toward the medical team as parents attempt to cope with the daily uncertainty of possible adverse medical events, including the possible death of their child prior to or during transplantation (Gold et al. 1986).

During this waiting phase, the medical team needs to continue to provide comprehensive information about reasons for listing, with frank disclosure of any medical changes. Given the overwhelmed state of many families, information should be presented in a variety of supplemental ways, such as booklets, leaflets, video or audio recordings of clinical consultations, or role-plays for preparation of children of different age groups (Watson 1995), as well as through computer-based interventions, such as the *Transplant Experience Journal* (http://www.experiencejournal.com/transplant), created by the Children's Hospital Boston and the Neuropsychiatric Institute of the University of California at Los Angeles. Some patients and families appreciate talking to other patients and families who have undergone transplants. Families should be encouraged to maintain as normal a routine as possible, which can be especially important for younger patients. For children who are hospital inpatients for extended periods of time, parents and medical (e.g., nursing, child life, psychiatry) staff should help foster developmentally appropriate behaviors. Primary caregivers may need education about the importance of promoting self-care and taking appropriate breaks to avoid burnout and may need help dealing with the presence of extended family members.

Postoperative Stage

Posttransplant, patients can experience acute mental status changes (e.g., delirium) and side effects from immunosuppressant medications that can affect physical appearance, emotional functioning, and sleep and eating patterns. Any posttransplant medical complications are understandably stressful. Once patients are medically stable, patients and families commonly experience a "honeymoon" period, followed by the reality of living with a new chronic illness. Although families are hopeful about an eventual return to a "normal" life, they often experience anxiety about leaving the safety of the hospital environment, because posttransplant care can appear overwhelming. In a study in which parents of pediatric heart transplant recipients completed questionnaires, nearly 40% of parents indicated moderate to severe posttraumatic stress symptoms relating to communication about the child's illness, balancing of various role demands, emotional strain, and supervision of the child's medical care (Farley et al. 2007). Marital conflict may have arisen. Patients and families also may be disappointed by the perceived slowness of recovery from surgery and return to typical activities such as school.

Returning home and transitioning back to school can be stressful as well. Some patients have trouble abandoning their "sick role" and the accompanying special attention. Patients may resent the need for close monitoring and additional treatments. Although many patients are adherent to their medications immediately after transplant, nonadherence can develop as time passes and routine follow-up becomes less frequent. Donor-related issues may arise, and families may want to learn about the donor and make attempts to find out details about the donor's identity. As during previous phases of the process, parents and patients may feel sadness for or guilt about the donor family.

In this phase, the medical team's initial goal is to provide education about the posttransplant treatment regimen. The mental health consultant can play an important role by educating the family about possible emotional reactions of patients, parents, siblings, extended family members, and friends. For example, Wray and Radley-Smith (2005) reported that pediatric transplant patients experienced significantly higher problematic behaviors at home upon transition. Education about the emotional impact of

immunosuppressant medications and how to manage behavioral changes is important. Additional studies showing decreased academic achievements following transplantation underscore the importance of strong school liaison and regular assessments of academic functioning during the transitional period of school reentry (Wray et al. 2001). The mental health consultant should also address any sibling-related issues (e.g., acting-out behaviors, emotional issues) that may arise due to disruptions in the typical family roles and structure.

POSTTRANSPLANT ADJUSTMENT

Medical Issues

Although organ transplantation can be a lifesaving intervention, it should not be perceived as an absolute cure. Physicians often talk about transplant as trading one chronic illness for another. Following transplantation, patients must be prepared to adhere to an immunosuppressive medication regimen and lifestyle modifications on a daily basis for the rest of their lives. These medications help to prevent graft rejection but can have numerous physical and medical side effects. Steroid-based immunosuppressant medications can cause weight gain, moon facies, excessive body hair growth, truncal obesity, acne, and gingival hyperplasia. Medical complications can include renal insufficiency, hypertension, osteoporosis, and posttransplant lymphoproliferative disease. Furthermore, because of perpetual immunosuppression to protect foreign graft functioning, patients are at constant increased risk for infection. Among adolescent pediatric kidney transplant recipients, a positive correlation has been identified between length of time since transplant and worsening body image self-esteem when comparing new transplant recipients with those who had received kidneys at least 1 year prior (Gerson et al. 2004). For adolescents who are struggling with body image concerns, the adverse medication side effects and the integration of a donor organ into their body can be a recipe for nonadherence (Bunzel and Laederach-Hofmann 2000).

Emotional Adjustment

The majority of patients adjust well emotionally following transplant. In a longitudinal study of 23 pediatric heart transplant patients who were reassessed almost a decade later, the majority of patients demonstrated psychological functioning within normal range. However, more than 25% of patients and families had lasting psychological symptoms and reported emotional adjustment difficulties (DeMaso et al. 2004). In fact, a review of empirical literature found that 20%–24% of pediatric heart transplant patients experienced psychiatric symptoms such as anxiety, depression, and behavioral problems (Todaro et al. 2000). In a study of 104 adolescent heart, liver, and kidney transplant patients, 16% met full criteria for PTSD, with an additional 14.4% meeting two of three symptom-cluster criteria (Mintzer et al. 2005). PTSD symptoms have been associated with nonadherence among pediatric liver transplant recipients, and Shemesh et al. (2000) hypothesized that one mechanism of nonadherence may be related to avoidance of medications, which can serve as painful reminders of chronic illness. Other research revealed that 36% of kidney transplant patients experienced depression or PTSD (Wallace et al. 2004) and that the 1-year and 3-year posttransplant rates of depression for heart and heart-lung recipients were 23% and 13%, respectively (Wray and Radley-Smith 2006).

Studies have found higher rates of behavioral problems in both the home and school settings for heart and heart-lung transplant patients than for healthy peers (Wray and Radley-Smith 2005). Some research indicates that behavioral problems increase over time posttransplant and remain problematic for many years. In fact, Wray et al. (2001) reported that school-related behavior problems persisted in 27% of patients after 5 years. However, in a later study, Wray and Radley-Smith (2005) found that 23% of patients had behavioral problems at school at 1 year posttransplant, but the rate decreased to 9% at 2 years posttransplant. On the other hand, behavioral problems at home appeared to worsen over time, with 22% of pediatric heart and heart-lung transplant patients exhibiting behavioral problems at 1 year posttransplant, increasing to 34% at 2 years. Possible psychosocial reasons for increased behavioral problems include parenting issues (e.g., vulnerable child syndrome), parental distress or psychiatric symptoms, and general family disruption related to transplant.

One study has demonstrated that the quality of life of heart, lung, and kidney transplant patients was similar to that of controls in all age groups except the youngest group of children, ages 8–11 years, who seemed to have more difficulties in certain areas, including making friends and concentrating (Apajasalo et al. 1997). In another study that in-

vestigated children's perspectives about their lives following transplantation, nearly all of the children identified a combination of both positive and negative life experiences, with those patients who endured greater numbers of rejections or lack of support expressing overall more negative experiences regarding their quality of daily lives (Olausson et al. 2006). Similarly, in a study examining quality of life of school-age heart transplant recipients, the children described their lives after transplant as both "easy and not easy" with the most frequently cited factors contributing to their overall outlooks divided into three primary categories: opportunities to participate in desired recreational or educational activities, relationships with friends and family, and impacts of the procedure and posttransplant regimen on the child (Green et al. 2007). A longitudinal study investigating the long-term quality of life after pediatric heart transplantation described most recipients as very satisfied with their overall health and functioning at 5–10 years following transplant (Grady et al. 2007).

Parents experience increased levels of psychological and emotional distress following transplant (Tarbell and Kosmach 1998). In a large study of 170 parents of children who underwent heart, liver, or kidney transplantation, parents were found to have elevated levels of PTSD symptoms, although this study did not find elevated levels of depression (Young et al. 2003). Additionally, over half of the parents reported moderate to severe symptoms, with 27.1% meeting the cutoff criteria for PTSD. Factors related to PTSD were the overall impact of transplant on the family, attitudes toward the medical providers, and parents' perception of their child's health. More recent research has echoed the finding of elevated PTSD symptoms in parents of pediatric heart transplant patients (Farley et al. 2007).

Academic and Cognitive Adjustment

A review of cognitive outcomes for pediatric heart transplant patients found that most children and adolescents were functioning within the average range posttransplant, although research indicates that these patients' performance is often lower than that of their healthy peers (Todaro et al. 2000; Wray et al. 2001). One study of children who received heart transplants as infants revealed that children were at risk for deficits in visuospatial skills and scored in the lower ranges for IQ and achievement at higher rates than expected (Baum et al. 2000). Other studies indicated more significant deficits. For example, Brosig et al. (2006) found that 46% of heart transplant patients scored two standard deviations below the normative population on measures of cognitive functioning.

Moreover, pediatric patients who experience posttransplant complications (e.g., infection, rejection) may be at greater risk for cognitive issues (Todaro et al. 2000). For example, neurological complications are not uncommon in lung transplant patients. One study found that 45% of pediatric lung transplant patients had neurological complications, most often seizures but also encephalopathy, headache, depression, and focal neurological deficits (Wong et al. 1999). In addition, studies on cognitive development have indicated that after liver transplantation, children show postoperative results on cognitive assessments in the lower normal range compared with healthy peers (Kaller et al. 2005), with particular deficits in the domains of learning and memory, abstract thinking, visuospatial abilities, and motor control (Stewart et al. 1991). Favorable prognostic factors include children who are younger, have had a shorter duration of illness, and are more physically developed at the time of transplant (Kaller et al. 2005). Also, studies of adult patients have demonstrated improved cognitive abilities following liver transplantation (Rovira et al. 2007).

Treatment Adherence

Treatment adherence, especially to immunosuppressant medications, is of utmost importance in the transplant population and has been found to be significantly related to acute and chronic rejection and graft loss (Ettenger et al. 1991; Korsch et al. 1978; Schweizer et al. 1990; Shaw et al. 2003; Wolff et al. 1998). Moreover, medication nonadherence is a major cause of graft failure in adolescent transplant recipients, and graft survival 5–6 years posttransplant is worse for adolescents than for other pediatric age groups (except infants) (Rianthavorn et al. 2004). Despite the importance of these medications, nonadherence rates are alarmingly high in pediatric populations, with adolescent transplant recipients demonstrating higher rates of nonadherence than adults (Schweizer et al. 1990) and children (Ettenger et al. 1991; Shaw et al. 2003). In fact, researchers report rates of graft failure due to nonadherence in adolescents that are four times those in adults (Cecka et al. 1997). Another study found rates of nonadherence to be as high as 64% for adolescent patients (Ettenger et al. 1991). Dobbels et al. (2005) reported vari-

ability in adherence by organ type for pediatric and adolescent populations: 32% of renal transplant patients, 30.8% of liver transplant patients, and 15.9% of heart transplant patients had known nonadherence.

Several individual and family characteristics have been linked to nonadherence in solid organ transplant populations. Individual factors, aside from age (specifically, adolescence), include poor self-esteem, communication and social skills deficits, poor acceptance of diagnosis, and psychiatric conditions such as depression and anxiety (Wolff et al. 1998). Medication side effects have been found to be associated with poor adherence (Kugler et al. 2007). In a study of 112 renal transplant patients, nonadherence was related to having a comorbid psychiatric illness, and psychiatric illness was a predictor for graft loss, emphasizing the importance of psychological treatment (Shaw et al. 2003). PTSD specifically has been strongly linked to nonadherence (Shemesh et al. 2000), and once PTSD symptoms were treated, adherence improved. In a study by Maikranz et al. (2007), depression has been found to be related to nonadherence. In this study, hope and uncertainty were linked to depression and anxiety and may be targets for intervention. Another individual factor, maturity level, has also been found to be related to risky behaviors, including nonadherence (Stilley et al. 2006). Family characteristics that may play a role include single-parent households, family conflict/instability, poor intrafamily communication and support, and low socioeconomic status (Wolff et al. 1998).

Unfortunately, despite the existing literature documenting the high prevalence of nonadherence (especially in adolescent patients), as well as the significant minority of pediatric transplant patients, parents, and siblings who experience psychiatric symptoms before and after transplant, surprisingly little research has been conducted examining psychological interventions for nonadherence or psychiatric symptoms in this population. Treatments that have been proposed generally target specific factors thought to underlie the behavior. For example, using the three categories of nonadherence—accidental, invulnerable, and decisive—identified by Greenstein and Siegal (1998) in adult transplant patients, Rianthavorn and Ettenger (2005) have formulated specific treatment approaches for each type of nonadherence in adolescent patients (see Table 22–2).

TABLE 22–2. Subtypes of nonadherence

Subtype	Typical characteristics	Interventions
Accidental	• Forgetfulness • Poor organizational skills	• Improve organizational skills • Create a routine to prompt medication administration • Introduce memory aids and cues (e.g., pill boxes, alarms) • Simplify the medical regimen • Increase parental supervision
Invulnerable	• Failure to believe in potential negative consequences of nonadherence • Commonly do not experience immediate negative health events	• Provide education about medications • Provide education about potential long-term and "invisible" consequences of missed doses • Increase parental supervision • Involve patient in peer groups to reinforce discussion of adherence
Decisive	• Willful decision to miss medications • Associated failure to acknowledge potential negative consequences • Poor parental supervision • Family conflict	• Evaluate motives for nonadherence • Increase parental supervision • Use behavioral interventions • Consider referral for individual or family psychotherapy
Other	• Presence of psychiatric comorbidity (e.g., depression, anxiety, posttraumatic stress disorder, oppositional defiant disorder)	• Treat comorbid psychiatric symptoms • Consider referral for individual or family psychotherapy

Source. Adapted from Rianthavorn and Ettenger 2005.

Research of other chronic illnesses has attempted to increase adherence through educational interventions, behavioral interventions, and improved social support (Dobbels et al. 2005). For example, pediatric patients who are awaiting transplant or are newly posttransplant can meet with mentor families (Snyder 1995). Researchers have suggested using reward systems (Rapoff 1999), problem-solving strategies (Maikranz et al. 2007), and cognitive strategies to address emotional distress and nonadherence. (For a detailed review of treatments with pediatric populations, see Chapter 13, "Treatment Adherence.")

Posttransplant Prevention Care

Although limited data are available on posttransplant psychological interventions to enhance clinical outcomes and reduce the risk of nonadherence, some transplant centers are starting to implement such programs. The pediatric transplant program at Lucile Packard Children's Hospital is currently testing a six-session protocol for pediatric organ transplant recipients. Table 22–3 summarizes the major goals and components of this protocol.

Transition to Adult-Centered Care

Adherence difficulties unfortunately do not end with adolescence. Transitioning from pediatric to adult-centered care is another vulnerable time for solid organ transplant recipients (Stabile et al. 2005). A small retrospective study of liver transplant patients who transitioned to adult-centered care found that adherence decreased after transfer (Annunziato et al. 2007). Researchers have begun developing pilot interventions to address aspects of the transition process (Annunziato et al. 2008), although this area lacks randomized, controlled studies.

Concluding Comments

Solid organ transplantation is a common and widely accepted surgical option for children and adolescents who formerly would not have survived their illness. Due to the steady and consistent improvements in outcomes for pediatric transplant recipients in childhood, many of these individuals may anticipate long-term survival into adulthood. These developments have been closely associated with a

Table 22–3. Posttransplant prevention therapy protocol topics and goals

Topics	Goals
Patient and family adjustment posttransplant	• Review typical posttransplant course (e.g., possibility of readmission, medication changes) • Discuss typical emotional and behavioral responses (e.g., due to medication side effects) • Normalize patient's and family's reactions to transplant
Development of adherence plan	• Assess patient's and family's understanding of treatment expectations • *Child patients:* Create adherence behavior plan (e.g., daily schedule, formal behavior modification plan) • *Adolescent patients:* Develop adherence contract, outlining responsibilities of patient and parents
Developmental issues that may impede adherence	• Provide education about typical nonadherence rates • *Child patients:* Provide psychoeducation regarding establishing/maintaining routine, vulnerable child syndrome, and age-appropriate expectations • *Adolescent patients:* Show video about common issues faced by adolescents (e.g., not wanting to feel different) and consequences of nonadherence
Transition to home/school	• *Child patients:* Create school reentry book to share with peers • *Adolescent patients:* Discuss common issues that can impede adherence – Teach problem-solving techniques – Provide education about risk-taking behaviors
Additional topics as needed (e.g., sibling-related issues, persisting psychiatric symptoms)	• Address sibling-related issues • Assess and treat (or refer) patients or family members with persisting psychiatric symptoms

Note. The above information is based on an intervention being conducted with patients and families in the pediatric solid organ transplant programs at Lucile Packard Children's Hospital.

number of ethical and psychosocial issues for mental health consultants working in pediatric transplant programs. Still unresolved are many issues related to the screening of potential transplant recipients; one of the most important is the absence of data to guide transplant teams about candidate selection. However, a large database exists on the cognitive and emotional difficulties that face transplant recipients, and increased attention is being given to quality-of-life issues for both patients and family members. Future work should focus on efforts to demonstrate the health outcomes and financial benefits of mental health consultation with this patient population.

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23

Renal Disease

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The kidney performs many vital functions, including the filtration of water-soluble waste, the regulation of blood pressure, the homeostasis of water and electrolytes, and the hormone production that is necessary for red blood cell synthesis and bone health. In chronic kidney disease (CKD), the physiological impact, intensity of treatment, and potential for long-term disability have significant psychosocial consequences for children and their families. Children with CKD, 60% of whom are affected with congenital or inherited kidney disorders, contend with the lifelong emotional and physical consequences of abnormal renal function (Wong and Furth 2007). Despite the significant improvements in medical outcomes over the past three decades, much remains to be learned about the psychological and behavioral care of children with CKD.

Definition

CKD is a state of irreversible kidney damage and/or a reduction of kidney function that predisposes the patient to further deterioration in renal function. The Kidney Disease Outcome Initiative of the National Kidney Foundation (2002) has established a conceptual framework for the identification, management, and care of all patients with or at risk for kidney disease. CKD is defined as kidney damage irrespective of the level of kidney function for 3 months and/or a glomerular filtration rate (GFR) <60 mL/min per 1.73m^2 for at least 3 months, regardless of the underlying etiology (National Kidney Foundation 2002). CKD replaces the terms chronic renal failure (CRF) and chronic renal insufficiency (CRI), which describe renal dysfunction of varying degrees from mild to severe in nature.

CKD is classified in stages based on the severity of illness (Coresh et al. 2005; see Figure 23–1). Higher stages of CKD are associated with poorer kidney function and increasing likelihood of associated complications. CKD stage 5, or end-stage renal disease (ESRD), is defined as a severe, irreversible reduction in function that usually requires renal replacement therapy in the form of dialysis or kidney transplantation to sustain life. The medical management of CKD aims to treat the primary cause of kidney impairment, eliminate or minimize co-occurring physical conditions, prevent or abate the loss of kidney function, treat the metabolic disturbances associated with CKD, prevent and treat cardiovascular disease, and ultimately optimize normal growth and development. The complexity of care, financial costs, and emotional burdens for patients and their families increase as CKD advances.

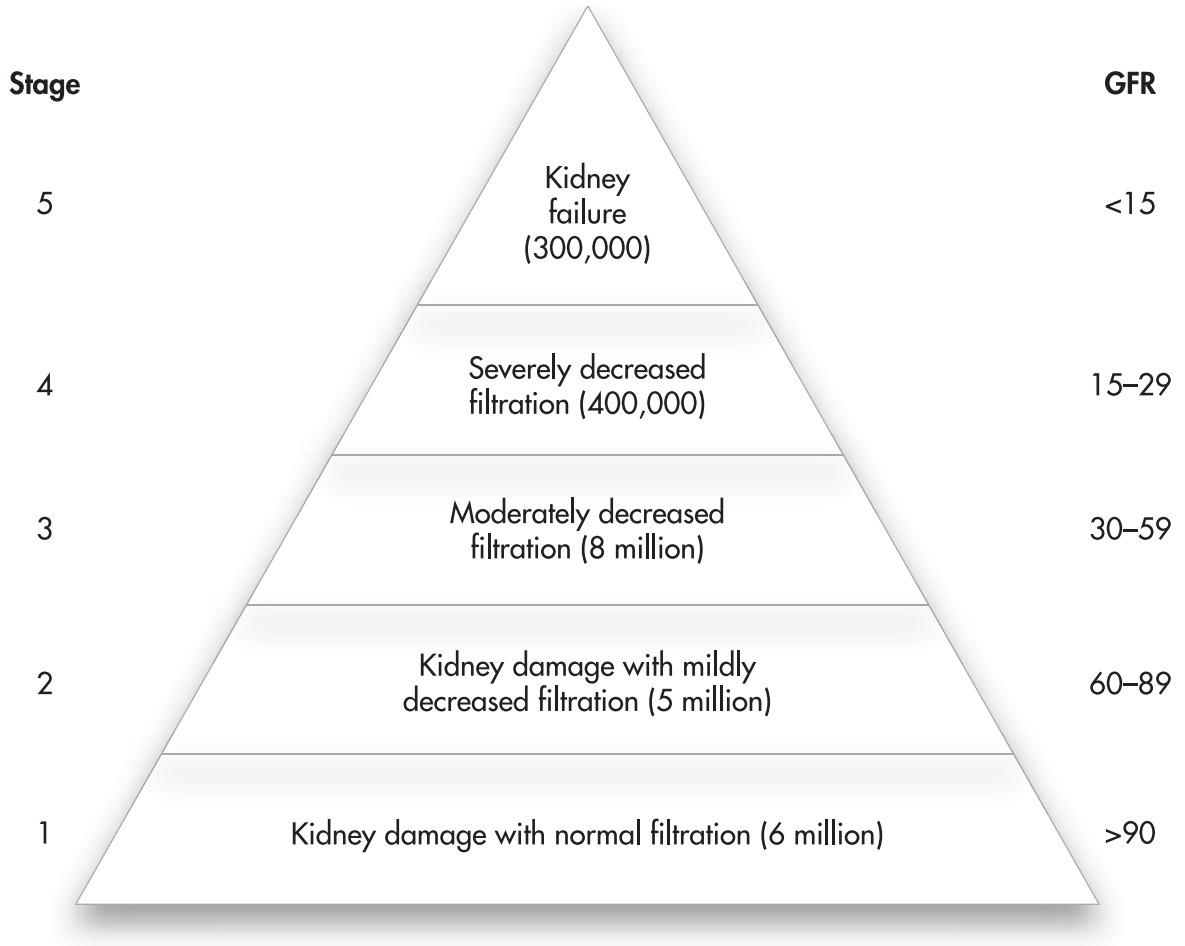

FIGURE 23–1. Staging and prevalence of chronic kidney disease.
GFR = glomerular filtration rate.
Source. Data from Coresh et al. 2005.

ETIOLOGY AND EPIDEMIOLOGY

Because individuals are commonly asymptomatic in the early stages of renal failure, accurately estimating the incidence and prevalence of CKD is difficult. Therefore, CKD is likely underdiagnosed and underreported. Estimates from the National Health and Nutrition Examination Survey of U.S. adults with CKD are shown in Figure 23–1 (Coresh et al. 2005). The prevalence of early stages of CKD (stages 1–4; 10.8%) is approximately 100 times greater than the prevalence of ESRD (stage 5; 0.1%) (Levey et al. 2003).

Although data on children and adolescents are less available, these ratios are likely similar to those of adults. In a review of Italian children with CKD younger than age 20 years, the mean incidence and prevalence were 12.1 and 74.7 cases per million, respectively (Ardissino et al. 2003). Estimates of ESRD from the U.S. Renal Data System (2008) from 1999 to 2006 suggest an incidence of 14.4 per million in the pediatric population. These estimates exclude children who develop renal failure but who do not initiate renal replacement therapy, as well as those who develop CKD in adolescence and present later as adults with ESRD.

The causes of CKD in children are significantly different from those in adults. Diabetic nephropathy and hypertension, the dominant causes of adult CKD, are rare in children. According to data from the North American Pediatric Renal Transplant Cooperative Studies, congenital and urological anomalies account for almost 60% of pediatric cases of CKD (Ardissino et al. 2003). Childhood CKD tends to affect more males (64%) than females (36%). Ardissino et al. (2003) reported the following ethnic distribution of children with CKD: 61% Caucasian, 19% African American, 14% Hispanic, and 6% other ethnic groups.

Natural History

The natural history of renal disease is variable and at times unpredictable. Although some patients may recover fully and suffer few or no sequelae (e.g., poststreptococcal glomerulonephritis, typical [diarrhea-positive] hemolytic-uremic syndrome), the majority of children and adolescents develop progressive renal disease and dysfunction, often leading to ESRD. The prevalence and severity of CKD complications increase as glomerular filtration rate decreases. Table 23–1 outlines these medical complications, which can be disruptive to the child's life. Furthermore, treatment interventions themselves may contribute to additional medical and emotional complications.

Psychosocial Adjustment

Children and Adolescents

Children and adolescents with CKD have to adjust to a life that differs significantly from that of their healthy peers. They require lifelong intensive medical treatments that often fluctuate unpredictably and subsequently require intensive interventions such as dialysis and even transplantation (Aldridge 2008; Snethen et al. 2004). Additional burdens may include restrictions on diet and multiple medications. For transplant patients, this can mean the need to take large quantities of medications, often as many as 20 or more pills per day, which may have unpleasant side effects. Patients may experience significant emotional stress related to acceptance of their illness, the need for multiple inpatient admissions, and/or life-threatening medical events (Reynolds et al. 1986). Adolescents with ESRD, who are often acutely aware of their life challenges, can express disabling concerns about their long-term health and life expectancy, as well as their future prospects for a career, spouse, and family.

With advanced renal disease, patients may undergo dramatic changes in physical appearance, as a result of either the disease process itself or adverse effects of treatment. Short stature and delayed puberty are common, along with long-term psychological effects that accompany these deficits (Grootenhuis et al. 2006; Rosenkranz et al. 2005). Bone deformity may be a result of ESRD. Scarring from catheter and port placements for dialysis, as well as gastrostomy tubes, may be a source of embarrassment and impaired body image. Corticosteroids and immunosuppressants commonly cause cosmetic

Table 23–1. Complications of pediatric chronic kidney disease

Complications	Etiology	Sequelae	Treatment
Electrolyte abnormalities	Renal tubular wasting, decreased glomerular filtration rate, impaired gastrointestinal absorption	Poor feeding, emesis, decreased energy, growth retardation, dehydration	Electrolyte supplementation, diet restriction
Inadequate nutrition	Uremia, increased metabolic rate, early satiety in peritoneal dialysis patients	Cachexia, anorexia	Gastrostomy tube feedings, supplementation with special renal formulas
Growth impairment	Impaired growth hormone and insulin-like growth factor, anemia, secondary hyperparathyroidism	Short stature	Growth hormone supplementation, optimization of nutrition
Anemia	Reduced erythropoietin synthesis, iron deficiency	Fatigue, poor school performance	Iron supplementation, use of erythropoiesis-stimulating agents
Bone and mineral metabolism	Impaired production of 1,25 dihydroxycholecalciferol	Renal osteodystrophy	Calcitriol supplementation, diet restrictions, phosphorus-binding agents
Hypertension/ cardiovascular disease	Hypervolumnia, hypercalcemia, alterations in renin angiotensin system	Left ventricular hypertrophy, progression of renal disease	Antihypertensive medication, diet modification

side effects (e.g., acne, central obesity, hirsutism, abdominal striae, bruising). Exercise intolerance and fatigue may limit physical activity (Eijsermans et al. 2004; Konstantinidou et al. 2002; Pattaragarn et al. 2004). In addition, school- and peer-related activities may be disrupted by necessary clinic appointments and hospitalizations.

In an early study of psychosocial adjustment, Garralda et al. (1988) compared 22 children undergoing hospital dialysis, 22 children with less severe renal disease, and 31 healthy controls. This study showed higher rates of emotional illness in the dialysis group, with 33% of this group experiencing a definitive psychiatric disorder. Compared with healthy controls, the nondialysis renal disease group had more psychological problems, with 66% of the children experiencing mild psychosocial adjustment difficulties. Psychiatric illness was not found to be associated with duration of renal failure, number or length of hospitalizations, body height, serum urea levels, hypertension, anemia, congestive heart failure, or osteodystrophy. This study suggested a trend toward high levels of anxiety and depression, as well as low self-esteem.

Bakr et al. (2007) used DSM-IV-TR criteria to assess 19 Egyptian children with predialysis CKD and 19 children with ESRD receiving hemodialysis. The prevalence of any psychiatric disorder was 52.6%, with the most common disorders being adjustment (12.4%), depressive (10.3%), neurocognitive (7.7%), anxiety (5.1%), and elimination (2.6%) disorders. The disorders were more prevalent in dialysis patients (68.4%) than in predialysis patients (36.8%). No significant correlation was found between these disorders and gender, severity of anemia, CKD duration, or hemodialysis duration. The authors concluded that the psychiatric disorders were more likely explained by the experience and difficulties of living with CKD than by demographic or physical factors.

Fukunishi and Kudo (1995) compared 53 Japanese children with ESRD—26 children undergoing continuous ambulatory peritoneal dialysis (CAPD) and 27 children with kidney transplants—with 27 healthy controls. Using the Diagnostic Interview for Children and Adolescents, the researchers found that 65% of children receiving dialysis met DSM-III-R criteria for separation anxiety disorder. Although rates of separation anxiety were lower in the transplant group than in those receiving CAPD, 29.6% of children in the transplant group had adjustment disorders, especially difficulties in the establishment of satisfactory peer relationships.

Brownbridge and Fielding (1991) evaluated psychosocial adjustment to ESRD in 73 British children and adolescents by comparing patients receiving hemodialysis, CAPD, and transplantation. The CAPD group had lower rates of depression and behavioral disturbance than the hemodialysis group. These results suggest that early physical adversity and social restrictions may be associated with persistent psychosocial problems in ESRD.

Studies focusing specifically on depression and traumatic stress in children with ESRD have produced findings similar to those of adults with ESRD (Kimmel et al. 2007). Using the Children's Depression Inventory to compare 29 adolescents with CKD and 29 age-matched healthy controls, Castro et al. (2006) found that 17% of the chronic renal disease subjects were in the clinically depressed range. This rate is similar to the 22% rate found by Simoni et al. (1997) in a study of 23 adolescents undergoing hemodialysis using a modified version of Birleson's Depression Self-Rating Scale. Finally, it is important to be aware of the high incidence of traumatic stress disorder symptoms in pediatric kidney transplant recipients (Mintzer et al. 2005).

Little is known about effective coping strategies in children with CKD. Snethen et al. (2004) used the A-COPE Survey to investigate stress management techniques used by 35 adolescents with ESRD. The authors reported that the majority of adolescents used the tactic of "listening to music" as a coping strategy. Males used humor significantly more than females, and younger adolescents vented feelings or avoided problems more often than older adolescents. Renal transplant recipients were significantly more likely to cope by "engaging in a demanding activity" that was intellectual or physical in nature and had the potential to facilitate "peer bonding."

Family

In families facing pediatric CKD, parents commonly report experiencing increased levels of anxiety and depression (Brownbridge and Fielding 1991; Friedman 2006; Norman et al. 2004). The development of ESRD, with the possible need for dialysis or transplant surgery, is particularly stressful. At this juncture, frequent multidisciplinary assessments are necessary to determine the most appropriate time at which to initiate dialysis based on the child's physical and metabolic status. These assessments must also include an evaluation of the patient's home environment, including the family's financial resources and social supports. Peritoneal dialysis or

hemodialysis may have a significant effect on a family's organization and structure (de Paula et al. 2008). Families assume a significant burden of care and responsibility, such as the need to rearrange schedules, alter vacation plans, and in some cases change career goals, to ensure optimal care for their child. Issues related to treatment nonadherence, potential graft loss, and medical complications become critical (Friedman 2006). Mortality rates among youngsters requiring renal replacement therapy are substantially higher than those among children without ESRD. In an Australia/New Zealand study of children and adolescents with ESRD, mortality rates were 30 times higher in pediatric patients undergoing renal replacement therapy than in Australian children in the general population, and rates were more than 4 times higher in children who were receiving dialysis than in those who had received renal transplants (McDonald and Craig 2004).

In a qualitative study of 31 Turkish parents of children being treated by hemodialysis, Cimete (2002) used focus group interviews to determine common family stressors and coping strategies. Parents reported ongoing anxiety about the possibility of their children's death and distress related to developmental delays and physical limitations that interfered with peers and education. Parents also reported guilt related to the need to restrict their children's fluid and food intake. They also expressed concern about healthy siblings who themselves expressed feelings of worry, neglect, and jealousy. Effective coping strategies endorsed by the parents included prayer, sharing feelings with spouses or others in the same situation, viewing things in a positive manner, and asking for help.

Fukunishi and Kudo (1995) administered the Family Environment Scale to mothers of children with ESRD. They found that scores on the Independence and Achievement Orientation subscales were significantly lower in the families of children who were receiving dialysis than in families of healthy controls. The authors postulated that children's physical dependence on their mothers during CAPD therapy and the mothers' tendency to be overprotective toward their children might explain some of the study's findings. The burden of CAPD was thought to restrict the ability of children to engage in other appropriate social activities. The authors further hypothesized that strong dependence on mothers may have led CAPD children to develop symptoms of separation anxiety.

Family functioning has been shown to have a significant impact on the physical and emotional care of youngsters with CKD. In a study of 41 families of children with kidney disease (including 15 children with steroid-sensitive nephritic syndrome, 12 children with CKD, and 14 kidney transplant recipients), Soliday et al. (2001) found that family conflict was associated with increases in externalizing symptoms and higher numbers of prescribed medications in the children with kidney disease. By contrast, family cohesion was associated with lower rates of hospitalization. In addition, a nontraditional family structure (e.g., single-parent families, blended families, families with biological parent and unrelated partner) was associated with a higher number of prescribed overall medications.

In a study of 41 families with children with renal disease and 34 families with healthy children, Soliday et al. (2000) demonstrated that family environment predicted not only the behavior of children but also the level of stress experienced by parents of ill and healthy children. Regardless of the children's health status, family cohesion and encouragement to express emotions directly predicted better outcomes in terms of child behavior and parenting stress. Higher family conflict had the opposite effect. The data indicated that children with CKD respond in a manner similar to that of healthy controls and that an appropriate family environment may actually buffer the effects of illness-related stress.

Garralda et al. (1988) reported similar findings in that they noted a higher incidence of child psychiatric problems when parents reported increased stress and less access to emotional support. Of note in this study, children with psychiatric disturbances were also less likely to be adherent with their renal medications. Soliday et al. (2001) concluded that it is prudent for clinicians to address significant family conflict in order to optimize physical and emotional outcomes.

Cognitive Functioning

Significant neurocognitive deficits in pediatric patients with CKD have been attributed to aluminum toxicity related to the use of aluminum-based phosphate binders. However, this is not the only explanation. Gipson et al. (2007), in their review of neurodevelopmental deficits in pediatric and adult survivors of childhood-onset CKD, reported that children are at risk for both structural and physiological abnormalities of the central nervous system. An increased

risk of brain atrophy and infarction exists particularly in those patients with associated coagulation disorders and in those with a history of hypertensive crises. Reports of nonspecific electroencephalographic abnormalities, delayed myelination of the somatosensory cortex, and slower peripheral nerve conduction velocities have also been published. Furthermore, Gipson et al. (2007) pointed out that general cognitive functioning scores are lower than normal among children with CKD and that attention, executive function, and memory are common areas of concern.

Adults with childhood-onset CKD are at increased risk for lower educational, employment, and occupational levels as well as for neuropsychological impairment and psychiatric difficulties (Icard et al. 2008). Duquette et al. (2007) used a cross-sectional design to compare 30 children with CKD with 41 age-matched healthy controls. Subjects with CKD showed evidence of mild impairments on IQ, math, and reading measures and were more likely than controls to have IQ scores below the average range. Compared with controls, youngsters with CKD met criteria for a learning disability with greater frequency and were at higher risk for grade retention and school absenteeism. Renal function was found to be a significant predictor of intellectual and academic scores.

Slickers et al. (2007) studied 29 children and adolescents with mild to moderate stages of CKD to identify clinical predictors of neurocognitive deficits. In this study, increased CKD severity correlated with lower IQ and memory function. A linear relationship with disease severity was reported, such that IQ scores declined continuously as disease severity worsened. Memory function was also lower in children with a longer duration of disease. In addition, IQ scores were lowest in patients who developed renal disease at younger ages and in patients in whom CKD had been present for a greater percentage of their life.

The identification of modifiable risk factors that contribute to poor neurocognitive outcomes is an area of active investigation in pediatric CKD. Past studies have suggested that low hematocrit (Gerson et al. 2006; Stivelman 2000) and hypertension (Gerson et al. 2006; Lande et al. 2003) are associated with neurocognitive deficits, in particular impaired attention (Lande et al. 2003). However, Slickers et al. (2007) failed to demonstrate a convincing relationship between these deficits and hypertension in children. Additionally, medications (e.g., prednisone and tacrolimis) commonly used in the treatment of ESRD have been implicated as risk factors for poor neurocognitive outcomes (Cornic and Rousset 2008; de Quervain 2006; Kemper et al. 2003; Suwalska et al. 2002).

Health-Related Quality of Life

Patients' health-related quality of life (HRQOL) varies depending on the stage of CKD, the need for dialysis, and whether or not patients are transplant recipients. In many studies, these groups are compared with each other, leading to variable findings. Much of the early HRQOL research was done using generic questionnaires. Goldstein et al. (2008), however, developed the Pediatric Quality of Life Inventory 3.0 ESRD Module to assess changes in HRQOL that are specific to CKD.

Ruth et al. (2004) used the Netherlands Organization for Applied Scientific Research Academic Medical Center Child Quality of Life Questionnaire, the Child Behavior Checklist, and the Teacher Report Form to assess the relationship between HRQOL and psychosocial adjustment in a study of 45 Swiss children and adolescents with steroid-sensitive nephrotic syndrome. In this study, the patients had satisfactory HRQOL scores except in social functioning, suggesting difficulties in peer and family interactions. However, parents' HRQOL perceptions were more negative than their children's perceptions and included impairments in motor, cognitive, and emotional domains of functioning. Medical severity correlated with poorer HRQOL. This study was unique in that it examined mothers' psychological distress, which was shown to negatively affect their children's HRQOL and behavior.

Studies comparing different populations of children with CKD using measures of HRQOL have resulted in conflicting findings. Gerson et al. (2005), McKenna et al. (2006), and Reynolds et al. (1991) all completed studies comparing the following four groups: CKD patients, ESRD with dialysis patients, posttransplant patients, and healthy controls. In all three studies, children with CKD reported lower HRQOL compared with control subjects.

Gerson et al. (2005) suggested that activity limitations in patients with CKD had more significant impact on HRQOL than did either physical or emotional discomfort. Compared with healthy controls, adolescents with CKD reported higher scores on the items that assessed resilience in the domain of home safety and health. On the self-report of items that assessed risks, CKD subjects endorsed greater

avoidance of personal risky behaviors, such as smoking and drinking; a lower likelihood of having friends who engaged in risky behaviors; and a lower tendency to engage in disruptive social behaviors.

Reynolds et al. (1991) reported that youngsters undergoing hemodialysis had lower levels of self-esteem and increased rates of depression compared with either renal transplant recipients or healthy children. Gerson et al. (2005) reported that subjects receiving dialysis reported greater physical discomfort and lower physical activity levels than did adolescents in the CKD, transplant, and healthy control groups. McKenna et al. (2006) found that compared to transplant recipients, subjects receiving dialysis reported higher scores on HRQOL measures. In contrast, a French cross-sectional study by Manificat et al. (2003) found no differences in reported HRQOL between pediatric liver and kidney transplant recipients and a healthy reference population.

Using a generic HRQOL questionnaire completed by parents, Gerson et al. (2004) examined the association between anemia and HRQOL in 105 adolescents with CKD. Patients (n=70) with hematocrit values of 36 or less reported that they were less likely to participate in school activities and were less physically active than subjects with higher hematocrit values. Pattaragarn et al. (2004) examined exercise capacity in children receiving peritoneal dialysis or hemodialysis and in healthy children. Although results showed exercise capacity was consistently poorer in the dialysis patients, exercise capacity was not related to hemoglobin values.

Childhood-onset CKD has been shown to be related to poor adult outcomes. Adults with CKD reported that they experienced a delay or failure in achieving appropriate milestones in the areas of autonomy and psychosexual and social development; this appears to be especially true for adults with ESRD (Stam et al. 2006). Icard et al. (2008) reported that adults with childhood-onset CKD were more likely to have difficulty with psychosocial adjustment, educational achievement, and employment.

Treatment Interventions

Although significant research exists on difficulties in psychosocial and cognitive adjustment in children with CKD, little research has been reported regarding treatment interventions. In fact, few CKD-specific data are available for either pediatric or adult populations, and studies of pediatric patients have generally been limited to single case studies or small case series.

Walker (1985) found that a group treatment of girls with CKD proved to be of therapeutic value in improving self-image and reducing levels of emotional stress. Wysocki et al. (1990) reported the results of a behavior modification approach for managing disruptive and noncompliant behaviors in four adolescent males undergoing hemodialysis. Results showed that all four subjects experienced improvements in either behavior or health status during the intervention, which was both inexpensive and well accepted by the patients, families, and staff.

More data have been reported on psychotherapeutic interventions in adults with CKD. Sleep disturbance, for example, is a commonly reported complaint of adults receiving dialysis (Iliescu et al. 2004; Novak et al. 2006). In a randomized, controlled prospective study, 24 adults who were undergoing peritoneal dialysis and who had insomnia were given a 4-week trial intervention with cognitive-behavioral therapy (CBT) (Chen et al. 2008). Results from the study included improvements in sleep quality and decreased daytime fatigue. In another investigation, a group CBT intervention was used to enhance adherence to fluid restriction in a group of adults receiving hemodialysis (Sharp et al. 2005). During the 4-week treatment, no significant improvement was seen in the immediate-treatment group when compared to a delayed-treatment group. However, the group receiving immediate treatment did demonstrate significant improvements at a 10-week follow-up assessment.

Investigations have shown some success in improving adherence to fluid restriction in adults. Hegel et al. (1992) compared a cognitive intervention with a behavioral intervention of positive reinforcement, shaping, and self-monitoring. They reported that the behavioral intervention was superior to the cognitive intervention in preventing long-term weight gain but that those subjects who received combined cognitive and behavioral interventions experienced no added benefit. Fisher et al. (2006) demonstrated long-term success in reducing volume overload in a small group of hemodialysis patients by using CBT techniques and motivational interviewing. Tong et al. (2008) conducted a systematic review of interventions for informal caregivers (family or friends) who care for CKD patients. They identified only three studies, all of which focused on the effect of educational material on caregivers' knowledge, and found that the provision of infor-

mation improved caregivers' knowledge. Further details of the individual and family therapy approaches for children with physical illness are given in Chapters 28 and 29, respectively.

Data are limited regarding pharmacological treatment in patients with CKD. In adults with ESRD, pharmacotherapy, including selective serotonin reuptake inhibitors, is recommended when clinically indicated, and such treatment typically has no significant contraindications (Cohen et al. 2007). One study of adults receiving peritoneal dialysis demonstrated that depressive symptoms were markedly decreased following 12 weeks of treatment with sertraline, bupropion, or nefazodone (Wuerth et al. 2003). Further details on the pharmacological treatment of children with physical illness are given in Chapter 30.

Concluding Comments

Children with CKD and their families face numerous physical and psychological challenges in coping with and adapting to their illness. Data suggest that youngsters at all stages of renal disease, including renal transplant recipients, have significant rates of psychological morbidity. Commonly reported findings include impairments in academic and cognitive functioning, along with disfiguring cosmetic changes related to surgeries and medication side effects. The burden of medical care, in particular that related to dialysis, frequently results in negative effects on academic performance, peer relations, and family functioning. These effects of CKD are generally chronic and persistent, with sequelae extending into adulthood. Data on psychological treatments are sparse, emphasizing the need for future treatment intervention studies specific to pediatric CKD.

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24

Rheumatology

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The purpose of this chapter is to provide a practical overview of the epidemiology, symptomatology, medical management, psychosocial adjustment and adaptation, associated cognitive sequelae, and evidence-based psychosocial treatments for juvenile rheumatoid arthritis (JRA) and systemic lupus erythematosus (SLE) in children and adolescents. The focus of this chapter is solely on JRA and SLE because these two rheumatological disorders represent the most common pediatric rheumatoid diseases and are associated with myriad medical and psychological symptoms that may affect the quality of life of these children and adolescents as well as their caregivers.

Juvenile Rheumatoid Arthritis

Medical Overview

JRA, also referred to as juvenile idiopathic arthritis, is the most frequent connective tissue disease of childhood (Olson 2003). The etiology of JRA is unknown but may include a combination of factors such as environment (e.g., infection, trauma, stress), autoimmunity, and immunogenetics (Drotar 2006). Diagnostic criteria for JRA include an age of onset of younger than 16 years of age, arthritis of one or more joints, and a duration of disease greater than or equal to 6 weeks; other conditions that present with arthritis in childhood must be excluded (Arnett et al. 1988).

JRA is composed of three main subtypes that all share the feature of chronic joint inflammation. These distinct subtypes—pauciarticular (oligarticular) disease, polyarticular disease, and systemic disease—vary in their onsets, symptoms, treatments, and outcomes (see Table 24–1). Diagnosis of each subtype is based on the number of joints involved during the first 6 months of illness. Specifically, pauciarticular disease is associated with four or fewer joints, polyarticular is associated with five joints or more, and systemic disease is associated with multiple systems of the body and rash or fever (Drotar 2006).

Pauciarticular disease is the most common form of JRA, affecting more than one-half of all children with JRA. Data indicate that this subtype is more common in girls and in children younger than 8 years. Areas of the body most commonly affected by pauciarticular disease include the larger joints such

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TABLE 24–1. Three major subtypes of juvenile rheumatoid arthritis (JRA)

	Pauciarticular (oligarticular) disease	Polyarticular disease	Systemic disease
Onset	Typically in children	Any age	Any age, but most frequently in early childhood (younger than 8 years of age)
Prevalence	More than 50% of all cases of JRA	30%–40% of all cases of JRA	10%–20% of all cases of JRA
Gender	More common in females	More common in females	Equal frequency in males and females
Joint involvement	Four or fewer joints	Five joints or more	Multiple systems of the body
Affected areas	Larger joints—knees, shoulders, elbows, wrists, ankles	Smaller joints—hands, feet. Occurs in symmetrical fashion	Multiple systems—high cyclic fevers, joint inflammation, skin rashes, internal organ inflammation
Prognosis	Excellent except for eyesight	Guarded to moderately good	Moderate to poor

as the shoulders, knees, elbows, wrists, and ankles. The prognosis for this subtype is excellent except for eyesight (Cassidy et al. 2005).

Polyarticular disease, which may affect five or more joints in the body, is likely to have an impact on smaller joints, including the hands and the feet, and to occur in a symmetrical fashion. This subtype accounts for about 30%–40% of all cases of JRA and can occur at any age. Similar to pauciarticular disease, the polyarticular disease subtype occurs more in girls than in boys. The prognosis for polyarticular disease is guarded to moderately good (Cassidy et al. 2005).

Systemic disease, also termed *Still's disease,* is the least common of the subtypes, occurring in about 10%–20% of children with JRA. Multiple systems of the body are affected by systemic disease, including high cyclic fevers, joint inflammation, skin rashes, and inflammation affecting internal organs, including the heart, liver, and spleen. This subtype can begin at any age, although the most frequent onset is during early childhood. In contrast to the other two subtypes, systemic disease occurs with equal frequency in boys and girls. Finally, systemic JRA is considered the most difficult subtype to treat, with up to 25% of children evidencing poor response to their disease, resulting in a moderate to poor prognosis (Cassidy et al. 2005).

JRA frequently results in short- and long-term disability due to joint destruction and other complications (Cassidy et al. 2005) and often extends past adolescence into adulthood (Oen 2002). Some of the more common symptoms experienced by children with JRA include acute and chronic pain, persistent inflammation of multiple joints, decreased mobility, excessive stiffness, and growth retardation (Connelly 2005). These complications often result in frequent visits to the doctor, restrictions of age-appropriate activities, and chronic school absenteeism (Connelly 2005). Damage resulting from joint destruction and other complications most frequently occurs early in the course of the disease. The course of the disease is considered unpredictable, but it most often includes varying periods of flares and remissions (Ward et al. 2008).

Medical management of JRA tends to be aggressive early in the disease and primarily focuses on reducing pain and inflammation, preventing joint deformities and destruction, maintaining complete function in affected joints, and identifying, treating, and preventing any complications (Rapoff et al. 2005). As such, the treatment of JRA is considered ameliorative and not curative. The most common treatment options for JRA include pharmacotherapy, psychosocial support, and physical and occupational therapy (Cassidy et al. 2005). Nonsteroidal anti-inflammatory drugs (NSAIDs; e.g., ibuprofen) are the first line of treatment for JRA because of their efficacy in reducing inflammation, swelling, and pain. Additional pharmacological options include cyclo-oxygenase 2 selective inhibitors, corticosteroids, disease-modifying antirheumatic drugs (e.g., methotrexate), or slow-acting antirheumatic drugs. Psychosocial support techniques focus on pain relief

techniques that assist the affected child in controlling pain caused by JRA. Finally, the goals of physical and occupational therapy are to preserve and improve range of motion, maintain the flexibility of joints, increase muscle strength, and reduce pain.

Epidemiology

Recent estimates indicate that approximately 300,000 children in the United States are affected by pediatric arthritis and rheumatological conditions (Sacks et al. 2007), with a higher preponderance in girls than in boys. The estimated prevalence rate for JRA is 0.7–4.01 per 1,000 children (Manners and Bower 2002), whereas the incidence is 15–30 new cases per 100,000 children (Sherry 2000). As such, JRA is the most common rheumatological disease of childhood, accounting for approximately 70% of arthritic disease in children, and is considered one of the most common chronic physical illnesses of childhood.

Psychosocial Adjustment

Children and adolescents with JRA may experience multiple challenges that affect their ability to effectively adjust to their disease. Possible challenges may include illness-related psychological challenges, disease exacerbation, changes in the treatment plan, adherence to the treatment regimen, and control of symptoms associated with the disease (Kietz 2004). Furthermore, several lines of research suggest that issues related to the family environment (e.g., family cohesion or conflict) also may affect the child's psychosocial adjustment to JRA (Helgeson et al. 2003; Kyngäs 2000; J.W. Varni et al. 1988). Although multiple challenges to psychosocial adjustment have been identified in the extant literature, there remains considerable debate as to whether children with JRA, and their families, are at increased risk for adjustment difficulties or actually demonstrate significant resilience given the adversities associated with this disease (Kietz 2004).

Child

In a study of psychological adjustment among youth with chronic arthritis, LeBovidge et al. (2005) examined the association of psychosocial stress and attitude toward illness with psychological adjustment. Results revealed that higher levels of illness-related and non-illness-related stressors were associated with higher levels of anxiety and depressive symptoms. Alternatively, results from a study that compared social and emotional functioning between children with JRA and case-control classmates revealed no differences on measures of social and emotional functioning (Noll et al. 2000). Indeed, both groups scored in the normative range on all measures. Furthermore, results from a study that compared children with JRA and their physically healthy peers on measures of social functioning revealed no differences between the groups on measures of social reputation and social acceptance (Reiter-Purtill et al. 2003).

LeBovidge et al. (2003) conducted a meta-analysis to examine psychological adjustment among children with chronic arthritis. Outcome variables included measures of adjustment, internalizing and externalizing symptoms of psychopathology, and self-concept. Results of the meta-analysis revealed higher levels of total adjustment difficulties and internalizing problems (e.g., anxiety, depression) in children and adolescents with arthritis. However, these children and adolescents were comparable in terms of externalizing behavioral problems and self-concept when compared with nondisease comparison control subjects.

Family dynamics and social support also play a significant role in children's adjustment and adaptation to JRA. For example, results from one study indicated that children from cohesive families adjust better to JRA, whereas children from families high in conflict demonstrate poorer adjustment (Helgeson et al. 2003). Moreover, there is evidence to indicate that greater parental distress is associated with higher levels of depressive symptoms in children with JRA (Wagner et al. 2003). In fact, social support from peers and parents may mitigate the effects of stress in children with rheumatic disease. Von Weiss et al. (2002) investigated the influence of daily hassles (psychosocial stressors that occur on a daily basis, e.g., waiting in line for prescriptions, finding a parking space at the doctor's office) and social support as these predicted adjustment in children with rheumatological diseases. Findings revealed that children who reported greater social support and less daily hassles experienced fewer overall adjustment problems. Furthermore, social support from classmates was predictive of fewer depressive symptoms (Von Weiss et al. 2002).

Parent

Consistent with the results of studies on psychosocial adjustment among children with JRA, the evidence is equivocal as to whether parents of children

or adolescents with JRA are at greater risk for experiencing psychosocial adjustment problems relative to parents of physically healthy children. For example, Manuel (2001) investigated psychosocial adjustment among parents of children with JRA. Results indicated that mothers of children with JRA reported significantly higher levels of emotional distress as compared with mothers of healthy children. Similarly, in an investigation of mothers of children with JRA, those mothers reported that they experienced greater symptoms of depression and general distress than mothers of healthy children (Frank et al. 1998).

In contrast, several studies have found no differences in psychosocial adjustment between families with and without a child with JRA. Specifically, Gerhardt et al. (2003) reported similar levels of parental distress, family functioning, and social support between families of children with JRA and comparison control families. The authors interpreted their data to suggest that families of children with JRA demonstrate significant resilience.

Cognitive Issues

Few investigators have examined whether youth with JRA experience cognitive sequelae that are associated with treatment or disease variables (Carter et al. 1999; Feldmann et al. 2005). There has been some evidence to suggest that the use of steroids associated with the management of JRA may produce cognitive sequelae (Feldmann et al. 2005). Employing a case-control design, Carter et al. (1999) examined cognitive functioning in youth with JRA and youth with chronic fatigue. Cognitive functioning was measured with the Kaufman Brief Intelligence Test (K-BIT). Findings revealed no significant differences between the two groups, with both groups having a mean K-BIT intelligence quotient that was in the average range. This suggested that cognitive functioning of youth with JRA actually may not be impaired.

Another study investigated cognitive function in systemic JRA (Feldmann et al. 2005). Specifically, the investigators examined possible cognitive and fine motor impairments in youth with JRA in comparison with healthy control subjects. Findings revealed that intellectual functioning for the JRA group did not differ from that of the comparison control group. Information processing, memory, and attention in the JRA group also were found to be within normal limits. In fact, motor performance in the JRA group was actually higher than mean scores of the comparison control group. The results of this study corroborate the earlier findings of Carter et al. (1999) and suggest that cognitive functioning is not impaired in youth with JRA. However, future research might build upon this literature in order to solidify the conclusions of these two studies.

Psychological Factors Affecting Onset and Course

Although it is unclear what may temporally precede the onset of JRA in youth, current theories implicate a diathesis-stress model with a genetic predisposition toward the disease triggered by multiple pathways such as infection, psychosocial stressors, and mood resulting in the same disease (i.e., equifinality; Schanberg et al. 2000). Although psychosocial stressors and their impact on disease onset, course, and severity have been studied in adults, a systemic investigation has not been undertaken in the pediatric population with JRA. Stress has been examined as an outcome variable in this literature rather than as a predictive factor of onset, course, and severity of disease (Schanberg et al. 2000). One study employed a daily diary method for 7 days to observe daily mood, daily stressors, and daily symptoms in 12 youth with JRA. Results indicated that JRA symptoms, mood, and stressful events fluctuated daily. The most interesting and compelling finding was that daily mood and daily stressful events significantly predicted daily JRA symptoms, specifically fatigue, stiffness, and activity interference. Daily mood also predicted daily reports of pain. The preliminary findings of this study are intriguing, and additional longitudinal research with a larger sample size is necessary to determine the role that psychosocial variables (e.g., mood, life stressors) play in the onset, course, and severity of the disease.

Evidence-Based Treatments

Psychosocial Adjustment

Although findings from the meta-analysis by LeBovidge et al. (2003) suggest that youth with JRA may be at increased risk for overall adjustment problems, little systematic research has focused on explicitly improving psychosocial adjustment among youth with JRA. In fact, few studies have examined interventions for parents and caregivers of youth with JRA (Hagglund et al. 1996; Ireys et al. 1996; Turner et al. 2001).

Ireys et al. (1996) conducted a randomized clinical trial in which mothers of youth with JRA were assigned to a 15-month social support intervention or control group. In the social support group, a mentor

was assigned (i.e., mothers of young adults who have had JRA since childhood) who provided informational support, affirmation support, and emotional support. Findings revealed that the social support intervention was effective in decreasing mental health symptomatology among mothers of youth with JRA and increasing perceived availability of support.

Hagglund et al. (1996) evaluated a 3-day residential intervention for families of youth with JRA that provided psychoeducation and medical management of the disease. Results revealed a reduction in children's internalizing, but not externalizing, symptoms. Moreover, although there was a reduction in caregiver strain, there was no change in caregiver psychological distress. A follow-up study conducted by Turner et al. (2001) evaluated the effectiveness of a workshop on parental appraisals of JRA impact and parental psychosocial well-being relative to a control group. At 3-month follow-up, parents in the intervention group reported fewer episodes of stress related to their child's disease and an improvement in their overall mental health relative to the comparison group. Although the aforementioned findings are encouraging, albeit tentative given some of the methodological limitations (e.g., small sample sizes, weak effect sizes), future research with larger sample sizes clearly is necessary.

Adherence to Medical Regimens

Youth with JRA are asked to adhere to a variety of medical regimens, including medications (e.g., NSAIDs) and therapeutic exercises (Lemanek et al. 2001; Rapoff and Lindsley 2007). Adherence to these regimens appears to be less than optimal (Rapoff 2006). In a study of youth with JRA, electronic monitoring over nearly 1 month suggested that 52% of the participants were adherent to NSAIDs, whereas 48% were classified as nonadherent (Rapoff et al. 2005). Adherence to therapeutic exercises is actually considered more problematic than adherence to medication (Rapoff 2006). Motivation appears to be a viable predictor of adherence to medication in adolescents. Similarly, uncontrollable pain and support by nurses also have been demonstrated to predict adherence to medication (Kyngäs 2002). Other predictors of adherence to medication include younger age at disease onset, longer disease duration, shorter duration of subspecialty care, greater delay between disease onset and first subspecialty clinic visit, fewer clinic visits (Litt and Cuskey 1981), dysfunctional family interactions, high family stress (Chaney and Peterson 1989), socioeconomic status, and active joint count (Rapoff et al. 2005).

Several studies conducted by Rapoff and colleagues (Pieper et al. 1989; Rapoff et al. 1984, 1988a, 1988b) have demonstrated that various psychological interventions combining behavioral (e.g., parent-managed token reinforcement programs, self-monitoring, positive verbal feedback) and educational (e.g., verbal instruction about medications, side effects, and importance of medications) strategies improve adherence to treatment for JRA (specifically medications, splint wearing, and prone lying). These studies generally suggest that these strategies are *probably efficacious* based on the criteria developed by the Society of Pediatric Psychology (Lemanek et al. 2001). Probably efficacious treatments require 1) two or more group intervention studies displaying superiority over a wait-list control group or 2) one study meeting criteria for a well-established intervention (Spirito 1999). A more rigorous randomized clinical trial compared a clinic-based, nurse-administered educational and behavioral intervention with a control group to prevent adherence dropoff to NSAIDs in youth newly diagnosed with JRA (Rapoff et al. 2002). Findings revealed that the intervention group was more adherent to medication as compared with the control group; however, no differences were observed in disease activity or functional limitations.

Pain

Pain is a clinically significant symptom of JRA in youth (Cassidy and Petty 2001). Youth with JRA experience pain on an almost daily basis (Anthony and Schanberg 2005). Pain intensity ranges in the mild to moderate range, with some children reporting higher pain intensity (Schanberg et al. 2003). The most predictive model of pain utilizes a biopsychosocial approach whereby pain is influenced by a variety of factors such as disease, demographic, and psychological variables (Anthony and Schanberg 2005). Specifically, psychological variables that may predict pain include daily mood and daily stressors (see Schanberg et al. 2000).

The frontline defense for managing JRA-related pain includes pharmacological interventions such as NSAIDs to reduce pain and inflammation. However, given that pain is conceptualized through a biopsychosocial approach, psychological approaches are also warranted. Unfortunately, few psychological intervention studies have focused on ameliorating pain, and those that do exist are riddled with

methodological limitations such as small sample sizes, no control groups, and selection bias.

Earlier studies utilized behavioral and cognitive techniques to improve the experience of pain (Lavigne et al. 1992; Walco et al. 1992). Using a multiple baseline across-subjects design, eight children received a manualized treatment employing progressive muscle relaxation, biofeedback, thermal biofeedback, and operant pain management strategies (Lavigne et al. 1992). Overall, there was a 25% reduction in mean pain scores from pre- to posttreatment. Differences were found between the immediate and delayed treatment groups. However, youth were receiving concurrent pharmacological treatment that may have confounded the results.

A second study employed a cognitive-behavioral intervention for pain (Walco et al. 1992). The intervention included eight weekly sessions of progressive muscle relaxation, meditative breathing, and guided imagery. Both youth and parents reported decreased pain immediately after the intervention and at 6- and 12-month follow-up. Participants also displayed improved activities of daily living at 6- and 12-month follow-up. Limitations of this study include the small sample size, very high rate attrition, and absence of a control group. Based on the criteria of the Society of Pediatric Psychology, cognitive-behavioral interventions are *promising interventions,* but further research with larger sample sizes and comparison groups is necessary (Walco et al. 1999). The criteria for promising interventions include 1) positive support from one well-controlled study and at least one other less well-controlled study; 2) a small number of single-case design experiments; or 3) two or more well-controlled studies by the same investigator (Spirito 1999).

Field et al. (1997) conducted a randomized trial in which youth with mild to moderate JRA who either were massaged by their parents 15 minutes a day for 30 days or engaged in progressive muscle relaxation with their parents daily for 30 days. Findings revealed that the youth in the massage group experienced both psychosocial- and pain-related improvements. Massage immediately reduced parental anxiety, diminished child anxiety based on behavioral observations, and lowered salivary cortisol levels. Long-term massage effects included less frequent pain, lower severe pain, and fewer words for pain. Parent reports indicated less severe pain during the evening and fewer pain episodes limiting vigorous activity, whereas physician reports revealed less pain and less morning stiffness.

Behavioral Approaches to Enhance Treatment

Two studies employed behavioral strategies designed to enhance the treatment of youth with JRA (Stark et al. 2005; Van der Meer et al. 2007). In a pilot study, a behavioral intervention was utilized to combat the psychological side effects (e.g., anticipatory nausea, behavioral distress) of methotrexate in youth with JRA (Van der Meer et al. 2007). Behavioral intervention (e.g., systemic desensitization or cognitive-behavioral therapy) was found to ameliorate psychological side effects in youth with JRA. A more rigorous and controlled study employed a randomized clinical trial designed to test the efficacy of a behavioral intervention compared with enhanced standard of care dietary counseling for the purpose of preventing osteoporosis in youth with JRA through increased calcium intake (Stark et al. 2005). The behavioral intervention group consisted of children and parents receiving six sessions of nutritional counseling on increasing calcium intake and behavioral strategies (i.e., positive reinforcement). The comparison group consisted of three visits for nutritional counseling. Youth in the experimental group demonstrated a significantly greater increase in calcium intake than children in the comparison group. Of clinical significance is that a greater percentage of youth in the experimental group (92%) reached the goal of 1,500 mg of calcium at posttreatment relative to the comparison group (17%).

Systemic Lupus Erythematosus

Medical Overview

SLE is the most common autoimmune connective disease of childhood. SLE is multisystemic in onset and lifelong with no known cure (Kone-Paut et al. 2007). Treatment is aimed not only at symptom management but also at prevention of further complications (e.g., organic involvement). The musculoskeletal system is frequently affected, resulting in arthritis that may be extremely painful during the initial onset and throughout the course of the disease. Other complications of pediatric SLE that may be associated with significant pain and disability include ischemic necrosis of the bone, serotosis, and vasculitis. Cutaneous manifestations (e.g., malar rash, dermatitis, alopecia, photosensitivity) also occur frequently in these patients. In addition, specific organ systems (e.g., renal, hepatic, lung, cardiac, hematological) may become involved; thus, the disease may be life threatening (Kone-Paut et al. 2007) (see Table 24–2).

TABLE 24–2. Summary of medical symptoms of systemic lupus erythematosus

System	Symptoms
Skin	Skin rash in discoid lupus; bruising; facial rash (butterfly rash); ulcers of the mouth and face
Joints	Joint pain (arthralgia) and inflammation (arthritis)
Hair	Brittle hair or hair loss
Tendons	Inflammation of the tendons
Muscles	Inflammation of the muscles (myositis); muscle aches
Lungs	Inflammation of the lining that surrounds the lung (pleuritis)
Heart	Inflammation of the lining that surrounds the heart (pericarditis)
Kidneys	Inflammation of the kidney
Blood	Poor circulation to the fingers and toes with cold exposure (Raynaud's phenomenon); inflammation of blood vessels (vasculitis); anemia
Pain	Chest pain; arthritic pain
Immune system	Swollen lymph nodes (lymphadenopathy)
Brain and nervous system	Thought and concentration disturbances; personality changes; sleep disorders, such as restless legs syndrome and sleep apnea; inflammation of the brain; photosensitivity; low grade fever; depression; seizures
Other	Menstrual irregularities; dryness of the eyes and mouth; loss of appetite, nausea, and weight loss; fatigue

Medical therapies for the disease include corticosteroids with or without immunosuppressant drugs; such therapies in and of themselves may be accompanied by significant physical (e.g., short stature, weight gain, cushingoid features) and psychiatric (e.g., depressive symptoms, emotional lability) sequelae. The course of SLE is variable, and the symptoms have wide-ranging effects including fatigue, malaise, and functional limitations (Kone-Paut et al. 2007). Because environmental factors play a role in the prevention and exacerbation of symptoms, some accommodations must be made by the patient. These include avoiding certain substances (e.g., hair dyes, ultraviolet light) as well as getting sufficient rest, maintaining regular exercise to prevent muscle atrophy, and appropriately managing stress. Finally, there are a host of other demands on the patient with SLE, including adherence to treatment regimens, frequent medical care contacts, and negotiation of psychosocial issues that may emanate from both functional limitations and physical appearance (Kone-Paut et al. 2007).

Epidemiology

Due to the paucity of data in pediatric SLE, there is little known about the epidemiology, long-term outcome, and optimal treatment of this disease during childhood (Ardoin and Schanberg 2005). It has been estimated that SLE affects 5,000–10,000 children in the United States, with the prevalence being even higher for African American individuals (Kone-Paut et al. 2007). Approximately 80% of children with lupus are female. The disorder most frequently appears and is diagnosed during adolescence. Most children and adolescents with SLE now survive well into adulthood, where management has focused on prevention of the long-term complications associated with SLE (Ardoin and Schanberg 2005).

Psychosocial Adjustment

Particularly with the complex symptom presentation and variable course of SLE, the adjustment of adolescents with SLE is of high concern (Beresford and Davidson 2006; Seawell and Danoff-Burg 2004). The array of medical and psychological manifestations of SLE clearly taxes the available coping resources of both the child and adolescent with lupus and the family (Bricou et al. 2006). In an investigation of 120 women with SLE, Dobkin et al. (2001) provided important data to indicate that as a group, women with this illness generally cope adequately with their disease over time. However,

Dobkin et al. (2001) also noted that a subset of patients (approximately 40%) evidence poor coping skills and remain distressed, thus requiring psychosocial interventions. Given the disease characteristics associated with SLE (i.e., changes in physical appearance, functional limitations, symptoms of depression, and complex symptom management), these variables are particularly relevant for youth with SLE (Beresford and Davidson 2006; Seawell and Danoff-Burg 2004). Given the clinical literature that clearly suggests the presence of depressive symptoms in children and adolescents with SLE (Nery et al. 2007), negative affect is deemed to be a particularly relevant area of adjustment. In an open interview, women with SLE indicated that one of the most troubling aspects of their disease was their physical appearance (Karlen 1998). Similarly, Cornwell and Schmitt (1990) found that women with SLE endorsed lower scores on measures of body image compared with women with rheumatoid arthritis and healthy control subjects. In fact, physical appearance is a salient issue in adolescents with SLE because of associated skin conditions and adverse effects of medication used to manage the disorder.

Because of their depressive symptoms, youth with SLE are at particular risk for cognitive distortions that are linked to physical appearance. More importantly, there has been a line of research to suggest that physical appearance is associated with adjustment in youth with chronic physical illness (Pendley et al. 1997; E.J. Varni et al. 1995). In fact, among adolescents with rheumatological disorders, body image was found to predict both social anxiety and loneliness even when severity of illness, objective ratings of attractiveness, and self-esteem were controlled (Pendley et al. 1997). Taylor et al. (1987) reported that problems with peer relationships and self-concept were endorsed as being the most frequently school-related problem, specifically for children with rheumatological disorders including those with SLE, even when compared with health-related concerns (e.g., activities of daily living, general physical health).

Recently, there has been some evidence in the adult literature to suggest that patients with SLE have greater difficulty with perceived control over their bodies relative to patients with other autoimmune disorders, including rheumatoid arthritis (Archenholtz et al. 1999). Related to perceptions of control, Tayer et al. (1996) have provided compelling evidence demonstrating a pain–learned helplessness association. High frequencies of pain and helplessness independently were associated with greater SLE-related depression. Tayer et al. (2001) suggested that helplessness and depressive symptoms are important variables that may mediate the contribution of disease status to fatigue in adult patients with SLE. Helplessness was found to mediate the effects of patients' social class on depressive symptoms such that patients who were of lower social class reported greater helplessness managing their illness. This is particularly important for a population of SLE patients who are frequently of lower socioeconomic status. Furthermore, given the developmental tasks of adolescence that include the need for autonomy and perception of control over one's environment, the data provided by Tayer et al. (1996) are important as they elucidate the essential ingredients for an intervention package for adolescents with SLE, who are at marked risk for depressive symptoms.

Some research has suggested that the use of social support may be particularly promising in enhancing disease adaptation (Bae et al. 2001; La Greca et al. 1995). Specifically, social support has been associated with lower levels of depressive symptoms and other internalizing behavioral symptoms as well as externalizing behavioral symptoms (Jump et al. 2005). Moreover, La Greca et al. (1995) found that social support from peers was an important predictor of adherence with prescribed medical treatments. Bae et al. (2001), in a retrospective cohort of 200 adult patients with SLE, found that greater levels of social support were associated with better physical and psychosocial adjustment, particularly for those individuals from more economically advantaged backgrounds.

Finally, one area of interest that has emerged from the chronic illness literature has been health-related quality of life (McElhone et al. 2006). Ruperto et al. (2004) provided important data to indicate that patients with SLE have significant impairments in their health-related quality of life, particularly in the physical domain. These investigators observed that quality of life among individuals with lupus may be affected by both disease activity and accumulated damage, particularly in the renal, central nervous, and musculoskeletal systems. Skevington (1998) delineated important variables associated with quality of life including the absence of negative mood, presence of positive mood, functional capacities, and effective management of affective and sensory components of pain. Wang et al. (2001) provided important data from the adult literature to indicate that self-reported health-related quality of life in pa-

tients with SLE is associated with functional impairments related to the disease. More importantly, Thumboo et al. (2000) prospectively identified those factors influencing quality of life in adults over a 6-month period. Findings revealed that improved physical health was associated with important psychological factors, including learned helplessness and psychological adjustment. Ravelli et al. (2005) observed that the prolongation of the life span of pediatric patients with SLE has been accompanied by a substantial risk of damage accumulation and has not been paralleled by an improvement in quality of life. Based on their observations, Ravelli et al. (2005) observed that treatment strategies aimed at improving control of disease activity and minimizing nonreversible physical damage are needed.

Cognitive Issues

The focus on cognitive sequelae in SLE is due to central nervous system (CNS) involvement inherent to the disease. SLE may affect many organs in the body including the brain. A slow decline in cognitive functions is frequently common among individuals with SLE, and it has been estimated that up to 60% of lupus patients experience gradual declines in cognitive functions (Takada 2008). Harrison and Ravdin (2002) observed that prevalence of cognitive impairments among individuals with SLE is quite variable given the diversity of demographics and disease presentation. Those cognitive functions that have been found to be impaired include short- and long-term memory, speed of information processing, ability to relate objects in space and time, and processing of emotions (for a review, see Takada 2008). Impairment may progress over the course of time and have significant impact on school or occupational functioning. Specific mechanisms underlying cognitive impairments in these individuals include occlusion of the blood vessels due to inflammation of blood vessels in the brain (vasculitis), effects of medication such as prednisone, and specific antibodies in the brain that impair cognitive functioning. Finally, there has been some evidence to suggest that single photon emission computed tomography (SPECT) may be a viable biological marker representing cerebral involvement of cognitive impairments among individuals with SLE (Kodama et al. 1995).

Neuropsychiatric Manifestations

Neuropsychiatric sequelae of pediatric SLE occur due to disease involvement in the central and peripheral nervous systems. Prevalence rates of neuropsychiatric manifestations vary widely and range from 20% to 95%; these variable rates may be due to lack of standard definitions in the literature and to the frequency of lupus-associated headaches (Benseler and Silverman 2007). Common neuropsychiatric sequelae include headaches, psychiatric manifestations (e.g., anxiety disorders, mood disorders, psychosis, cognitive dysfunction, and acute confusional state), cerebrovascular disease, seizures, and choreiform movements (Benseler and Silverman 2007).

Prevalence rates and patterns of neuropsychiatric sequelae are variable and evidenced by studies of pediatric patients with SLE. A retrospective chart review of pediatric SLE patients revealed that 44% of youth had neuropsychiatric occurrences (Steinlin et al. 1995). Nearly one-half of these youth experienced psychiatric manifestations, with the most common type of psychosis presenting as hallucinations and paranoia. Other reported psychiatric manifestations include severe depression and cognitive impairment or emotional lability. Additional observed manifestations included seizure, cerebrovascular accident, headache, and choreiform movements. In contrast, a differential pattern of neuropsychiatric occurrences was revealed in a retrospective chart review of pediatric patients with SLE (Olfat et al. 2004). For example, approximately 22% of youth had occurrences, with the most common manifestation being headache, observed in more than one-half of the youth. Fifty percent of youth also reported psychiatric symptoms consisting of depression, confusion, visual hallucinations, memory loss, and/or psychosis. Other observed neuropsychiatric manifestations included seizure, cerebrovascular accident, coma, transverse myelitis, and chorea.

A focus on psychiatric manifestations of SLE is warranted given the frequency in this population. Psychosis occurs in 12%–40% of youth with SLE and is best differentiated from idiopathic schizophrenia by the type of symptoms experienced (Benseler and Silverman 2007). The most common symptom is visual hallucinations, frequently of a threatening nature. Benseler and Silverman (2007) suggested that SPECT scans also may be helpful in differentiating whether psychosis can be attributed to SLE or idiopathic schizophrenia. Other psychiatric manifestations include mood disorders, most commonly depression, which may be organic in nature or a secondary reaction to the challenges and stressors of living with a chronic disease (Benseler and Silverman 2007).

One mechanism implicated in CNS involvement and SLE in adults includes the presence of antiphospholipid antibodies (aPL), although it is actually unclear whether aPL is associated with CNS involvement in youth (Harel et al. 2006). A retrospective cohort study was conducted with pediatric SLE patients to examine the association between aPL and neuropsychiatric manifestations (Harel et al. 2006). Approximately 34% of patients had neuropsychiatric manifestations, with the most common being seizures. Other manifestations included headache, mood disorder, cognitive dysfunction, cerebrovascular accident, and psychosis. Within this cohort, a 70% prevalence of aPL was observed; however, the relationship with neuropsychiatric manifestations was weak, with the exception of cerebrovascular accident, suggesting that there may be a different mechanism for the occurrence of neuropsychiatric sequelae in pediatric populations.

In the clinical setting, psychiatric consultations frequently are requested to assist in differentiating CNS lupus flares from corticosteroid-induced psychosis. Most of the guidance for this differential diagnosis in pediatric patients comes from case reports reported in the literature. Nonetheless, corticosteroid-induced psychosis is believed to be rare and may be ruled out if occurring in the presence of common features of CNS lupus flares such as headache, confusion, and concentration difficulties while also demonstrating uncommon features of neuropsychiatric SLE such as mania, head-banging, and excessive crying (Benseler and Silverman 2007).

Evidence-Based Treatments

To date, there have been no published intervention programs designed to enhance psychosocial adjustment and quality of life in children and adolescents with lupus. In one clinical trial that was sponsored by the National Institute of Arthritis and Musculoskeletal Disorders (Brown et al. 2008), participants included adolescent females with SLE with a mean age of 15 years. Participants were randomly assigned to one of three arms: cognitive-behavioral intervention, educational intervention, or a delayed/no contact control condition.

Given the more developed cognitive schemata of adolescents as compared with those of younger children and the success of cognitive-behavioral approaches in enhancing behavioral and emotional adjustment, the cognitive-behavioral intervention was deemed to be an appropriate match for adolescents with SLE and the specific physical and psychological sequelae that are unique to this disease. Although cognitive therapy was employed previously, primarily for pain management (Gil et al. 1996), the intervention was extended to other domains of functioning (e.g., negative affectivity, body image, social competence). The specific ingredients of the treatment package included coping skills training and cognitive restructuring techniques (Jensen et al. 1994). Efforts to teach active coping skills included training in relaxation, distraction, and problem-solving skills. Goals of the treatment included 1) developing skills for managing SLE, 2) reducing disability and perceptions of pain, 3) improving mood, 4) increasing self-efficacy expectations and perceptions of locus of control, and 5) delineating distortions associated with perceptions of physical appearance and social competence.

The cognitive-behavioral arm was administered over the course of 6 weeks. The first session focused on establishing rapport with the adolescents, explaining the rationale for the intervention, and teaching self-monitoring of mood and activity level. The second session focused on coping skills, including training in relaxation (e.g., progressive muscle relaxation, diaphragmatic breathing) and distraction (e.g., focus on things in the physical environment, mental counting technique). In addition, an important component addressed problem-solving skills (e.g., appropriate pacing of daily activities). These coping skills were discussed during the session, and the adolescents were asked to practice and apply skills as homework between sessions. Obstacles to practicing skills at home were discussed as a means of relapse prevention.

Finally, the third session focused on calming self-statements and cognitive restructuring, which are designed to diminish negative affectivity and alter perceptions of pain. Cognitive restructuring also was employed for the purpose of altering distorted perceptions of physical appearance and social competence. In this session, additional training was provided in the area of relapse prevention. Self-monitoring was employed as a means of ensuring compliance. The therapists also conducted two 10- to 15-minute telephone contacts in the week between sessions as well as other follow-up sessions. Finally, booster session were held with the adolescents at 2 months and 5 months after they began the study that focused on continued cognitive skill development, application, refinement, and relapse prevention.

Findings of the investigation revealed no significant differences in outcomes for the intervention or education group and the control group following testing or at any secondary follow-up time points. That the cognitive therapy group exhibited significantly greater change in some of the coping strategies than the other groups suggests that although the intervention may have had the desired effect of training the adolescents with SLE how to cope more effectively with their disease, this did not generalize to overall adjustment and disease adaptation or health-related quality of life.

Concluding Comments

Research in the area of rheumatological disorders of childhood has reached a tertiary stage in which experimental studies are needed to confirm much of the correlational studies that have been conducted to date. There is clearly a significant need for more psychological interventions for children and adolescents with JRA. In particular, randomized, controlled clinical trials are necessary. In fact, one study examined the perceptions of youth with JRA and their parents to determine the types of psychoeducational interventions that are needed (Barlow et al. 1999). Results indicated that both children and parents are requesting greater availability, easier access, and more comprehensive psychological interventions. Specifically, both children and parents require relevant educational information about the disease from the time of diagnosis—not simply factual information about the disease but also information pertaining to the psychological and social impact of the disease. Participants noted that many interventions were designed for the parents rather than the children and that more interventions placing children in an active role are warranted. A preference for group interventions was also reported. Thus, child-focused group psychological interventions are needed to assist youth with rheumatological disorders to cope with their disease. Finally, longitudinal studies also are needed to examine the natural history of JRA and SLE so as to determine psychosocial risk factors of the disease. It is hoped that such research will enhance the quality of life for these youth and their families.

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Infectious Diseases

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Although the medical advances of antibiotics and vaccinations have drastically reduced the mortality and morbidity of infections in the pediatric population, concerns remain regarding the optimum functioning and quality of life for youngsters with an underlying infectious disease. This chapter focuses on four examples of the interaction of an infectious disease and psychiatric symptoms: 1) *meningitis/encephalitis* as an example in which brain changes due to the illness may lead to significant sequelae; 2) *Lyme disease* as an example of a commonly seen infection in which the relationship between psychiatric symptoms and the underlying biology is unclear; 3) *pediatric autoimmune neuropsychiatric disorders associated with streptococcal infection* (PANDAS) as an example in which possible mechanisms have been elucidated as to the relationship of an autoimmune-induced response to infection leading to specific psychiatric symptoms; and 4) *pediatric HIV* as a model disease in which application of the biopsychosocial model is critical for success in comprehensive treatment and highlights an important role for the pediatric psychosomatic medicine specialist.

Meningitis/Encephalitis

Meningitis, or inflammation of the meninges, can result in severe central nervous system (CNS) illness in infants, children, and adolescents. *Encephalitis* refers to inflammation of the brain. *Meningoencephalitis* refers to both meningitis and encephalitis. Although generally caused by infectious agents (e.g., bacteria, viruses, fungi), they may also be due to noninfectious etiologies (e.g., medications, tumors) (Best and Hughes 2008).

Medical Overview

Historically, bacterial meningitis was a significant cause of morbidity and mortality in the pediatric population (Dawson et al. 1999), but the discovery of antibiotics in the 1930s and 1940s greatly decreased the mortality rate of children with bacterial meningitis (Tyler 2008). Additionally, the implementation of vaccines targeted against two forms of bacterial meningitis, *Haemophilus influenzae* type B disease and 7-valent pneumococcal conjugate vaccine (PCV7), further decreased infections of bacterial meningitis in infants and children in the developed world (Best and Hughes 2008; Tsai et al. 2008). Despite the implementation of these vac-

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cines, there is still a 5% mortality rate of bacterial meningitis in the developed world and about 30% in the developing world (Best and Hughes 2008).

Viral meningitis accounts for 82%–94% of the cases of acute meningitis (Dubos et al. 2006; Michos et al. 2007). Viral meningitis infection can range from aseptic meningitis, a syndrome of meningeal inflammation in which common infectious agents cannot be identified in the cerebrospinal fluid, to encephalitis, an acute inflammation of the brain (Eppes et al. 1999). Severe illness and death are uncommon in viral meningitis (Centers for Disease Control and Prevention 2003).

Fungal meningitis is a rare but serious infection accounting for 5%–10% of all pediatric meningitis infections and primarily seen in hospitalized patients with severe underlying disease (Krcmery and Paradisi 2000). Patients who most frequently present with fungal meningitis are critically ill neonates, neurosurgical patients, or patients whose care involves foreign body insertion (such as a catheter or central line), use of broad-spectrum antibiotics, immunocompromised status, use of steroids, and/or use of total parenteral nutrition (McCullers et al. 2000).

Encephalitis is a rare but serious pediatric health concern. There are many causes of encephalitis, with bacterial and viral infections of the CNS being the most common (Granerod and Crowcroft 2007). The clinical signs of encephalitis are similar to those of the other CNS infections mentioned previously. Fever, headache, and altered consciousness are symptoms associated with encephalitis. Neurological defects are also common and include focal or multifocal neurological impairments and focal and/or generalized seizures (Granerod and Crowcroft 2007). Overall, encephalitis is often associated with fatal outcome or profound impairment, such as severe cognitive and behavioral impairment, mood disorders, and epileptic seizures (Granerod and Crowcroft 2007).

Epidemiology

The specific pathogen likely to cause bacterial, viral, or fungal meningitis varies according to geographic location as well as age range and immune function. Currently there are about 1.6 cases of bacterial meningitis per 100,000 children age 4 years and younger annually (Peltola 2000). Although rates of invasive meningococcal disease most often occur in infants and young children, rates of infection in the United States increase marginally during late adolescence due to the high prevalence of young adults living in close proximity to one another at college (Kaplan et al. 2006). In developing countries, vaccination against *Haemophilus influenzae* type B is very expensive and rarely available to children (only available to 5.9% of children, compared with 98% in the United States) (Peltola 2000). Thus, bacterial meningitis is widespread and continues to be a major cause of mortality for children in developing countries.

The incidence of viral meningitis is greater than that of bacterial meningitis in children but is less severe; the mortality rate of viral meningitis is lower than that of bacterial meningitis (Whitaker et al. 2002). There are more than 10,000 cases of aseptic meningitis reported annually to the Centers for Disease Control and Prevention (CDC; Swayer 2002). Viral meningitis is most prevalent in the summer and autumn months; typically enteroviral infections (a type of viral meningitis) occur in June through October in the United States (Centers for Disease Control and Prevention 2003; Hasburn 2000).

Herpes simplex virus (HSV) is a common cause of acute necrotizing encephalitis that may appear at any age (Weil et al. 2000) but is most common in infants (Granerod and Crowcroft 2007). Frequency of infection is estimated to be 1 case per 250,000–500,000 people per year (Weil et al. 2000). HSV encephalitis is diagnosed in about 1 of every 3,000 live births in the United States and affects about 1,500–2,200 infants per year in the United States (Jacobs 1998).

Fungal meningitis is a rare form of an opportunistic infection and occurs in patients with compromised immune systems such as low birth weigh neonates (<1,500g), oncology patients who are neutropenic, and HIV-positive patients. Fungal meningitis may occur in the form of nosocomial pediatric meningitis. Fungal nosocomial meningitis infection is rare, occurring in 5%–10% of all nosocomial meningitis cases (Krcmery and Paradisi 2000).

Psychosocial Adjustment

Child

A child's functional level after meningitis is determined by many factors, including age, illness severity, premorbid psychosocial functioning, degree of family stability, and family financial stability (Ewing-Cobbs and Bloom 2003; Shears et al. 2005). The degree of impairment is usually greater in children who had meningitis in infancy, experienced delays in diagnosis, or suffered acute neurological complications (Grimwood et al. 2000).

Two studies (a pilot and a follow-up) conducted in the United Kingdom found that after meningococcal infection, children displayed an increase in psychiatric problems as compared with their premorbid functioning (Judge et al. 2002; Shears et al. 2005). In the pilot study, Judge et al. (2002) followed 29 children (14 boys and 15 girls), ranging from 2 years to 15.9 years (mean age, 5.7), for 1 year after hospitalization in the pediatric intensive care unit. About two-thirds of the children (16 of the 29 children) had symptoms of posttraumatic stress disorder (PTSD), including nightmares and hyperarousal associated with thoughts and associations of their illness triggering vivid and distressing memories. Ten percent of those children met the full diagnostic criteria for PTSD (Judge et al. 2002).

Shears et al. (2005) conducted a follow-up study of 60 children, ranging in age from 3 to 16 years, who were assessed for psychiatric problems after a hospital stay (either pediatric intensive care or general floor) for meningitis infection. Parents and teachers completed questionnaires detailing each child's premorbid psychiatric functioning. Three months after hospitalization, parents and teachers were asked to complete the same measures to assess changes in psychiatric function following illness, and children in the study older than 8 years answered questions regarding PTSD symptoms. The teachers reported no differences in the behaviors of the children 3 months after infection compared with premorbid functioning. However, parents reported significant increases in total emotional and conduct problems as well as hyperactivity following infection (Shears et al. 2005). Among study children older than 8 years who completed a self-report questionnaire, 11% scored in the clinically significant range for PTSD. Disease severity was related to degree of psychiatric difficulties; children who had more severe meningococcal disease and longer hospital stays had more severe psychiatric problems (Shears et al. 2005).

A study conducted by Kupst et al. (1983) that looked at the psychological impact of bacterial meningitis on 28 families found that children developed a host of behavioral problems after infection, including somatization, regression, and anxiety. After treatment, many children developed fear of medical staff and procedures; this anxiety was noted to last for more than 2 years following hospitalization. In addition, the parents' behavior and care of their child were altered after bacterial meningitis infection occurred. Once their child recovered, many of the parents remained concerned about their child's health, perceiving their child as fragile and remaining worried that their child might die. This resulted in the parents being overly protective and indulgent of their child, which was felt to contribute to behavioral issues (Kupst et al. 1983).

Children have been noted to have academic difficulties for as long as 12 years after CNS illness or injury (Grimwood et al. 2000). A 7-year prospective follow-up study conducted in New Zealand of 158 meningitis survivors, ages 3 months–14 years (age at enrollment), found 27% of children who survived bacterial meningitis had either neurological and behavioral problems or cognitive impairments compared with 11% of the control subjects (Grimwood et al. 1995). A follow-up study conducted 12 years after bacterial meningitis infection of the same patients and control subjects found that the children who had had bacterial meningitis infection remained at greater risk than control subjects for any type of disability. Specifically, differences in general intellectual, neuropsychological, and academic functions were the same at 12 years postinfection as they were at 7 years postinfection, but behavioral skills as measured by the Child Behavior Checklist deteriorated significantly in the meningitis group (Grimwood et al. 2000). The subjects who had had acute neurological complications had more behavioral and cognitive sequelae than children who had had uncomplicated meningitis or the control subjects (47% vs. 30% vs. 11.5%, respectively) (Grimwood et al. 2000).

Parent

Research on the psychological distress and needs of parents following a child's acquired brain damage (i.e., meningitis) is limited. A study conducted in Amsterdam that assessed the psychological functioning of 102 mothers and 90 fathers at 3, 6, 12, 24, and 36 months after their child was discharged from pediatric intensive care following severe meningitis found that for mothers, the prevalence of psychological distress was significantly greater compared with the general population at 3 and 6 months postillness, and for fathers, the prevalence of psychological distress was significantly greater compared with the general population at 6, 12, and 24 months following their child's infection. Up to 50% of mothers experienced psychological distress 3 months after discharge, and 69% experienced psychological distress 6 months after discharge, whereas 58% of fathers reported experiencing psy-

chological distress 6 months after discharge, 45% experienced distress 12 months after discharge, and 50% experienced distress 24 months after discharge (Ehrlich et al. 2005). A pilot study of 27 parents and a subsequent follow-up study of 105 parents (60 mothers and 45 fathers) conducted in the United Kingdom found that parents are at risk of experiencing posttraumatic stress symptoms following hospitalization. Using the 15-item Impact of Event Scale (IES), 38% of the mothers and 19% of the fathers were at risk for developing PTSD. As was seen in the child, severity of illness impacted degree of psychiatric sequelae; greater psychiatric sequelae in the parents was associated with their child having greater severity of illness and longer hospital stays (Judge et al. 2002; Shears et al. 2005).

Ramritu and Croft (1999) interviewed parents (27 mothers and 7 fathers) of 28 children with acquired brain damage (7 with meningitis) an average of 2 years after the child had been acutely ill. The investigators found that the sudden onset and critical nature of illnesses such as meningitis interfered with parents' ability to mentally and psychologically prepare. After the child became seriously ill, parents experienced shock and fear related to the uncertainty of their child's survival. In all phases (i.e., acute and rehabilitation), parents found it important to have regular contact with the medical team. The parents stated that it was particularly useful to be regularly informed about the diagnosis, treatment plan, prognosis, and any anticipated changes in their child's behavior. This contact with the medical team helped to reduce parental anxiety, distress, and fear. Social support such as a spouse, family members, other parents with children in the hospital, a church minister, and friends was also cited as helpful in alleviating parental stress, worry, and depression (Ramritu and Croft 1999).

Psychological counseling was beneficial for parents and helped them deal with their child's illness. Counseling was cited as being particularly useful in situations in which parents felt guilty or responsible for their child's illness. Specifically, parents found it helpful to be reassured that feelings of guilt, tiredness, frustration, anger, and impatience with their ill child were normal. Many parents believed that counseling should be offered regularly rather than waiting for parents to ask for the service. Lastly, parents found it important to maintain family stability by spending some time with the well sibling while caring for their sick child. Parents also found it helpful for the well child to receive developmentally appropriate information on the diagnosis, treatment, and procedures (if any) that the sick child was receiving (Ramritu and Croft 1999).

Cognitive Issues

Approximately 10%–15% of children who survive bacterial meningitis infection have severe sequelae such as deafness, motor impairments, epileptic seizures, and learning disabilities (Koomen et al. 2004). It is believed that an additional 20% of meningitis survivors experience more subtle cognitive, academic, and behavioral difficulties (Koomen et al. 2004). Baraff et al. (1993) conducted a meta-analysis of all the medical reports that delineated the outcomes of bacterial meningitis published after 1955. Reports from 4,418 children who had acute bacterial meningitis were analyzed to see if the patients experienced any type of neurological sequelae; 10.5% of children had deafness, 5.1% had profound bilateral deafness, 5.1% had mental retardation, 4.2% had spasticity, 3.5% had paresis, 4.2% had seizure disorder, and 83.6% had no detectable sequelae. Prevalence of sequelae varied significantly by type of bacterial agent (Baraff et al. 1993).

Koomen et al. (2003) assessed 149 school-age survivors of bacterial meningitis and found subtle neuropsychological effects in about 20% of children postinfection. The post–bacterial meningitis children were more than twice as likely to repeat a year of school compared with the healthy control subjects. Within this postillness group, children who had hearing loss or language delay were most likely to be referred to special needs schools (Koomen et al. 2003).

Anderson et al. (2004) looked at the cognitive and executive functioning of 109 school-age survivors of bacterial meningitis compared with healthy control subjects and found similar results to those of Koomen et al. (2003). Anderson et al. (2004) found that even though mean IQ scores for the bacterial meningitis group were within the average range, the affected group tended to perform more poorly than healthy control subjects on all measures of the Wechsler Intelligence Scale for Children–III and Wechsler Adult Intelligence Scale–III (used for children ages 17–18 years old).

Age at onset of illness is an important predictor for long-term neurological outcome. Children who contracted meningitis before 12 months of age performed the most poorly on the intellectual tests within the meningitis group. Performance was especially poor in the verbal comprehension and reading

domains (Anderson et al. 2004). Psychosocial variables play a role in predicting degree of impairment following illness; social disadvantage and limited access to rehabilitation were found to increase likelihood of cognitive impairment after infection (Anderson et al. 2004).

The vast majority of patients with aseptic meningitis make a full recovery with no neurological or behavioral sequelae (Chang et al. 2007). One study compared 33 eight-year-olds previously infected with enteroviral meningitis between the ages of 4 months and 1 year with healthy sibling control subjects and found that none of the children who had enteroviral meningitis had major neurological sequelae (Bergman et al. 1987). The postmeningitis group performed as well as the sibling control subjects on cognitive and behavioral tests (Bergman et al. 1987). Farmer et al. (1975) followed 15 infants with meningoencephalitis due to coxsackie virus B5 and compared them with 15 control subjects matched by age, sex, socioeconomic status, birth weight, and gestational age. They found no differences in IQ or visual perception tests between children who had viral meningitis and healthy control subjects. Baker et al. (1996) conducted a 3-year prospective evaluation of 16 children with a documented history of enteroviral meningitis in infancy to assess whether postmeningitis infants had deficits in physical growth, development, speech and language, hearing, or intelligence compared with 13 matched control patients. No differences were seen between the two groups in terms of growth, development, hearing, articulation, and expressive language (Baker et al. 1996). Subtle but significant differences were found between the viral meningitis group and the control subjects in terms of receptive language, and these deficits were still present 3 years after infection (Baker et al. 1996). Overall, these studies confirm that serious neurological or cognitive sequelae are rare in children with viral meningitis.

Lyme Disease

Medical Overview

Lyme disease is a tick-borne infection transmitted to humans via deer ticks and is caused by the spirochete *Borrelia burgdorferi* (Healy 2000). Lyme disease initially enters the bloodstream and can disseminate into the musculoskeletal, neurological, and cardiovascular systems (Eppes et al. 1999; Gustaw et al. 2001). Prompt diagnosis and treatment of Lyme disease commonly result in full recovery (Sood 2006). However, in cases in which treatment and/or diagnosis is delayed, chronic Lyme disease, which can cause neurological, rheumatoid, and cardiovascular sequelae, may occur (Dandache and Nadelman 2008).

The diagnosis of Lyme disease is based on clinical symptoms and in some cases is supported by findings from serological and cerebrospinal fluid tests (Dandache and Nadelman 2008). The CDC has defined Lyme disease as the presence of an erythema migrans rash 5 cm or larger in diameter or laboratory confirmation of infection with *B. burgdorferi* and at least one objective sign of musculoskeletal, neurological, or cardiovascular disease as well as a history of exposure to a geographic location that has a high incidence of deer ticks (Dandache and Nadelman 2008). If cerebrospinal fluid examination reveals more than eight white blood cells per cubic millimeter accompanied by the presence of erythema migrans and/or positive Lyme serology, a clinical diagnosis of Lyme disease is made (Eppes et al. 1999).

Serological testing for antibodies to *B. burgdorferi* involves a two-tier system, most commonly a polyvalent enzyme-linked immunosorbent assay (ELISA) followed by immunoglobulin IgM and IgG immunoblots (Dandache and Nadelman 2008). Serological testing, however, lacks sensitivity, and early Lyme disease is the most common time during the illness for false-negative results—half of all patients with early Lyme disease have a negative serology. Therefore, diagnostic testing for Lyme disease is a tool that should only be used in cases when there is a clinical question of whether Lyme disease is present. In all other instances, the CDC criteria listed earlier should be used for diagnostic purposes (Dandache and Nadelman 2008).

There are three stages of Lyme disease. The first stage is considered the incubation period and encompasses the time from tick bite to early symptoms. On average this stage lasts between 3 and 31 days and is characterized by one or more of the following symptoms: skin rash, erythema migrans 5 cm or more in diameter, fever, chills, fatigue, myalgias, and arthralgias. The erythema migrans rash is a characteristic sign of Lyme disease; however, fewer than 50% of patients with Lyme disease develop a rash (Healy 2000). The second stage of Lyme disease, the early disseminated stage, is characterized by secondary skin lesions and neurological symptoms including meningitis and facial palsy. About 15%–40% of Lyme disease patients develop these neurological

symptoms. This stage may include cardiac symptoms, namely a general slowing of the heartbeat and musculoskeletal symptoms similar to rheumatoid arthritis. These symptoms occur in about 15%–20% of patients (Healy 2000). The third stage, known as late-stage or chronic Lyme disease, can occur months or even years after the initial tick bite and is considered a chronic condition. Symptoms of this late stage commonly include chronic inflammatory arthritis, chronic ophthalmic impairment, and neurological sequelae. The most common neurological complication is subacute encephalopathy, which is characterized by cognitive deficits as well as disturbances in mood and sleep (Healy 2000).

Epidemiology

Lyme disease is the most commonly reported vector-borne infection in the United States. A surveillance report of Lyme disease in the United States from 1992 to 2006 found that a total of 248,074 cases of Lyme disease were reported to the CDC from health departments in the 50 states, the District of Columbia, and U.S. territories. During that 15-year period, the incidence in Lyme disease greatly increased from almost 10,000 cases in 1992 to almost 20,000 cases in 2006. Nearly 94% of the reported cases were from only 10 states in the northeast (Connecticut, Delaware, Massachusetts, Maryland, Minnesota, New Jersey, New York, Pennsylvania, Rhode Island, and Wisconsin). Children between the ages of 5 and 14 years had the highest rate of infection. Additionally, Lyme disease had the greatest prevalence during the summer months; 65% of reported cases had illness onset occurring in June and July (Centers for Disease Control and Prevention 2008a).

Psychosocial Adjustment

Child

In a study conducted by Healy (2000), the child's adjustment was found to be highly variable and depended on the severity of the Lyme disease as well as the organ systems affected. Premorbid cognitive, behavioral, and psychological functioning as well as family stability greatly affected a child's reaction to his or her illness. After illness onset, children have to adjust to changes in their ability to participate in many aspects of daily life. A child's mood, school performance, and energy level can all be affected. Adolescents with undiagnosed Lyme disease are seen more often for psychiatric illnesses such as depression than children without Lyme disease. Many of the behavioral changes caused by Lyme disease are similar to depression and other psychiatric illnesses such as anxiety (Fallon et al. 1998).

Fatigue is a major issue for most children with Lyme disease. Many children need to alter their schedules and decrease their activity level so they are not overexerting themselves, a task that may be challenging and upsetting for children (Healy 2000). Case studies have linked Lyme disease in children and adolescents with anorexia nervosa, obsessive-compulsive disorder (OCD), panic disorder, and psychotic features (Whitaker et al. 2002).

Parent

Chronic Lyme disease usually results from delayed diagnosis. Parents may feel angry, frustrated, fearful, and helpless regarding their child's health. Parents often blame themselves for not seeking treatment for their child sooner and the physician for not testing the child earlier. According to Healy (2000), many parents feel that the physician played down the seriousness of the illness as well as the potential for sequelae, resulting in additional anger toward the physician. Parents' negative reaction to their child having Lyme disease is mitigated if they are educated about the disease, the course of illness, and the expected symptoms (Healy 2000).

Cognitive Issues

Adams et al. (1999) assessed the cognitive functioning of 25 children 4 years after the onset of Lyme disease compared with matched sibling control subjects and found no difference in cognitive functioning between the two groups. Cognitive domains associated with neuropsychological sequelae commonly reported in adults with Lyme disease were tested using the following neuropsychological measures: IQ, information processing speed, fine-motor dexterity, executive functioning, memory, reaction time, and depression screening. Overall, no cognitive impairments in children 4 years after diagnosis and treatment were found (Adams et al. 1999).

In children with late Lyme disease, the most prevalent neurocognitive symptoms were behavioral changes, including changes in mood, forgetfulness, declining school performance, headache, and fatigue (Healy 2000). In the review conducted by Healy (2000), teachers noticed that after Lyme disease, children exhibited behaviors that interfered with learning in the classroom such as inattentiveness, distractibility, confusion, trouble staying on task,

and difficulty concentrating on tasks that required short-term memory. Many of the cognitive problems that children experience after Lyme disease infection are similar to behaviors exhibited by children and adolescents with attention-deficit/hyperactivity disorder (ADHD; Healy 2000). Overall, after Lyme disease, general intelligence is not affected, but there are specific deficits related to auditory or visual sequencing tasks that can occur in children with chronic Lyme disease (Whitaker et al. 2002).

Pediatric Autoimmune Neuropsychiatric Disorders Associated With Streptococcal Infection (PANDAS)

Medical Overview

The term *PANDAS* was established by Swedo and colleagues in 1998 to characterize a subset of childhood OCD and tic disorders thought to be triggered by group A beta hemolytic *Streptococcus* (GABHS) infection (Swedo et al. 1998). Swedo and colleagues suggested that the GABHS infection triggers an autoimmune response with antibodies targeted against GABHS that cross-react with neuronal cells to produce inflammation in the CNS, specifically in the basal ganglia. This inflammation is thought to lead to the onset of OCD and tic behaviors, including Tourette's syndrome, which are the characteristic symptoms of PANDAS (Perlmutter et al. 1999).

A diagnosis of PANDAS is made based on the following diagnostic criteria: 1) presence of DSM-IV-TR (American Psychiatric Association 2000) criteria for OCD, tic disorder, or both; 2) onset of symptoms before puberty; 3) episodic course of symptom severity, with an abrupt onset of symptoms and sudden exacerbation of OCD and/or tic behavior; 4) temporal association of psychiatric symptoms with GABHS infection (e.g., OCD and/or tic behaviors are linked to positive throat culture and/or elevated anti-GABHS antibody titers); and 5) presence of neurological abnormalities (e.g., motor hyperactivity, adventitious choreiform movements, or tics) during symptom onset and subsequent exacerbations. Patients with OCD as their primary psychiatric symptom may have normal results on neurological examination, especially during periods of remission (Swedo et al. 1998).

To make a definitive diagnosis of PANDAS, streptococcal infections associated with symptom exacerbation and declining titer levels correlated with symptom remission must be demonstrated (Swedo et al. 1998). A throat culture should be performed during onset or exacerbation of psychiatric symptoms to confirm GABHS infection because not all children with GABHS infection have a sore throat (Murphy and Pichichero 2002; Snider and Swedo 2004). Additionally, not all exacerbations of PANDAS are linked with GABHS infection. Viral infections may also trigger PANDAS reoccurrence; the primary immune response is specific, directed against a particular epitope in the GABHS, but the secondary responses may be more generalized and targeted against a wider range of antigens (Swedo et al. 1998).

Epidemiology

The average age at onset of pediatric tic disorder is 6.3 years old, whereas 7.4 years is average age at onset of OCD (Swedo et al. 1998). Children infected with PANDAS tend to display their first episode of tic and OCD behavior about 3 years earlier than children with pediatric-onset tic disorder and OCD without PANDAS (Swedo et al. 1998). Boys are more likely than girls to develop PANDAS (Murphy and Pichichero 2002; Swedo et al. 1998). In their original description of the first 50 cases of PANDAS, Swedo et al. (1998) found that incidence was highest among boys; overall rates of infection among boys outnumbered infection of girls by a ratio of 2.6 to 1. This uneven distribution was even more pronounced in children 8 years old and younger; for this age group, the incidence in boys outnumbered the incidence rate in girls by a ratio of 4.7 to 1 (Swedo et al. 1998). Murphy and Pichichero (2002) found that the average community-based medical practitioner may see one to three new cases of PANDAS per year.

Psychosocial Adjustment

Due to the sudden onset of this illness as well as the significant psychiatric symptoms, many children rapidly go from having "normal" functioning to having severe impairments. Murphy and Pichichero (2002) followed 12 children for 3 years after their initial PANDAS episode; during the initial episode, 4 out of the 12 children were referred for psychiatric evaluation due to the severity of their symptoms. For 3 of these 4 children, the psychiatric symptoms were so intense that they became incapacitated and unable to leave their home (Murphy and Pichichero 2002). The children themselves found the psychiatric symptoms quite upsetting. This is thought to be due to the

fact that there was a clear distinction between pre- and postillness functioning (Swedo et al. 1998).

PANDAS is associated with many comorbid psychiatric conditions. ADHD, affective disorders, and anxiety disorders were the most common comorbid psychiatric diagnoses associated with the 50 initial PANDAS patients. Swedo et al. (1998) also delineated the behavioral symptoms associated with exacerbation of PANDAS in the first 50 cases and found that the most common difficulties were emotional lability (66%), changes in school performance (60%), personality change (54%), bedtime fears/rituals (50%), fidgetiness (50%), separation anxiety (46%), irritability (40%), tactile/sensory defensiveness (40%), and impulsivity/distractibility (38%). These comorbid behavioral symptoms always occurred at the same time that the OCD and tics began or worsened and were associated with an increase in antistreptoccal antibody titers (Swedo et al. 1998). Antibiotic treatments that reduced the severity of OCD and tic behaviors also dramatically reduced these comorbid psychiatric conditions (Swedo et al. 1998).

Cognitive Issues

Children with acute PANDAS have an enlarged caudate nucleus, globus pallidus, and putamen in the basal ganglia (Da Rocha et al. 2008). In an analysis of the basal ganglia and related structures of 34 children with PANDAS compared with 82 healthy control subjects, Giedd et al. (2000) found a markedly enlarged caudate, putamen, and globus pallidus. However, they also found that the sizes of the thalamus and total cerebrum were similar in both groups (Giedd et al. 2000). The basal ganglia and related structures that are enlarged in children with PANDAS are also enlarged in children with Sydenham's chorea and OCD without PANDAS (Giedd et al. 2000). Enlargement of the basal ganglia and related structures is correlated to times when the child is experiencing acute PANDAS symptoms. Treatment with antibiotics for GABHS decreases the size of the basal ganglia in children with PANDAS (Da Rocha et al. 2008). When the child's symptoms are in remission/nonacute phase, the basal ganglia and associated structures return to normal size (Da Rocha et al. 2008).

Evidence-Based Treatment

There are many different types and combinations of treatments available for children with PANDAS. In general, antibiotics such as penicillin or amoxicillin that are commonly used to treat GABHS infection result in a marked decrease of OCD and tic behavior associated with PANDAS. Antibiotic treatment often leads to remission of psychiatric symptoms within 14 days, with restoration of the premorbid functional state (Murphy and Pichichero 2002).

In instances in which antibiotic treatment does not relieve the psychiatric symptoms associated with PANDAS, psychotropic medicines and psychological interventions are additional treatments to consider using when OCD and tic symptoms persist or are debilitating. Selective serotonin reuptake inhibitors (SSRIs), which are used as standard treatment for OCD, are used in the treatment of OCD symptoms associated with PANDAS. SSRIs such as clomipramine, fluvoxamine, and sertraline result in reduction of OCD and tic behavior (Moretti et al. 2008). Cognitive-behavioral therapy (CBT) has been shown to decrease OCD and tic behavior, but in follow-up studies many of these symptoms return once the CBT is stopped. As with OCD in the general pediatric population, the greatest treatment efficacy occurs when SSRIs are used in conjunction with CBT.

Immunomodulatory interventions such as intravenous immunoglobulin or plasma exchange are more invasive treatments that are used as a last resort when symptoms are severely incapacitating and do not respond to the interventions mentioned earlier. Perlmutter et al. (1999) assessed the effectiveness of plasma exchange treatment and intravenous immunoglobulin as compared with placebo/sham (saline solution) in 29 children ages 5–14 years diagnosed with severe infection-triggered exacerbations of PANDAS. At 1-month follow-up, it was found that children in both the plasma exchange and intravenous immunoglobulin groups had marked symptom improvement compared with children in the placebo group. Psychiatric symptoms remained dramatically improved 1 year after treatment; 82% of children in the experimental groups had symptom improvement from baseline (Perlmutter et al. 1999).

Debate About PANDAS

It should be noted that in the literature there is ongoing debate regarding the validity of PANDAS as a unique disease entity. Kurlan and Kaplan (2004) have challenged the five diagnostic criteria of PANDAS and have suggested that there has not been substantial evidence to confirm that the onset or exacerbations of neuropsychiatric symptoms are directly linked to GABHS infection, which is the

distinguishing feature of the PANDAS diagnosis as compared with pediatric OCD and/or tic disorder. Kurlan and Kaplan believe that because many authors have suggested that OCD and tic behavior may not be the only psychiatric symptoms associated with PANDAS, the true boundaries (and inclusion of symptoms) of the PANDAS clinical spectrum have not been scientifically validated or standardized. They also believe that the degree and characteristics of symptom severity required for a diagnosis have not been obtained against control studies. Kurlan and Kaplan have stated that the criteria of prepubertal onset is heavily based on the referral patterns of the first 50 described patients and have suggested that there is no immune-mediated explanation for why PANDAS would only occur in 3- to 12-year-olds.

Furthermore, the cause and effect of GABHS infection and neuropsychiatric symptoms are not so clear. It is well established that stress and illness of any kind cause a worsening of OCD and tic symptoms; thus, the neuropsychiatric symptoms associated with GABHS might be caused by illness in general and not the specific GABHS infection (Kurlan and Kaplan 2004). There are no strict or universal guidelines of what "temporal association" of onset of psychiatric symptoms and GABHS infection means. Swedo et al. (1998) implied that evidence of a GABHS infection up to 9 months prior to symptom onset is acceptable criteria for the diagnosis of PANDAS, but it has also been stated that the presence of GABHS in the upper respiratory tract may not be detectable until weeks after onset or exacerbation of infection. This lack of strict guidelines makes it difficult to establish PANDAS as a distinct syndrome. The lack of regular, continuous, and prospective throat cultures along with the lack of universal streptococcal antibody determinations has further hindered the ability to establish a valid temporal relationship between streptococcal infection and onset or exacerbation of neuropsychiatric symptoms (Kurlan and Kaplan 2004).

Singer et al. (2004) have focused on the lack of consistent laboratory tests aimed at determining whether patients with PANDAS have elevated levels of anti–basal ganglia antibodies when compared with healthy control subjects. Singer et al. (2004) measured anti–basal ganglia antibodies and found no major antibody changes in 15 children diagnosed with PANDAS as compared with healthy control subjects. These authors presented five inclusion criteria for evidence of an autoimmune mechanism in any neuropsychological disorder. These included 1) identification of antibodies; 2) presence of immunoglobulins at the pathological site; 3) positive response to immunomodulatory therapy; 4) induction of symptoms with antigens; and 5) ability to passively transfer the disorder to animal models.

However, recently these criteria have been met to establish an autoimmune mechanism for PANDAS in experimental mouse models (Hoffman et al. 2004; Yaddanapudi et al. 2009). In 2004 Hoffman et al. developed a PANDAS mouse model and found motor and behavioral changes in the mice immunized with a GABHS homogenate. Yaddanapudi et al. (2009) further confirmed this mechanism by which a humoral immune response to GABHS can cause CNS dysfunction and lead to PANDAS. It is believed that antibodies induced by GABHS antigens cross-react with CNS epitopes, disrupting normal neuronal function and result in repetitive behaviors (Yaddanapudi et al. 2009). Naive mice transfused with immunoglobulin G (IgG) from PANDAS mice showed abnormal behavior similar to the GABHS donor mice. Specifically, the posttransfusion naive mice displayed deficits in motor coordination, learning/memory, and social interaction; these impairments are similar to those seen in PANDAS children. This study demonstrated that IgG is the active component of the GABHS donor serum; injection of the IgG sera caused abnormal PANDAS-like behavior, while injection of IgG-depleted GABHS sera did not induce behavioral changes in the mice (Yaddanapudi et al. 2009). These two studies are some of the first to elucidate a physiological mechanism of PANDAS in an animal model, which will help to inform understanding and treatment of PANDAS in children.

Pediatric HIV Infection

Medical Overview

When pediatric AIDS was first described in the early 1980s, neurodevelopmental abnormalities were identified as a complication of HIV infection in children (Belman et al. 1985; Epstein et al. 1985, 1986). Over the past two decades, there has been significant improvement in morbidity and mortality due to early diagnosis of HIV-infected infants and children and immediate initiation of treatment according to CDC guidelines with drug regimens, including the use of highly active antiretroviral therapy (HAART). As a result, infants, children, and adolescents with HIV infection are living longer, and the prevalence and natural history of neurodevelopmental and

neuropsychiatric symptoms in these patients have changed and in many cases improved.

Epidemiology

Nearly 7,000 people around the world become infected with HIV daily (Piot et al. 2008). Globally, there were an estimated 33 million people living with HIV, with about 1.2 million in the United States in 2007. That same year around the world, there were 2.7 million new HIV infections and 2 million AIDS-related deaths (Centers for Disease Control and Prevention 2008b). Compared with an adult prevalence rate of 0.6% in North America and 0.3% in Western and Central America, the prevalence rate in Sub-Saharan Africa in 2007 was 5%. In the United States, the CDC estimated that approximately 56,300 adolescents and adults were newly infected with HIV in 2006. This translates to a rate of 22.8 per 100,000 persons. There were 135 cases of HIV/AIDS in children under 13 years of age, 41 cases in adolescents ages 13–14, and 1,332 cases in adolescents ages 15–19 (Centers for Disease Control and Prevention 2008b). In developed countries, the rate of new HIV infections has fallen substantially since the mid-1990s. This is primarily due to the effectiveness of HAART therapy, earlier detection methods, and more widespread preventive measures to slow the transmission of HIV/AIDS infection.

Today HIV infection affects people of different races disproportionately, with women of color being the fastest-growing demographic group infected with HIV; data from the 2005 census show that, combined, African American and Hispanic women represent 24% of all U.S. women. However, African American and Hispanic women accounted for 82% of the estimated total AIDS diagnoses for women in 2005 (Centers for Disease Control and Prevention 2005; McDavid et al. 2006).

Vertical or mother-to-child transmission is the primary route of infection for infants. Due to HIV-positive pregnant women receiving antiretroviral therapy, having caesarian deliveries, and avoiding breast-feeding, high-income countries have almost eliminated transmission of HIV from mother to child (Piot et al. 2008). Today the rate of vertical transmission in resource-rich countries is 1%–2% (Townsend et al. 2008).

The prevalence of HIV-related CNS disease in children was estimated at 50%–90% in early studies (Belman et al. 1988; Civitello et al. 1993; Epstein and Sharer 1998). By the mid-1990s, the prevalence was estimated to be between 20% and 50% (Blanche et al. 1997; England et al. 1996; The European Collaborative Study 1990; Lobato et al. 1995). The prevalence of encephalopathy has also decreased in children, from 40.7% in children born before 1996 to 18.2% in children born after 1996, as documented in a retrospective study of 146 vertically infected children followed at one institution. The study documented that the prevalence of progressive encephalopathy decreased from 29.6% in children born before 1996 to 12.1% in those born after 1996 (Shanbhag et al. 2005). In New York, Chiriboga et al. (2005) also documented a decrease in the rate of progressive encephalopathy from 31% in 1992 to 1.6% in 2000.

Psychosocial Adjustment

Child

How a school-age child copes with his or her illness depends on many factors, including age and developmental stage, cognitive abilities, parental adaptation, social skills, and the child's psychological makeup (Wiener et al. 2003). It is important to assess the disclosure status and stage of illness, because all these factors determine the meaning the illness carries for the child and the kind of psychological and intellectual resources available to cope with the disease and to meet each challenge. For those with vertically acquired HIV, pubertal development and sexuality, fear of contagion and transmissibility, and a need for adherence to complex and often difficult regimens are primary concerns throughout adolescence (Grubman et al. 1995).

Adherence in children and adolescents living with HIV is a significant clinical issue (Hammami et al. 2005; Murphy et al. 2005; Van Dyke et al. 2002; Wiener et al. 2004). Side effects of HIV treatment such as diarrhea, nausea, skin rashes, unusual deposits of body fat, and lipodystrophy are additional barriers to adolescent adherence (Santos et al. 2005). Other factors that contribute to poor adherence include impulsivity, short attention span, and desire to fit in with peers. Adolescents with advanced HIV disease, who are out of school and have higher alcohol use and depression, are less likely to be adherent (Murphy et al. 2005; Wiener et al. 2004). A social crisis such as a breakup with a girlfriend or boyfriend, a family fight, a problem in school or on the job, or a death can lead to brief periods of nonadherence to medication regimens and other adverse health-related behaviors.

Assessment for grief, depression, anxiety, and other mental health problems should be considered

if nonadherence suddenly occurs. Because developmentally appropriate resistance of authority and experimentation with nonadherence may lead to an increased risk of HIV viral resistance, it may be wise to consider deferring treatment with a protease inhibitor until the treatment team believes the adolescent will be able to adhere to the regimen. Adolescents are most likely to be adherent when they feel informed about their treatment and believe that taking medications is their own decision (Wiener et al. 2003). The goals for youth with HIV/AIDS are to increase self-care behaviors, to reduce secondary transmission, and to enhance their quality of life (Rotheram-Borus and Miller 1998).

Children and adolescents with HIV infection may have a number of psychiatric comorbidities. The prevalence of psychiatric disorders in pediatric HIV/AIDS has been difficult to determine, limited by small and diverse demographic samples, lack of consistent testing measurements, frequent subthreshold DSM-IV-TR diagnoses, lack of appropriate control groups, and differences between pre- and post-HAART samples (Lourie et al. 2005; Mellins et al. 2009). A review of reported DSM psychiatric diagnoses in pediatric HIV/AIDS found average prevalence rates of ADHD at 28.6%, anxiety disorders at 24.3%, and depression at 25% (Scharko 2006). The review included a study of HIV-infected youth ages 6–15 years that suggests that depression (47%) and attentional disorders (29%) are most common and that depression may be associated with encephalopathy and worsening immune function (Misdrahi et al. 2004).

Other psychiatric disorders include anxiety disorders, delirium, dementia, substance abuse, and pain disorders. Separation anxiety is common in pediatric HIV, and it may be precipitated by a life stress such as parental illness, moving, or even death of a pet. PTSD from traumatic events, including those arising from the hospital environment and invasive medical treatments, may be seen in children with HIV/AIDS. Symptoms include hypervigilance, flashbacks of the trauma, intrusive thoughts, nightmares, difficulty sleeping, and irritability or mood lability.

Delirium may occur in acute illness or be due to toxic drug interactions. Underlying medical causes such as medication intoxication should be evaluated. Certain antiretroviral agents such as efavirenz have been associated with a number of significant CNS effects including dizziness, sleep disturbances, and mood alterations that often resolve after the first few weeks of therapy but also may persist (Treisman and Kaplin 2002). The reader is referred to Chapter 5 for further discussion of delirium. HIV-associated dementia may be seen in HIV-positive adolescents who become treatment resistant or discontinue treatment (Scharko 2006). This clinical presentation is becoming more common late in the course of HIV infection of children born with HIV. Low-dose typical and atypical antipsychotic medications may be useful.

Adolescents with HIV/AIDS may develop substance abuse disorders despite their medical condition. What may begin as developmentally appropriate experimentation can become a disorder as youth find substances help them escape the reality of having a chronic life-threatening illness or may treat underlying pain, anxiety, and/or mood disorders. In addition, there may be a genetic or environmental predisposition to substance abuse.

Children living with HIV commonly experience pain (Gaughan et al. 2002; Hirschfeld et al. 1996; Lolekha et al. 2004), including abdominal pain of unclear etiology, myositis, tension headaches, and neuropathic pain that is difficult to manage. Discomfort related to invasive procedures, toxicities and adverse drug reactions, invasive secondary infections, pancreatitis, and erosive esophagitis may be treated pharmacologically. Pain has been found to be associated with more severe immunosuppression and increased likelihood of death (Gaughan et al. 2002). There are no published studies examining the relationship between chronic pain and psychological distress in HIV-infected children. Nevertheless, children fear pain, and pain is made worse by emotional distress, so attention at regular intervals to physical and emotional distress is warranted.

Parent

Due to the stigma associated with this disease, parents' anxiety associated with informing school personnel about their child's diagnosis is tremendous (Cohen et al. 1997). Most parents keep an HIV/AIDS diagnosis from the school for as long as possible. If the family decides it is in the child's best interest to share the diagnosis with the school, the health care team can assist families with the school process. How and when to disclose the diagnosis of HIV to one's child and/or others can cause significant psychological distress for children, adolescents, and parents/caregivers.

Disclosure of an HIV diagnosis to children is an individualized and dynamic process that should take place in a supportive atmosphere of coopera-

tion between health professionals and parents and should be conceived of as a process rather than as a single event (Lipson 1993, 1994). It is critical to obtain a clear understanding of the family's cultural background and the factors that might influence responses to an HIV diagnosis or disclosure of the diagnosis to the child, such as the child's cognitive status (Mason et al. 1995; Mettler et al. 1997); clear and effective language interpretation services are essential (Munet-Vilaro 2004). The American Academy of Pediatrics (American Academy of Pediatrics Committee on Pediatric AIDS 1999) published guidelines that endorsed disclosure of HIV to older children and adolescents as beneficial and ethically appropriate. Factors associated with a parent's decision to disclose the HIV diagnosis to his or her child, predictors of disclosure, and the psychological impact of disclosure have been described (Lester et al. 2002; Mellins et al. 2002).

Cognitive Issues

The CNS manifestations of HIV infection can be subdivided into 1) those directly attributable to HIV brain infection and 2) those indirectly related to the effects of HIV on the brain, such as CNS opportunistic infections, malignancies, and cerebrovascular disease.

Clinical manifestations of primary CNS HIV infection identified in the mid-1980s and early 1990s include the classic triad of HIV-related encephalopathy: 1) developmental delays (particularly motor and expressive language); 2) acquired microcephaly; and 3) pyramidal tract motor deficits (Belman et al. 1985; Epstein et al. 1985, 1986). In the past, pediatric patients were classified with either the presence or absence of encephalopathy. However, given the broad spectrum of clinical manifestations and severity of CNS disease in infants and children and the decreased prevalence of severe encephalopathy in the HAART era, researchers developed a new classification system for pediatric HIV-related CNS disease currently used at the National Cancer Institute of the National Institutes of Health. Now patients are classified as having encephalopathy, having CNS compromise, or not being apparently affected.

In general, children younger than 3 years of age have higher rates of CNS disease than older youth (Blanche et al. 1997; England et al. 1996; Lobato et al. 1995), and patients with more advanced degrees of immune suppression have higher rates of encephalopathy (Brouwers et al. 1995b), a trend that remains true in the post-HAART era. Of 62 children presenting with HIV infection before the age of 3 years in London, 22% had abnormal neurological signs and 40% had significant developmental delays; children with more severe immune dysfunction had more neurological abnormalities and developmental delays (Foster et al. 2006). HIV-related CNS disease may be the presenting manifestation of HIV infection in as many as 18% of pediatric patients, an unusual occurrence in adults (Vincent et al. 1989).

Early onset of HIV infection (i.e., infection occurring in utero) increases a child's risk for poor neurodevelopmental outcome within the first 30 months of life (Smith et al. 2000). Early onset of neurological symptoms and signs in HIV-infected infants (before the age of 1 year) seems to have a different significance and pathophysiology than those occurring later on in children and adults (Tardieu et al. 2000). In addition, the infants who went on to develop early CNS symptoms had significantly smaller head sizes and weights at birth than their counterparts without neurological symptoms. These findings suggest that prenatal onset of HIV brain infection in a subgroup of infants with early-onset neurological disease has a different course and pathophysiology of CNS disease than in older children and adolescents whose course is more similar to the dementia and motor cognitive dysfunction seen in adults. This may have important therapeutic and preventive implications.

The most common computed tomography scan abnormalities in symptomatic, treatment-naive HIV-infected children are ventricular enlargement, cortical atrophy, white matter attenuation, and basal ganglia calcifications (DeCarli et al. 1993). Calcifications may indicate a selective vulnerability of the basal ganglia of the developing brain to HIV infection because they are primarily seen in vertically infected children or premature babies who were transfused in the neonatal period (Civitello et al. 1994). In addition, the severity of brain abnormalities has been correlated with lower levels of general cognitive abilities and language functioning in children with symptomatic HIV infection (Brouwers et al. 1994, 1995a; Wolters et al. 1995).

Encephalopathy can be either progressive (subtypes include plateau and the more severe subacute) or static. The subacute progressive type is often seen in infants and young children who are naïve to antiretroviral therapy (Belman et al. 1994; Mintz 1999). The hallmarks of subacute progressive encephalopathy are loss of previously acquired milestones, particularly motor and expressive language,

with progressive nonfocal motor dysfunction (spastic quadriplegia or hypotonia in young infants and spastic diplegia or hypotonia in older infants and children) (Belman et al. 1994). The course is usually more insidious, developing over weeks to months, than the course observed with opportunistic infections, tumor, or stroke.

Children with "HIV encephalopathy" may have prominent oromotor dysfunction, facial diparesis, and abnormal eye movements (particularly nystagmus and impaired upgaze) (Civitello et al. 1993). Impaired brain growth leads to acquired microencephaly. Progressive cognitive deterioration occurs along with social regression and apathy. Extrapyramidal movement disorders such as bradykinesia, cerebellar signs, and seizures are less common (Mintz et al. 1996).

The course of the plateau type of progressive encephalopathy is more indolent, with either the absence of acquisition of new developmental skills or a slower rate of acquisition of skills previously mastered. The rate of cognitive development declines, as does the rate of brain growth. Motor involvement, particularly spastic diplegia, is common. Children with static encephalopathy tend to have fixed neurodevelopmental deficits with no loss of skills. Development continues at a stable but slow rate. IQs are stable but low. Motor dysfunction is common but not progressive. Whereas the etiology of progressive encephalopathy is thought to be related to the direct effects of HIV brain infection, the etiology of static encephalopathy can be varied and can include in utero exposure to drugs, alcohol, and/or infections; prematurity; and perinatal difficulties. Other factors include genetic influences; nutritional, endocrinological, and metabolic factors; environmental and psychosocial factors; and finally HIV brain infection.

Children with "HIV-related CNS compromise" have less severe CNS dysfunction and usually function normally (e.g., attend school, interact normally). They typically have normal overall cognitive functioning, but they may have had a significant decline in one or more neuropsychological tests (yet are still functioning above the delayed range) or they may have significant impairments in selective neurodevelopment functions. Alternatively, they may have mildly abnormal neurological examination findings (pathologically brisk deep tendon reflexes with extensor plantar responses) that do not affect their day-to-day functioning. Patients who were functioning in the average cognitive range at baseline and who have shown improvement after institution of or change in antiretroviral therapy are also classified in this category.

Children are classified as "apparently not affected" when their cognitive functioning is at least within normal limits and when there has been no evidence of a decline in functioning or of neurological deficits that affect their day-to-day functioning. In addition, there should be no therapy-related improvements in cognitive or motor functioning.

The specific domains of neuropsychological impairment seen in children with HIV disease include expressive (greater than receptive) language, attention, adaptive functioning (socialization, behavior, quality of life), and memory (Klaas et al. 2002; Wolters et al. 1995). In children treated with HAART, specific deficits in executive function and processing speed have been described (Martin et al. 2006).

Adolescents who are infected through drug use or sexual practices may display neurocognitive changes more similar to those seen in adults (Willen 2006). In adults, the features of HIV dementia consist of the new onset of progressive disabling cognitive impairment (memory loss, psychomotor slowing), usually with motor dysfunction (gait disturbance, tremor, hyperreflexia, fine motor impairments, and apraxia) and behavioral change (apathy). Neuropsychological testing usually shows impairment in frontal lobe functioning, psychomotor speed, and nonverbal memory, which has been termed a subcortical dementia.

Typically in adults, HIV dementia develops when the patient has profound immune suppression. Risk factors include low CD4 counts, anemia, increased age, female gender, and injection drug use. Prior to HAART, the course of adult HIV dementia was progressive over 3–9 months, resulting in severe neurological deficits and death, which appeared similar to the progressive encephalopathy in children. Since HAART, several subtypes of dementia have been developed including 1) a subacute progressive dementia, seen in untreated patients similar to the pre-HAART era; 2) a chronic active dementia, seen in patients on HAART with poor adherence or viral resistance; and 3) a chronic inactive dementia, seen in patients on HAART who have had some neurological recovery and are stable (McArthur 2004; McArthur et al. 2005). Minor cognitive/motor disorder is a more subtle form of HIV-related CNS disease seen in adults, which seems to be similar to CNS compromise seen in children.

Some CNS impairments are thought to be possibly due to exposure to prenatal cocaine or multiple substances (Lester et al. 2001) as well as the quality of the child's environment (Brown et al. 2004; Frank et al. 2001). Additional contextual factors such as poverty, nutrition, caregiver stability, caregiver psychiatric illness, and ongoing drug use also may play a role during child development, regardless of prenatal drug exposure and HIV disease status (Coles and Black 2006), in the etiology of CNS impairment. Finally, there are a number of secondary CNS disorders that are not directly attributable to HIV brain infection but are related to the effects of immune suppression and other unknown factors. CNS opportunistic infections such as cytomegalovirus, fungal infections (*Candida* and *Aspergillus*), and toxoplasma encephalitis can all result in cognitive impairment. Neoplasms such as primary CNS lymphoma and cerebrovascular diseases (commonly stroke) can also affect neurocognitive functioning in children and adolescents. There is a characteristic vasculopathy seen in HIV-infected children resulting in aneurysmal dilatation of vessels of the circle of Willis with or without associated ischemic infarction or hemorrhage (Husson et al. 1992; Kure et al. 1989). The etiology of this vasculopathy is unclear, but it may be related to direct viral invasion of the vessel walls (Kure et al. 1989).

Evidence-Based Treatment

In youth with HIV infection, changes in mental status or the emergence of new cognitive or psychiatric disorders requires collaboration with the medical team to rule out any reversible and treatable causes. Therefore, the mental health consultant treating HIV-positive youth should be familiar with assessments of basic immune function and viral load and have a low threshold for ordering additional medical evaluations such as head imaging and cerebrospinal fluid examination and even antiretroviral drug resistance testing.

Although many children cope well and adapt, symptoms of depression such as fatigue, cognitive impairment, decreased social interaction and exploration, and anorexia may be in part derived from a cytokine/immunological response to HIV and its treatments (Miller 2009). It may only be possible to determine that antiretroviral medication is causing psychiatric side effects by evaluating the time course of psychiatric symptoms in relation to starting HIV medication regimens and by instituting trials of stopping treatment.

In general, the same psychotropic medications can be used in the HIV-infected child as in the general population. However, bone marrow suppression, hepatitis, and pancreatitis may cause treatment-limiting toxicities and affect metabolism of antiretrovirals, particularly protease inhibitors. Treatment with psychotropic medications is part of comprehensive multidisciplinary care and multimodal treatment to improve the quality of life for pediatric HIV/AIDS patients by decreasing discomfort and increasing functioning.

Important determining factors for pharmacological intervention are severity and duration of psychiatric symptoms and overall level of functional impairment. Symptomatic treatment includes pharmacological treatment of pain, movement disorders, seizures, spasticity, ADHD, and other psychiatric/behavioral disorders in children with HIV-related CNS disease. Because the full gamut of developmental and childhood psychiatric disorders is seen in children and adolescents with HIV/AIDS, common treatment for clinical disorders is briefly discussed. The reader is also referred to Chapter 30, "Psychopharmacology in the Physically Ill Child." Adult psychiatric syndromes of adjustment disorder, major depression, anxiety, and delirium are seen in children as well. As in adults (Angelino and Treisman 2001), treatment of psychiatric syndromes in children and adolescents may improve outcomes.

A higher rate of psychotropic medication use and of psychiatric hospitalizations in HIV-infected children compared with uninfected control subjects has been reported (Gaughan et al. 2004). In addition, a high rate of psychotropic medication use (45%) in an HIV clinic cohort ($N = 64$; mean age, 15.3 years) has been reported, with psychostimulants and antidepressants being most commonly prescribed and 30% of the sample receiving two or more psychotropic medications (Wiener et al. 2006).

Psychostimulants are often used to treat ADHD in children with HIV, although dosing is not well established and efficacy is variable. Often, higher dosages of stimulants are required to achieve scholastic benefit but need to be balanced against appetite loss, growth retardation, and insomnia, which are often significant issues for children with HIV. Clonidine, bupropion, and atomoxetine use in HIV-positive youth has also been described (Cesena et al. 1995; Pao and Wiener 2008). Treatment for behavioral disorders such as repetitive and persistent patterns of aggressive behaviors, serious violations of rules, and destruction of property (American Psy-

chiatric Association 1994) is directed at behavioral and parenting interventions. Medications such as atypical antipsychotics or mood stabilizers at low dosages are considered if behavioral dyscontrol is severe (Wiener et al. 2006).

For treatment of depression in HIV-positive youth, current treatment guidelines for the management of depression in children can be followed. Antidepressants, including tricyclic antidepressants as well as SSRIs and bupropion, have been used empirically, and off label in many cases, in youth with HIV (Pao and Wiener 2008). There is no evidence that one SSRI is more effective than another in HIV-positive youth. Citalopram or mirtazapine is used due to fewer side effects and less problematic drug-drug interactions. Mirtazapine may be used to promote weight gain and treat insomnia. Methylphenidate, which may also potentiate opiate treatment, may be useful for pain and depression in HIV (Walling and Pfefferbaum 1990).

Treatment options for bipolar disorder in HIV-positive youth include divalproex sodium when neutropenia is not a concern, other mood stabilizers such as lamotrigine, and, rarely, lithium (Kowatch and Delbello 2006). Similarly, drug-drug interactions, neutropenia, and hepatotoxicity are clinical management concerns.

Scharko (2006) described a case in which risperidone was not effective and haloperidol was required to treat a delirium in the context of HIV dementia. Low-dosage typical and atypical antipsychotic medications may be useful in the treatment of AIDS dementia.

The treatment of pain in HIV-positive youth is very important and often involves a multimodal approach. The treatment goal must be to minimize pain and oversedation when possible. Pediatric pain management principles using age-appropriate assessment of all developmental ages should be applied and include a repertoire of nonpharmacological (such as distraction, relaxation, psychotherapies, and hypnosis) and pharmacological treatments (Duff 2003; Greco and Berde 2005).

Concluding Comments

Many parents experience stress after their child has been seriously ill. This is especially true when illness results in CNS involvement (Whitaker et al. 2002). After a child is critically ill, many parents' everyday activities are altered. Parents experience social isolation, strained familial relationships, time demands, and economic strains related to caring for their child (Hooper et al. 2007). In addition, parents report high levels of depression resulting from their inability to control their child's behavior (Hooper et al. 2007). The degree of anxiety and/or depression experienced by parents is directly related to the severity of their child's impairments (Hooper et al. 2007).

Bacterial, viral, and fungal meningitis and encephalitis are all serious pediatric illnesses that are generally most prevalent when a child is young (e.g., younger than 12 months old) or if a child has an immune defect. These serious illnesses result in hospitalization of the child and may also restrict appropriate stimulation early in a child's life. Restrictions of touch and contact with primary caretakers during hospitalization due to the illness as well as the parents'/caretakers' extreme worry and reaction to the child's illness may lead to altered parent-child interaction and adversely affect the child's development (Hooper et al. 2007). This likely occurs with other acute serious illnesses as well.

A portion of children with these CNS infections experience language delay and neurological sequelae of the infection. These children have slightly lower IQ scores than healthy control subjects, and it is common for children to experience marked impairment in verbal skills. Language and communication skills are particularly vulnerable to biological and environmental stress (Whitaker et al. 2002). Problems in communication skills further affect personal-social development (Whitaker et al. 2002). Overall, the physical, neurological, and psychological sequelae of CNS infection are not separate components but rather interact with and exacerbate each other.

Significant medical advancements in the detection and treatment of meningitis, Lyme disease, PANDAS, and HIV infection have dramatically increased the survival rate of children infected with these diseases. However, dissemination of the infection into the CNS as well as the fear, trauma, and overall psychological distress associated with the serious nature of these illnesses can result in significant psychiatric morbidity, affecting multiple domains of the child's and his or her family's life. Comprehensive multidisciplinary care, including psychiatric evaluation and treatment, may improve the quality of life for pediatric patients afflicted by infectious diseases by decreasing discomfort and increasing functioning. The severity and duration of psychiatric symptoms and overall level of functional impairment will determine treatment plans.

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26

Neurological Disease

D. Richard Martini, M.D.

Patients with a history of neurological disease, including epilepsy, stroke, head trauma, and brain tumor, are at greater risk for a variety of psychiatric disorders, both acute and chronic. There are typically clinical and genetic factors related to the disease and its etiology and psychosocial factors such as quality of life, family history, and life stressors that contribute to the presentation. In some cases, as in epilepsy and demyelinating diseases, the appearance of psychiatric symptoms may precede the medical diagnosis. Once the psychiatric diagnosis is made, in most cases the phenomenology, clinical course, and response to treatment do not differ between those children with and without neurological disease. This chapter reviews neurological disorders known to have psychiatric sequelae and examine the effects of epilepsy, stroke, tuberous sclerosis, white matter disease (with an emphasis on multiple sclerosis), hydrocephalus, myelomeningocele, Wilson's disease, and brain tumors. Several of these clinical presentations—for example, brain tumor, stroke, encephalitis, Lyme disease, and HIV—are also discussed in greater detail elsewhere in this volume (see Chapters 15 ["Pediatric Oncology"], 17 ["Sickle Cell Disease"], and 25 ["Infectious Diseases"], respectively).

Epilepsy

Medical Overview and Epidemiology

Seizures are defined as a temporary change in motor function, sensation, or consciousness that is the consequence of abnormal electrical discharges in the brain. These disorders are more likely to appear in childhood and adolescence, with nearly 75% appearing prior to age 20 (Cowan et al. 1989). Each individual episode, although terrifying to caregivers and family, is relatively benign for the patient. Epilepsy should be distinguished from seizure disorders that do not have long-term sequelae. Febrile seizures, for example, occur in 2%–5% of all children between the ages of 6 months and 5 years but do not indicate a need for extensive evaluation or therapy. Nonfebrile seizures are either partial or generalized and are characterized by a change in motor or sensory function or in level of consciousness. Partial seizures are further classified as simple or complex, and generalized seizures are described as tonic, clonic, or both. Descriptions of the various seizure types are provided in Table 26–1.

Seizure disorders are also present as part of complex syndromes with neurophysiological and developmental symptoms. Lennox-Gastaut syndrome is responsible for less than 5% of all childhood epilepsies and presents with intractable seizures, deteriorating cognition, autistic spectrum disorders, aggression, and hyperactivity. Landau-Kleffner syndrome is characterized by an acquired epileptic aphasia with onset typically between the ages of 3 and 8 years. There is a receptive aphasia or verbal auditory agnosia with intact hearing. Associated features include hyperactivity, inattention, irritability, and mild motor apraxia. Juvenile myoclonic epilepsy is an idiopathic syndrome that appears in the second

TABLE 26–1. Seizure disorders of childhood

Seizure type	Description	Patient characteristics	Electroencephalographic findings	Treatment	Prognosis
Febrile	Simple—Generalized, lasting less than 15 minutes, occurring once in 24 hours Complex—Focal, lasting longer than 15 minutes, occurring more than once in 24 hours Atypical—Do not meet above criteria	Average age of 24 months, typically between the ages of 6 months and 6 years, 3%–4% of all children, occurs within 24 hours of a fever greater than 39°C	Not recommended in a healthy child	Rectal diazepam in patients with prolonged or multiple seizures, phenobarbital prophylaxis with multiple seizures or a history of central nervous system disease, adequate fever control	Greater risk of recurrence when the age of onset <18 months, fever <39°C, duration is <1 hour, positive family history; 0.9% chance of developing epilepsy (compared with 0.5% in the general population)
Infantile spasms	Age-related seizures with epileptic spasms, hypsarrhythmia, and cognitive problems "Symptomatic" cases with an organic etiology, or "cryptogenic" cases with no cause and better prognosis	90% of cases develop before 2 years of age. Seizures may be preceded by cognitive deterioration. >50% with motor deficits, microcephaly, blindness, or deafness	Hypsarrhythmia (multifocal spikes, disorganized background)	Adrenocorticotropic hormone, benzodiazepines (nitrazepam and clonazepam), valproate, pyridoxine, topiramate, zonisamide, vigabatrin	Mental retardation in >50%, psychiatric disorders (autism and attention-deficit/hyperactivity disorder) in >25%
Juvenile myoclonic epilepsy of Janz	Idiopathic, with myoclonic jerks, generalized tonic-clonic seizures, and absence seizures	Most begin between the ages of 12 and 18 years, multiple triggers (stress, alcohol use, sleep deprivation, photic stimulation, menses), inherited	10–15 Hz polyspikes and intermittent slow-wave discharges; may be normal	Valproate, levetiracetam, lamotrigine, topiramate	Not outgrown, managed on one anticonvulsant, high rates of psychiatric disorder (depression)

TABLE 26–1. Seizure disorders of childhood *(continued)*

Seizure type	Description	Patient characteristics	Electroencephalographic findings	Treatment	Prognosis
Progressive myoclonic epilepsy	Myoclonic seizures and progressive neurological decline with cerebellar degeneration and/or progressive dementia	Age at onset is related to the etiology and varies from infancy to late adolescence Disorders are genetic and either autosomal recessive or mitochondrially transmitted	Not diagnostic, but magnetic resonance imaging may demonstrate cerebellar or generalized atrophy, and magnetic resonance spectroscopy may demonstrate a lactate peak Metabolic studies may also identify a specific diagnosis	Valproate, intravenous pyridoxine for patients <2 years, zonisamide, topiramate, levetiracetam, corticotrophins for short-term remissions	Generally poor, depending on the underlying diagnosis; these are degenerative diseases with refractory seizures
Absence epilepsy	Brief staring spells (<10 seconds) with no response to strong stimuli, absence seizures, eyelid fluttering, myoclonic jerks, may occur multiple times per day	Neurologically normal preschool and school-age children	Three-per-second spike-and-wave activity, especially during hyperventilation	Valproate, ethosuximide, lamotrigine	10% will develop tonic-clonic seizures
Benign rolandic epilepsy	Most common idiopathic partial epilepsy of childhood, nocturnal seizures, hemisensory and unilateral or generalized motor phenomena, genetic transmission with incomplete penetrance	Onset between 2 and 13 years of age, 80% with onset between 5 and 10 years. 20%–30% with positive family history	High-amplitude centrotemporal sharp waves that may be unilateral or bilateral, semirhythmic at times	Most responsive to low-dose monotherapy with carbamazepine Valproate, gabapentin, and lamotrigine are also effective	Syndrome is outgrown by age 18 with or without the use of anticonvulsants

TABLE 26–1. Seizure disorders of childhood *(continued)*

Seizure type	Description	Patient characteristics	Electroencephalographic findings	Treatment	Prognosis
Lennox-Gastaut	Atypical absence, tonic-clonic, tonic, or myoclonic seizures; may also present with partial simple or complex seizures Seizures are brief but may be repetitive and prolonged	Onset typically between 1 and 8 years, with greatest frequency between 3 and 5 years Patients may have structural abnormalities or central nervous system insults	Not diagnostic, but typically during wakefulness generalized, bisynchronous slow spike-and-wave and polyspike-and-wave discharges, maximal in anterior brain	Valproate, rufinamide, lamotrigine, felbamate, topiramate, benzodiazepines (clonazepam and nitrazepam)	Underlying etiology determines outcome; epileptic encephalopathy with mental retardation and behavioral disorders
Landau-Kleffner syndrome (LKS) and epilepsy with continuous spike waves during slow-wave sleep (CSWS)	LKS—loss of language with partial or generalized tonic-clonic seizures occurring in 70%–80% CSWS—partial, generalized tonic-clonic, myoclonic, atonic, or atypical absence seizures; global cognitive deterioration and behavioral disturbance; CSWS with electrical status epilepticus in sleep (ESES)	LKS—onset between 3 and 8 years of age CSWS—onset between 4 and 14 years of age	Paroxysmal spike-and-wave activity that is often continuous and generalized, although considerable variability exists Activity induced during sleep	Valproate, ethosuximide, benzodiazepines (clobazam), lamotrigine, levetiracetam, vigabatrin Adrenocorticotropic hormone in high doses to treat language and cognitive dysfunction Diazepam can suppress ESES	<50% regain language function; varying degrees of cognitive, behavioral, and motor delays are associated with aphasia

decade of life and accounts for 5%–10% of all epilepsies. The myoclonic jerks are sudden, brief, and bilaterally symmetric, usually affecting the upper extremities. Before diagnosis, these jerking movements may be misdiagnosed as nervousness, clumsiness, or tics. Benign rolandic epilepsy is the most common idiopathic partial epilepsy of childhood that affects patients younger than 15 years of age. Eighty percent of patients become symptomatic between ages 5 and 10 years, and 20%–30% of patients have a positive family history of the disorder. Patients are neurologically normal and typically outgrow the syndrome by the time they are 18 years old. There is a characteristic electroencephalographic pattern with high amplitude centrotemporal sharp waves that can be unilateral or bilateral, and the findings are amplified by sleep.

Psychosocial Adjustment

The behavioral consequences of epilepsy were first identified by Rutter in the Isle of Wight Childhood Epidemiologic Study, in which he found a nearly 30% rate of psychiatric disorder in children with seizure disorder (Rutter 1981). Subsequent studies continue to identify a wide range of psychiatric symptoms that may accompany a seizure disorder. The child's presentation and prognosis depend on an accurate assessment of seizure frequency and severity as well as the identification of behavioral and emotional sequelae. The impact of seizure frequency on the presence of psychopathology is less certain. Several studies have suggested that it has little effect unless the patient has symptomatic epilepsy, encephalopathies, and mental retardation (Berg et al. 2004; Freilinger et al. 2006).

A number of studies, including a comprehensive meta-analysis, noted higher rates of behavioral and emotional problems in children with epilepsy. Prevalence rates of mental health disorders are noted to be between 16% and 77% (Baker et al. 2005; Hoie et al. 2006; Rodenburg et al. 2006). In general, children with epilepsy have rates of psychiatric disorder three to nine times higher than those of healthy populations and populations of children with chronic illnesses known to have an adverse effect on quality of life (Austin et al. 1992). When studying this population and the factors that contribute to the onset of psychiatric symptoms, both epilepsy- and family-related variables determined outcome (Austin and Dunn 2002; Austin et al. 2001). There are also indications that although the rates of psychiatric disorder remain high in populations of children with epilepsy, the nature of the disorder is unique for each individual. Seizure-related factors, including age at seizure onset, seizure frequency, seizure type, and seizure lateralization, are not related to psychopathology in pediatric patients with epilepsy (Caplan et al. 2004). Factors other than neurophysiology must determine outcome in these cases, and there is evidence that family history of psychiatric disorder and the high level of social stress that accompanies the diagnosis play an important role (Oostrom et al. 2003, 2005). Young patients who have poorly controlled epilepsy are more symptomatic, however, and are more likely to experience delayed adaptive functioning that will prevent the acquisition of new skills. In addition, behavioral problems are more likely to develop in children with cognitive and linguistic delays when compared with children who do not experience these deficits (Handwerk and Marshall 1998).

Mood and Anxiety Disorders

There is an increased risk for depression and anxiety in children with epilepsy. Depression and anxiety disorders have been identified in these patients prior to the start of treatment, and studies with sibling control subjects found higher rates of mood disorders early after diagnosis and the initiation of treatment. This raises the possibility that the psychiatric and seizure presentations have a common neurophysiological etiology (Austin et al. 2001). There are also associations between mood disorder, disruptive behavior, and suicidal ideation in these patients (Caplan et al. 2004). The relative risk for suicidal behavior in these patients is not related to psychosocial stress or medication side effects. These patients are at greater risk for suicide than the general population (Plioplys 2003). Generally, older female patients with lower IQ, neurological disabilities, and comorbid learning disorders are more likely to experience depression along with a seizure disorder (Buelow et al. 2003; Caplan et al. 2005; Davis et al. 2003; Dunn et al. 1999; Thomé-Souza et al. 2007; Williams et al. 2003). Selective serotonin reuptake inhibitors (SSRIs) are the preferred antidepressant medication for the treatment of depression in children with seizure disorder, although there is some evidence of drug interactions with SSRIs and antiepileptic medications. Both medication groups utilize the same cytochrome metabolic systems (CYP450 and 2D6) in the liver (Flockhart and Oesterheld 2000). Rates of bipolar disorder in this population are not considered high, although few studies have carefully examined

this issue (Rodenburg et al. 2005). Parallels exist between the characteristic symptoms of mood lability, impulsivity, and rage that accompany a bipolar diagnosis and the typical presentation of epilepsy syndromes. Perhaps there are common neurophysiological models to explain both syndromes. The use of anticonvulsant medications as mood stabilizers demonstrates a common treatment pathway that reduces the hyperexcitability of neurons (Salpekar and Dunn 2007). Children with epilepsy experience social stressors that affect peer relationships and, consequently, self-esteem. Young epilepsy patients, particularly adolescents, cannot engage in a variety of age-appropriate activities for fear of a seizure recurrence, the risk of embarrassment, and the possibility of endangering themselves or others. As a result, children with epilepsy tend to avoid social situations and do not talk about the diagnosis for fear of being ostracized. This fear may be shared by parents who subsequently report more behavioral problems in their children.

Psychotic Symptoms

Children with epilepsy do not typically present with ictal or postictal psychosis in a manner similar to symptoms that accompany seizures in adults. Children with partial complex seizures, however, may have interictal symptoms of psychosis with hallucinations, delusions, and formal thought disorder in the context of poor seizure control (Caplan et al. 1998).

Family Adjustment

Parents who are not concerned about stigma or social consequences are less likely to identify psychiatric symptoms. As in most cases of childhood psychopathology, parenting style and the parent-child relationship are the variables with the most significant impact on the development of problems in children with epilepsy when seizure-related factors and family and child characteristics are controlled (Austin et al. 2004; Rodenburg et al. 2005). Family members are traumatized by the seizure events and fear that the child will eventually experience brain injury, lose intelligence, develop a brain tumor, or die. Parents who convey a sense of control and mastery over the disease provide a greater sense of emotional stability for the patient.

Cognitive and Academic Effects

Children and adolescents with seizure disorders experience problems in the classroom and generally demonstrate lower levels of academic achievement and lower IQ scores. Teachers may have lower expectations for children with seizure disorders and may either try to protect them from the typical challenges of the classroom or set low expectations for performance (Bishop and Boag 2006). Seizure frequency can certainly affect a child's attention and mental speed through both interictal and postictal presentations. Poorly controlled seizures can have a cumulative effect on the quality of the child's education. A study of young patients with complex partial seizures and normal IQs noted that psychiatric symptoms were more likely to be related to verbal IQ than to any seizure variable (Caplan et al. 2004). Higher seizure frequency is associated with lower IQ scores, poor attention, and loss of language skills. In addition, patients with severe seizure disorders that present as part of a syndrome, including infantile spasms and Landau-Kleffner syndrome, have mental retardation, hyperactivity, and a range of pervasive developmental disorders (Plioplys et al. 2007).

Inattention and impulsivity are the most consistent and significant psychiatric symptoms noted in children with new-onset epilepsy, even when controlling for demographic and seizure variables. Attention-deficit/hyperactivity disorder (ADHD) frequently occurs with children who experience a seizure disorder, with prevalence estimates as high as 38%. Patients tend to be inattentive, and it is not unusual for symptoms of ADHD to precede the epilepsy diagnosis. The disorder may be a more accurate predictor of school performance than either social or emotional factors (Williams et al. 2001). The risk factors associated with ADHD in epileptic patients are poor seizure control, additional neurological deficits, and specific antiepileptic medications including phenobarbital, benzodiazepines, topiramate, vigabatrin, and zonisamide (Aldenkamp et al. 2003; Loring and Meador 2004). There have been concerns that the use of stimulant medication is contraindicated in children with epilepsy, particularly when the disease is poorly controlled. There have been a few open-label studies that consider stimulants safe for the treatment of ADHD in children with epilepsy regardless of whether there is good seizure control (Gucuyener et al. 2003).

Pediatric Stroke

Medical Overview and Epidemiology

Cerebrovascular disorders are among the leading causes of death in children. In 2001, 28,000 years of

potential life were lost to stroke in patients under 25 years of age. Many of these patients experience permanent cognitive and motor disability, and because the disorder can strike very early in life, between 28 weeks of gestation and 1 month of age, the problems are lifelong. The presentation varies based on age, cause, and stroke location. Typically in children, patients present with hemiplegia and seizure in ischemic stroke, headache and vomiting in hemorrhagic stroke, and headache and decreased level of consciousness in cerebral venous thrombosis. The most common causes tend to be related to cardiac problems, hematological abnormalities, vasculopathies, and infections. Effective treatment is not yet well defined and tends to follow recommendations that work in the adult population. More research effort is needed in this area because nearly 30% of all strokes in the pediatric population will recur. More than 50% of children develop neurological or cognitive problems, with a nearly 20% mortality. The factors that contribute to a negative outcome include the severity of the clinical presentation, stroke subtype, cause of the disorder, and size of the infarct.

Arterial ischemic stroke (AIS) affects 2 or 3 children per 100,000 in North America and Europe, with the peak incidence during the first year of life (Giroud et al. 1995). The most common risk factors in children in contrast to adults include such diagnoses as arterial hypertension, abnormalities of extracranial and intracranial vessels, dissection of the aorta or carotid arteries or both, congenital heart disease, prothrombotic factors, diabetes mellitus, elevated homocysteine, abnormal lipometabolism, and genetic polymorphisms (Simma et al. 2007). Recurrent stroke is a significant problem in these populations, with a frequency as high as 25% (DeVeber 2005).

AIS occurs in from 0.6 to 7.9 pediatric patients per 100,000 (Earley et al. 1998; Giroud et al. 1995). In two studies of childhood AIS, hospitalization was more likely in males versus females, blacks versus whites, and ischemic versus hemorrhagic stroke. Patients had a mean age of 7.6 years (Ganesan et al. 2003; Lanthier et al. 2000; Lynch 2003). Younger patients in the first year of life are more likely to present with seizures, hypotonia, or apnea. Older patients are more likely to present with focal neurological abnormalities with hemiplegia and seizures. The most common mechanism for an AIS in nearly 80% of pediatric patients is an occlusion or stenosis of the terminal internal carotid artery or proximal middle cerebral artery. Causes in the remaining cases are typically unknown (Ganesan et al. 2003). Risk factors include cardiac disorder, hematological disorders, metabolic disorders, vascular disorders, and infarction (Strater et al. 2002). Congenital heart disease is the most common risk factor among hospitalized children (Fullerton et al. 2003), but stroke is also related to intracardiac defects, cardiac procedures, and acquired heart disease. Intracardiac thrombi are the most dangerous complications of these disorders and can embolize to the brain and precipitate thrombosis and cyanosis in patients with anemia (Kumar 2000). Among blood disorders associated with AIS, sickle cell disease is included among several genetic and acquired coagulation abnormalities in children. Sickle cell disease is the most common cause of stroke in African American children, with a rate over 200 times found in the general pediatric population. Further details about sickle cell disease are given in Chapter 17.

There is also a high rate of silent infarction that leads to a variety of neuropsychological deficits (Pegelow et al. 2002). AIS in childhood is a complication of meningitis, encephalitis, brain abscess, and sepsis, and there are reports of childhood AIS following varicella, HIV, mycoplasma, and parvovirus B19 infections (Lynch 2004). The etiology is related to the development of ischemia secondary to thrombosis due to an inflammatory response. In a study of children hospitalized in California from 1991 to 2000, meningitis and encephalitis were among the most common risk factors for stroke (Fullerton et al. 2003).

Hemorrhagic strokes appear in approximately 1.6–6.4 children per 100,000 and are more common in males and in African Americans (Fullerton et al. 2003). Patients typically present with headache, vomiting, decreased level of consciousness, seizures, and a variety of focal neurological deficits. The most common causes are vascular malformations, including arteriovenous malformations, aneurysms, and cavernous malformations.

Psychosocial Adjustment

Children with AIS and hemorrhagic stroke are at risk for the development of chronic seizures and a variety of psychiatric disorders including ADHD, disruptive behavior disorders, and anxiety disorders. Very few prospective studies exist on the psychiatric sequelae of stroke in pediatric patients. Based on evidence of high rates of psychiatric disorder in adults following stroke and the assumption that

children with brain lesions have higher rates of behavioral and emotional problems than those patients with other medical disorders, children with congenital or acquired stroke should be at greater risk for psychiatric disorders. One study followed a group of 29 patients between the ages of 5 and 15 years who had had a focal, nonrecurrent, nonprogressive, supratentorial brain lesion caused by a stroke before age 14. An orthopedic population was selected as the control group. Fifty-nine percent of poststroke subjects experienced rates of psychiatric disorder, a rate significantly higher than the control subjects and thought to be related to the effects of the lesions. These patients also had higher rates of psychiatric comorbidity. Another interesting finding was the direct relationship between neurological severity as measured by several variables, including seizure history, head circumference, degree of hemiplegia, and mobility on the functional side of the body, and the presence of psychiatric disorder. Patients with a family history of psychiatric disorder and with a debilitating neurological disorder were more likely to experience a poststroke psychiatric problem. Children with stroke also demonstrated more impairment in adaptive functioning, particularly socialization, an indication that interpersonal relationships may be affected by the same levels of emotional lability that are typically found in adult stroke patients (Max et al. 2002).

Cognitive Effects

Although the morbidity among survivors of arterial ischemic stroke is high, there are limited data on cognitive outcome. Generally, poorer outcomes are associated with incidence at younger than 1 year of age, depressed consciousness at presentation, and large hemisphere infarcts. Cognitive and behavioral deficits were noted in 3%–14% of patients following neonatal AIS after a 2- to 6-year follow-up study (Bernard and Goldenberg 2008).

Tuberous Sclerosis

Medical Overview and Epidemiology

Tuberous sclerosis complex (TSC) is a genetic disorder that produces hamartomatous growths in organs throughout the body, including the heart, kidney, skin, and brain. It occurs in approximately 1 in every 6,000 births and is the result of abnormalities in one or two genes, the *TSC1* gene on chromosome 9 at 9q34 or the *TSC2* gene on chromosome 16 at 16p13.3 (Povey et al. 1994). In 30% of cases the inheritance is autosomal dominant. Cortical tubers are most commonly found in the frontal lobes, followed by parietal, temporal, cerebellar, and occipital lobes. It is possible that the tubers act as a focus for epilepsy, with electrophysiological disturbances creating abnormal responses throughout the neural connections. Approximately 60%–80% of TSC patients experience a seizure disorder.

Psychosocial Adjustment

Children with TSC are at risk for a wide range of psychiatric disorders including anxiety, depression, and disruptive behavioral disorders frequently characterized by temper tantrums and aggression. Mood disorders may initially present with changes in sleep patterns, escalating aggression, or progressive social withdrawal with evidence of extreme shyness. These patients may also be prone to self-injurious behaviors (De Vries et al. 2007). Patients also experience sleep continuity disorders and a variety of specific fears and phobias. TSC is also associated with autism spectrum disorders at rates that are higher than those of any other known genetic disorder (Bolton 2004; Hunt and Shepherd 1993). Patients with TSC are 200–1,000 times more likely to experience autism spectrum disorders than the general population. Conversely, patients with autism are 200–300 times more likely to have TSC than the general population. Although the association is not yet clear, some investigators believe that the location of the tubers may affect the psychiatric presentation. For example, Bolton and Griffiths (1997) found that tubers in the temporal or temporoparietal lobes were associated with autistic symptoms, a finding that is consistent with several case reports that support the importance of temporal lobe abnormalities in the etiology of autism (Hoon and Reiss 1992). Despite these tendencies, there remains a great deal of variability in behavioral and developmental presentations among individuals in a pattern that is similar to the physical manifestations of TSC.

Cognitive Effects

Many patients with TSC experience comorbid learning, attentional, and developmental disorders. Those patients who do not meet strict criteria for ADHD nonetheless often demonstrate deficits in executive control processing that are associated with attention deficits and impaired goal-directed behavior. These individuals struggle to complete tasks that

require planning, organization, monitoring, and judgment (Prather and De Vries 2004). Although approximately 50% of patients with TSC have IQs in the normal range, the remainder can be mildly to profoundly developmentally delayed. The risk of psychopathology is higher in those patients who are mentally retarded. There is no gender difference in the development of psychiatric disorders among patients with TSC. In addition, there are no known differences in physical findings between male and female patients.

White Matter Disease

Medical Overview and Epidemiology

White matter provides for information transfer in the brain, whereas gray matter is involved in information processing. Myelination in the brain continues past the second decade, in contrast to the development of other brain neurons, and normal development is affected by pediatric illness and injury. The development of myelin may be related to the appearance of more mature aspects of personality like motivation, comportment, and executive functioning. All of these skills are related to the frontal lobe, which leads to the hypothesis that white matter tracts connect the frontal lobes to other regions of the brain and are therefore responsible for the development of adult behavior. There are more than 100 cerebral white matter disorders that can be classified as genetic, demyelinative, infectious, inflammatory, toxic, metabolic, vascular, traumatic, neoplastic, and hydrocephalic. Characteristic patterns of neurobehavioral dysfunction are evident in all of these disorders regardless of the etiology and demonstrate the importance of white matter in the development of high brain functioning. Disorders and diseases of white matter that affect children include the following: metachromatic leukodystrophy, globoid cell leukodystrophy, X-linked adrenoleukodystrophy, vanishing white matter disease, Pelizaeus-Merzbacher disease, Alexander disease, Canavan disease, and acute disseminated encephalomyelitis. These disorders are genetic in origin and are typically diagnosed in the first 5 years of life. Multiple sclerosis is among the most common demyelinating diseases in children and presents with isolated symptoms that may include optic neuritis, sensory signs, encephalopathy, ataxia, seizures, and brain stem disorders (Cecil and Kos 2006). Although multiple sclerosis primarily affects young adults between the ages of 20 and 40 years, 2%–5% of all patients with multiple sclerosis experience symptoms prior to age 16 years (Ness et al. 2007).

Psychosocial Adjustment

Behavioral and emotional problems may precede other signs and symptoms of white matter disease. Affected patients with gliomatosis cerebri and multiple sclerosis, for example, experience apathy and fatigue before signs of cognitive deficits and functional decline. Psychiatric presentations vary by disease and the subsequent cognitive and functional level of the child. The diagnosis of psychiatric disorder in these patients is complicated by the emotional impact of the disabilities. It is difficult to determine whether the patient has a primary psychiatric diagnosis or an adjustment disorder. There is no direct correlation between white matter dysfunction and the etiology of psychiatric disorder. This implies that the relationship is indirect at best. However, in studies of multiple sclerosis patients, negative thoughts that are associated with depressive syndromes are predictive of cognitive difficulties. The clinician should assume that the origins of the psychiatric symptoms are multifactorial and interrelated. In children with multiple sclerosis, more than 50% experience depression, anxiety, or adjustment disorders (Brousseau et al. 2007).

The availability of family support is a strong predictor of adjustment in children with white matter disease. Families that communicate and seek additional support from friends and health care providers are more available for their children and help them better cope with the diagnosis. The impact on school performance is particularly significant. Young patients may become disinhibited, openly oppositional, and disruptive in the classroom and experience a deterioration in academic performance. The sudden development of attentional difficulties in a preteen or adolescent is unusual and may be misinterpreted as defiance. Frequent redirection by the teacher leads to greater sensitivity and increasing irritability in the patient.

Cognitive Effects

Cognitive dysfunction is the most common neurobehavioral syndrome that develops as a consequence of white matter disease. The deficits are generalized rather than focal and, as in the case of multiple sclerosis, severe enough to be classified as a dementia. The range of possible neuropsychological symptoms in these cases includes the following: sus-

tained, divided, and selective attention deficits; executive dysfunction; confusion; memory retrieval deficits; visuospatial impairment; personality change; depression; somnolence; lassitude; and fatigue. Occasionally, young patients are given DSM psychiatric diagnoses as the primary cause of the clinical presentation, and there are cases that initially present with psychiatric symptoms before cognitive impairment is identified. Affected patients with gliomatosis cerebri and multiple sclerosis, for example, experience apathy and fatigue before signs of cognitive deficits and functional decline. Apathy is typically associated with medial frontal lesions, and fatigue accompanies frontal lobe demyelination. Early emotional symptoms are indicators of a more localized illness that precedes progression to a generalized disorder.

HYDROCEPHALUS

Medical Overview and Epidemiology

Hydrocephalus develops as an isolated congenital disorder in approximately 1 out of 1,000 births and leads to an enlarged ventricular system in the brain and associated expansion of the ventricles, displacement of adjacent brain structures, and increased intracranial pressure (Avellino 2005). Obstruction involves the lateral, third, and fourth ventricles; the foramen of Monro; and the cerebral aqueduct. The causes of the obstruction vary by location, and the signs and symptoms vary by age. It is the mechanical distortion of brain structures, causing altered cerebral blood flow and changes in metabolism and neurotransmission, that leads to the development of psychopathology (Braun et al. 1997; Caner et al. 1993: Catalan et al. 1994; Da Silva et al. 1994; Del Bigio et al. 1997; Tashiro et al. 1997). Subsequent reductions in brain mass and cortical mantle affect the parietal and occipital regions, a problem that is particularly prevalent in younger patients (Dennis et al. 1981; Fletcher et al. 1996; McAllister et al. 1991). Possible etiologies include congenital disorders like myelomeningocele and associated Chiari malformation, aqueduct stenosis, and Dandy-Walker syndrome. Hydrocephalus can also be acquired through prematurity and intraventricular hemorrhage, meningitis, traumatic brain injury, tumors, and infectious diseases. There are no nonsurgical interventions that are effective in the treatment of hydrocephalus. Surgical options involve either nonshunting or shunting procedures.

Psychosocial Adjustment

Children with hydrocephalus experience behavioral and emotional problems at rates as high as 40%. These patients have physical handicaps and endure long-term monitoring and a variety of invasive procedures. Their level of functioning is affected by impairment in fine motor skills, executive functioning, learning, memory, language, and attention. These deficits may lead to problems in social competence and eventually to internalizing disorders. Most of the studies that focus on the emotional adjustment of hydrocephalus patients focus on those children with spina bifida. Nevertheless, it appears that patients with hydrocephalus who are shunted or who had shunt revisions are more likely to experience psychiatric disorders when compared with control subjects (Fletcher et al. 1995).

Cognitive Effects

The cognitive effects of hydrocephalus vary considerably based on the impact on specific areas of the brain. Included are deficits in attention, executive functioning, learning, motor skills, and behavior (Mataró et al. 2001). Behavioral problems, specifically those characterized by inattention, are related to the degree of severity. Most patients present with overactivity, inattention, and impulsivity. It is also possible that symptoms of ADHD may be a consequence of executive dysfunction due to changes in the frontodorsal striatal circuit or alterations in the frontoventral striatal circuits (Sonuga-Barke 2002, 2004).

MYELOMENINGOCELE (SPINA BIFIDA)

Medical Overview and Epidemiology

Myelomeningocele (spina bifida) is among the most common birth defects, affecting approximately 1 in every 1,000 live births (McClone and Ito 1998), and is typically among the most challenging and complex pediatric conditions. It is caused by a failed closure of one or more vertebrae during the first few weeks of gestation. Management requires care from birth through adulthood by a multidisciplinary team that includes neurosurgery, urology, orthopedics, physiatry, neurology, and psychiatry. Patients experience frequent and sudden life-threatening emergencies, declining neuromotor function, recurrent headaches, and back pain. Patients with lesions

in lumbar nerve root L3 will ambulate, possibly with assistance. Children with lesions in the L1–L3 range will ambulate with difficulty and require high braces and orthotics. Lesions above L1 indicate nonambulation and dependency on a wheelchair. Hydrocephalus and the subsequent need for cerebrospinal fluid shunting during the newborn period occur in nearly 80% of cases. The need for shunt revisions often follows and requires lifelong assessments. Symptoms of shunt failure may be subtle and may not necessarily present with symptoms or signs of increased intracranial pressure such as headache, vomiting, lethargy, and papilledema. Instead, patients may complain of behavior change, decreased school performance, and chronic headache. Increased intracranial pressure in the context of shunt failure is life threatening and should be treated as a medical emergency. Neurogenic bladder is a source of morbidity and mortality due to complications like hydronephrosis and recurrent urinary tract infections. Patients must use a catheter to empty the bladder and comply with routine regimens in order to avoid medical complications. Urological interventions are attempted to relieve the patient of this burden by creating stoma that allow direct bladder catheterization. Neurogenic bowel is not a source of mortality but causes significant morbidity. Patients may experience fecal incontinence and social embarrassment. Patients must follow a strict regimen of fecal evacuation, something that becomes less acceptable as patients approach adolescence. A MACE (Mitrofanoff for Antegrade Colonic Enema) procedure creates an abdominal conduit into the colon for the delivery of high-volume fluids. This allows the patient to defecate at regular intervals. In addition to hydrocephalus, these patients experience weakness or paralysis of the lower extremities and urinary and bowel incontinence.

Psychosocial Adjustment

Patients with myelomeningocele are at risk for behavioral problems and psychiatric disorders including poor self-esteem, less positive affect, and high levels of stress (Lavigne et al. 1988; Snow et al. 1994). Patients commonly report more internalizing behaviors, fewer family interactions, less social competence, and less independent behavior (Lavigne et al. 1988). Preadolescents are more likely to experience poor adaptation than older patients and are less likely to initiate social contacts and make independent decisions. This is typically accompanied by a more passive style when interacting with family members, particularly parents. Although inattention is a recurrent issue, these patients are less physically active given their limitations (Holmbeck et al. 2003). These tendencies develop prior to adolescence, indicating that developing mood problems are likely to persist into adolescence. Few of these patients date regularly as teenagers, and the resulting social isolation leads to reduced interactions with peers and delayed social maturation (Hayden et al. 1979). Lower socioeconomic status contributes to lower expectations for school performance in this population and appears to have an additive effect in poor psychosocial adjustment as well (Holmbeck et al. 2003).

Cognitive Effects

The presence of hydrocephalus in this population increases the risk for reduced neuropsychological functioning that persists into adulthood. Patients typically score in the low average range on tests of intelligence and have deficits in executive functioning, abstract reasoning, and attention (Fletcher et al. 2005). A larger number of shunt revisions is associated with reduced performance IQ and difficulties in functional mathematical skills (Hetherington et al. 2006). In addition, studies have noted that shunt revisions after age 2 are associated with lower levels of independence and achievement when these patients become adults (Hunt 1990).

Wilson's Disease

Medical Overview and Epidemiology

Wilson's disease develops as a consequence of an abnormality in the metabolism of copper that leads to an accumulation of copper in the hepatocytes, eventually leading to cell death. As these cells die, copper is released into the bloodstream and begins to accumulate in the brain, eyes, kidneys, muscles, bones, and joints. It is the accumulation of copper in the brain and liver that creates the most characteristic symptoms of Wilson's disease. The disorder has a broad range of symptoms and requires a high index of suspicion for an accurate diagnosis. Liver disease is the most common presentation in adolescence, with elevated serum aminotransferase levels, jaundice, anorexia, vomiting, abdominal pain, ascites, weight loss, bleeding, hepatomegaly, and splenomegaly. Pediatric patients may present with hemolytic anemia, a disorder with a mortality rate of nearly 80%, and can have a fluctuating course with spon-

taneous remissions and exacerbations. More than 30% of young patients experience neurological symptoms including dysarthria, dysphagia, and a variety of movement disorders that include dystonia, rigidity, tremor, ataxia, and ballism. Patients may also present with premature osteoporosis and arthritis, cardiomyopathy, pancreatitis, nephrolithiasis, hypoparathyroidism, and infertility. Laboratory studies have noted a low ceruloplasmin in up to 95% of the cases, although the level can be low in asymptomatic cases, and a high 24-hour urine copper level. In half of patients with liver disease and in nearly all patients with neurological or psychiatric symptoms, patients will have Kayser-Fleischer rings on slit-lamp examination. A liver biopsy is another option when the diagnosis is uncertain or when measuring copper concentration. Neuroimaging is recommended in cases with neurological and psychiatric symptoms and frequently demonstrates an increased T2-weighted signal in the caudate, putamen, subcortical white matter, and brain stem.

Penicillamine is the first oral agent used to treat Wilson's disease by producing the excretion of copper in the urine. Tetrathiomolybdate is a more effective chelating agent with fewer side effects, including a much lower risk of neurological deterioration. Trientine is typically used as a chelating agent in cases of hepatic or neuropsychiatric symptoms. Patients with mild to moderate disease recover over a period of 6 months with acute therapy. Any persistent neurological, psychiatric, or hepatic disorder that remains after 2 years is likely to be permanent. A study by Akil et al. (1991) described a good prognosis in nearly two-thirds of patients treated for psychiatric disorders.

Psychosocial Adjustment

One-third of children with Wilson's disease will initially present with psychiatric symptoms, and nearly 60% will eventually have psychiatric manifestations of the disorder. Patients with Wilson's disease have at least one of the following problems at some point in the course of the disorder: dementia, psychosis, impulsivity, and oppositional defiant disorders that can later develop into disturbances of conduct. It is not unusual for patients with impulsive and acting-out behaviors to eventually become involved with police and the courts. Studies in adult patients have noted that psychosis is relatively rare in patients with Wilson's disease. The disease instead presents with personality change, depression, and cognitive impairment (Dening and Berrios 1990). In summary, Wilson's disease should be considered when a young patient has a family history of jaundice, evidence of neuropsychiatric disorder and premature deaths in siblings, sudden onset of psychiatric disorder with extrapyramidal symptoms, bleeding symptoms, recurrent or pathological fractures, and poor response to therapeutic interventions (Srinivas et al. 2008).

Cognitive Effects

Little information is available on the cognitive sequelae of Wilson's disease in children and adolescents, although it appears that these patients experience a decline in school performance. The disorder affects several parts of the central nervous system (CNS) including the cerebellum, brain stem, thalamus, subcortical white matter, and (most significantly) basal ganglia. In adults, Wilson's disease is associated with cognitive deficits and a subcortical dementia (Cummings 1986). Controlled studies comparing adult patients with Wilson's disease with healthy control subjects are beginning to delineate a broad range of cognitive impairments in patients with neurological symptoms, specifically in the areas of memory, executive skills, and visuospatial processing (Seniow et al. 2002).

Brain Tumors

Medical Overview

Brain tumors compose nearly 20% of all childhood cancers and are the most common form of solid malignant tumor that occurs in childhood. The incidence rate is nearly 3.5 cases per 100,000 person-years. Three thousand children are diagnosed with a primary brain tumor every year. Mortality is high, with a 5-year survival rate of 63% following the diagnosis of a primary malignant brain tumor (Central Brain Tumor Registry of the United States 2002). Treatment for childhood brain tumors has not changed significantly over the past 20 years, with most lesions requiring a combination of surgery, radiation, and chemotherapy. Surgery has inherent limitations when certain situations make an excision of the tumor risky or nearly impossible. Radiation therapy is most often used in combination with surgery, but the side effects, particularly in young children, can lead to severe cognitive and behavioral dysfunction. Corticosteroids, including dexamethasone, decrease the edema associated with brain tumors and improve the symptoms that are caused by

brain swelling. Unfortunately, these medications often result in side effects that include mood lability and psychosis. The drugs also decrease blood-brain barrier permeability and increase the toxicity and drug interactions from chemotherapeutic agents.

Psychosocial Adjustment

Management issues for the mental health specialist consulting on these cases are acute and chronic. Presentation is based on both the location of the tumor and the age of the patient. Psychiatric morbidity is high among survivors of malignant pediatric brain tumors. These patients are exposed to surgery, radiation, and chemotherapeutic agents that cause acute and chronic effects on the brain and CNS. Patients may develop endocrinopathies, growth abnormalities, intellectual decline, neurocognitive and psychosocial dysfunction, and a variety of behavioral and emotional disorders including depression, anxiety, dementia, and personality disorders (Zebrack et al. 2004). Patients with CNS malignancies are more likely to experience a psychiatric hospitalization than survivors of other forms of cancer. Cranial radiation is particularly problematic; the severity of late neuropsychiatric effects in the survivors of pediatric malignant brain tumors is related to the radiation dose and the age at treatment (Danoff et al. 1982). The effects of radiotherapy peaks some 3–5 years after treatment, with evidence of focal necrosis and progressive necrotizing leukoencephalopathy with necrosis, demyelination, and reactive gliosis. Patients may also present with increased ventricular size, widened sulci, areas of hypodensity or hyperintensity, and focal calcifications years after treatment (Valk and Dillon 1991). Psychotic symptoms develop following infarction, tumors, or traumatic brain injury and can appear years after the original insult.

Frontal Lobe Tumors

The frontal lobes of the brain function to maintain judgment, motivation, and essential aspects of personality including appropriate social skills. In adolescents and adults, lesions of the frontal lobe have resulted in the development of apathy, disinhibition, and emotional lability. It also appears that a certain degree of laterality exists, with left-hemisphere lesions associated with depression and right-hemisphere lesions associated with impulsivity and mood lability. Lesions of the frontal lobe can also affect attention, insight, mood, planning, and interpersonal communication depending on the location (Mah et al. 2004). The nonmotor frontal lobe is subdivided into the prefrontal anterior cingulate and the dorsolateral, orbitofrontal, and ventromedial cortices. The dorsolateral prefrontal cortex generates goal-directed behavior; thus, lesions in this area lead to labile affect, depression, and poor executive functioning. Judgment and socialization are based in the orbitofrontal cortex, and patients with tumors in this area tend to be disinhibited, with a "pseudopsychopathy" that may include mood fluctuations, self-mutilation, antisocial behaviors, and personality traits characteristic of borderline personality (Berlin et al. 2004). Ventromedial prefrontal cortex is responsible for empathy, foresight, and reversal learning. Deficits that result from lesions in this area include the persistence of high-risk negative behaviors that in the past were rewarded but currently have severe and adverse consequences. The anterior cingulate affects motivated attention and concentration along with the ability to recognize affect and mood conflicts. Tumors in this area interfere with these functions and lead to deficits in concentration, awareness, and mood congruence.

Craniopharyngioma

Craniopharyngiomas are benign, slow-growing tumors that develop from remnants of the craniopharyngeal duct. They are relatively rare and grow in close proximity to the hypothalamus and pituitary. As a result, the tumor disrupts both the endocrine and autonomic nervous systems. Injury to the hypothalamus can produce changes in eating, sleeping, reproduction, and body temperature. Affected connections from the hypothalamus to the limbic system can lead to increased emotionality. Psychiatric disorder is also a consequence of resulting changes in endocrine functioning, as are the alterations in sleeping, eating, and autonomic functioning that frequently accompany hypothalamic injury. Following surgery for craniopharyngioma, nearly 60% of patients experience obesity due to hypothalamic insensitivity to endogenous leptin release (Roth et al. 1998). The extent of hypothalamic damage, assessed on magnetic resonance imaging, correlates with the postoperative body mass index. These patients are also described as labile, aggressive, and disinhibited in patterns similar to those identified in frontal lobe syndromes.

Posterior Fossa Tumors

The posterior fossa syndrome is identified in over 30% of children after the resection of a cerebellar tumor. Young children with posterior fossa tumors will

present with lethargy, failure to thrive, and slowing of developmental milestones before specific neurological signs appear. They may also present with psychiatric symptoms characterized by bizarre behavior, emotional lability, extreme irritability, and decreased initiation of voluntary behavior. This presentation is identified as a posterior fossa syndrome and is noted in nearly 30% of patients following resection of cerebellar neoplasms. The symptoms accompany lesions in the vermis, floor of the fourth ventricle, or both (Levisohn et al. 2000; Sadeh and Cohen 2001). A study of 19 young patients with posterior fossa lesions noted increased emotional lability, persistent apathy and dysphoria, and inattention following surgery (Turkel et al. 2004).

Cognitive Effects

Young patients diagnosed with brain tumors experience a decline in cognitive functioning over time. Most studies involved medulloblastomas because the tumor is located in the posterior fossa where the direct effects on intelligence are less likely and because the prognosis for recovery is favorable. The effect of CNS therapy on cognitive skills can then be more accurately assessed. Studies of patients given craniospinal radiotherapy for medulloblastoma show significant declines in IQ over time. The effects of cranial irradiation are particularly devastating for children diagnosed and treated at very young ages. Decline in IQ may also be related to the presence of hydrocephalus and the posterior fossa syndrome. Studies of attention and memory in young brain tumor patients reveal similar patterns of increasing cognitive deficits associated with younger age, increased time from radiotherapy, and higher doses of radiotherapy (Mulhern et al. 2004).

Concluding Comments

Virtually every neuropsychiatric disorder that appears in adults can also develop in children. Diseases of the CNS have the highest risk for poor psychosocial outcome regardless of age, yet it is not known whether similar findings occur in children with CNS lesions or whether developmental factors influence their presentation. The child is vulnerable due to an immature brain that is susceptible to injury, with long-lasting cognitive and behavioral consequences. The nature of the deficits depends on the nature and location of the disease. Treatment is currently dictated by symptom presentation and psychiatric diagnosis, but with more evidence-based study interventions may eventually target specific disorders associated with neurological disease.

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27

Traumatic Brain Injury

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Traumatic brain injury (TBI) is a leading cause of hospitalizations and death among children and adolescents and therefore represents a major public health problem (Langlois et al. 2006). Pediatric TBI results in substantial medical and neurobehavioral morbidity (McLean et al. 1995; Slomine et al. 2006; Yeates 2000). The management of TBI requires an interdisciplinary approach during all phases of recovery. Medical and mental health professionals are often asked to address the emotional and behavioral needs of these patients. The goal of this chapter is to provide a review of the complex medical and neurobehavioral factors, as well as empirically supported treatments, that are relevant when consulting with this population.

Medical Overview

Health care professionals consulting with children with TBI need to understand the medical issues and complications that can develop during recovery from brain injury. Factors to be considered include the classification of injury severity, neuropathology and neuropathophysiology of TBI, methods of assessing neuropathology, management of medical complications, and assessment of postacute recovery.

Classification of Injury Severity

Injury severity has consistently proved to be a major determinant of the consequences of TBI (Oddy 1993). However, methods of classifying TBI severity vary and are often not well standardized. Classifications of TBI severity have been developed based on factors such as impairment of consciousness and length of posttraumatic amnesia (see Table 27–1). The most common measure of injury severity is the Glasgow Coma Scale (Teasdale and Jennett 1974; see Table 27–2). Studies using this scale as the measure of severity have found that the majority of TBIs can be classified as mild (Kraus 1995). For instance, the National Pediatric Trauma Registry (Lescohier and DiScala 1993) indicated that 76% of TBIs are mild, 10% moderate, and 13% severe. Most children with TBI, especially with moderate or severe injury, experience a period of posttraumatic amnesia characterized by disorientation, confusion, and memory loss. Investigators have developed standardized methods for measuring the presence and duration of amnesia, such as the Children's Orientation and Amnesia Test (Ewing-Cobbs et al. 1990). Scores on this test have been found to predict postinjury memory function up to 12 months after TBI (Ewing-Cobbs et al. 1990).

Neuropathology and Pathophysiology

TBI results in neuropathology via overt alterations in brain tissue as well as disruptions in brain function at a cellular level. Observable injuries resulting from head trauma can be classified into two broad categories: *primary* and *secondary.* Primary injuries

TABLE 27–1. Ratings of traumatic brain injury severity

Mild	Moderate	Severe
GCS = 13–15	GCS = 9–12	GCS≤8
PTA≤1 hour	PTA = 1–24 hours	PTA>1 day
LOC<30 minutes	LOC = 1–24 hours	LOC>24 hours

Note. GCS = Glasgow Coma Scale; LOC = length of loss of consciousness; PTA = length of posttraumatic amnesia.

result directly from the trauma itself. They include skull fractures, contusions and lacerations, and mechanical injuries to nerve fibers and blood vessels. Secondary injuries arise indirectly from the trauma and in children include brain swelling and edema, hypoxia and hypotension, increased intracranial pressure, mass lesions such as epidural hematomas, and seizures (Pang 1985).

The primary injuries that arise from head trauma reflect biomechanical forces, which can result in the tearing or bruising of blood vessels that gives rise to focal contusions or hemorrhage, as well as in the shearing or straining of white matter nerve fibers. Shear and strain forces have been thought to be responsible for diffuse axonal injury, which triggers a process of Wallerian degeneration in distal axonal projections and results in the diffuse loss of synaptic terminals (Povlishock et al. 1992).

Focal contusions are especially likely to occur in the frontal and temporal cortex because of their proximity to the bony prominences in the anterior and middle fossa of the skull. In contrast, shear/strain injuries appear to be most common at the boundaries between gray and white matter. Although diffusely distributed, they occur most often around the basal ganglia, periventricular regions near the hypothalamus, superior cerebellar peduncles, fornices, corpus callosum, and fiber tracts of the brain stem.

Brain swelling and cerebral edema are two major secondary complications of TBI and may be more common in children than among adults (Aldrich et al. 1992; Bruce et al. 1979, 1981; but see Lang et al. 1994). Brain swelling and cerebral edema are thought to result from a disruption of the normal relationships between blood, brain tissue, and cerebrospinal fluid. In contrast to brain swelling and cerebral edema, mass lesions are less common in children than adults (Bruce 1995). Mass lesions involve the accumulation of fluid, usually blood associated with contusion and hemorrhage. Epidural hematomas result from bleeding into the space between the dura and the skull, often in association with a skull fracture that disrupts the middle meningeal artery. Subdural hematomas result from bleeding into the space between the dura and the arachnoid membranes, frequently because of a tear in the bridging veins of the sagittal sinus, and are more often acute in nature. Intracerebral hematomas occur within the brain parenchyma and often follow the same spatial distribution as contusions. Subarachnoid or intraventricular hemorrhages are also common in TBI (Bruce 1995).

Head trauma can result in a variety of neurochemical events (Novack et al. 1996). Excessive production of free radicals can affect cell membrane integrity and cause lipid peroxidation or attack cell organelles, such as the mitochondria. Excitatory amino acids can be harmful in excessive amounts, disrupting cell function and eventually resulting in cell death. Glutamate and aspartate, two common excitatory amino acids, have an affinity for receptors prevalent in the hippocampus and thalamus. The release of these amino acids is especially sensitive to hypoxic-ischemic events and increases dramatically after TBI, which may help explain the vulnerability of the hippocampus to the effects of TBI. The disruption of cellular calcium homeostasis by hypoxia-ischemia is another indirect source of brain injury. Hypoxic-ischemic insults interrupt normal ion pumping mechanisms and induce the release of intracellular calcium. In addition, the calcium influx triggers other chemical events, including the release of free radicals and excitatory neurotransmitters. The disruption of calcium homeostasis also can result in vasoconstriction, leading to further hypoxic-ischemic insult.

Assessment of Neuropathology

The assessment of neuropathology after pediatric TBI involves a variety of neurological and neuroradiological procedures. Neurological examinations are often conducted during the acute stage of recovery to document changes in level of consciousness (i.e., changes in Glasgow Coma Scale scores) and focal neurological signs (Miller 1991; Vincent and

TABLE 27–2. Glasgow Coma Scale

Category	Score	Description
Eye opening		
None	1	Not attributable to ocular swelling
To pain	2	Pain stimulus applied to chest or limbs
To speech	3	Nonspecific response to speech or shout
Spontaneous	4	Eyes open; does not imply intact awareness
Motor response		
No response	1	Flaccid
Extension	2	Decerebrate posturing
Abnormal flexion	3	Decorticate posturing
Withdrawal	4	Normal flexor response; withdraws from pain stimulus
Localizes pain	5	Pain stimulus applied to supraocular region or fingertip; limb attempts to remove it
Obeys command	6	Follows simple commands
Verbal response		
No response	1	No vocalization
Incomprehensible	2	Vocalizes but not recognizable words
Inappropriate	3	Intelligible speech but no sustained or coherent conversation; may be shouting or swearing
Confused	4	Responds to questions but is disoriented
Oriented	5	Normal orientation to time, person, place

Note. Glasgow Coma Scale = eye opening score + motor response score + verbal response score.
Source. Adapted from Teasdale and Jennet 1974.

Berre 2005). Computed tomography (CT) is the preferred method of neuroimaging during the acute phase of TBI because it is rapidly and widely available, relatively inexpensive, and sensitive to lesions such as epidural hematoma that may necessitate neurosurgical intervention (Bigler 1999; Poussaint and Moeller 2002). CT is used to detect hemorrhage, pneumocephalus, hydrocephalus, midline shift, mass effect, ischemia, and herniation. Magnetic resonance imaging (MRI) is superior to CT in documenting most pathology associated with TBI because it possesses superior sensitivity and specificity to abnormalities in brain structure and function (Poussaint and Moeller 2002). MRI is superior to CT in documenting both focal lesions and diffuse axonal injury and particularly the subacute and chronic changes that can occur across time (Bigler 1999; Sigmund et al. 2007).

Numerous advanced imaging procedures have been developed to assess neuropathology in TBI. An extensive review of these methods is beyond the scope of this chapter but can be found in the literature (see Ashwal et al. 2006; Bigler 1999, 2005; Munson et al. 2006). Techniques such as functional MRI, proton magnetic resonance spectroscopy, positron emission tomography, and single-photon emission CT allow the correlation of neuropsychological functions with imaging results in order to assist with documenting neuropathology and predicting outcomes (Munson et al. 2006). Diffusion-weighted magnetic resonance images hold potential for the early detection of ischemic injury (Ashwal et al. 2006) and generally may be more sensitive to pathology than standard MRI (Bigler 1999). Diffusion tensor imaging is a specific form of diffusion-weighted MRI and is an emerging technology that documents white matter tracts (Ashwal et al. 2006). Magnetic resonance spectroscopy measures metabolic information, potentially providing TBI biomarkers (Ashwal et al. 2006; Bigler 1999).

Diagnostic procedures are also available to document cerebral electrophysiology following TBI.

Standard electroencephalography is relatively limited in detecting changes after TBI (Arciniegas et al. 2005). In contrast, evoked potentials, particularly somatosensory evoked potentials, have been found to be a predictor of TBI outcomes (Carter and Butt 2001). In one study, brain stem auditory evoked potentials were found to add significant prognostic value when used in addition to Glasgow Coma Scale scores and standard electroencephalography in predicting coma outcome following severe pediatric TBI (Liesiene et al. 2008).

Acute Management of Complications

A comprehensive review of the medical management of pediatric TBI is beyond the scope of this chapter. The interested reader is referred to the following resources for more comprehensive coverage: Adelson et al. 2003; Jankowitz and Adelson 2006; McLean et al. 1995; and Vincent and Berre 2005. In most cases, medical management of TBI focuses on the secondary injuries that arise indirectly after the initial trauma rather than on primary injuries. Thus the goal of medical management during the acute phase of TBI recovery is to prevent the occurrence of or minimize the negative effects of secondary injuries such as increased intracranial pressure and brain swelling (Jankowitz and Adelson 2006). The control of intracranial pressure is a paramount goal in the acute care of pediatric TBI patients. Following TBI, cerebral edema and hemorrhage result in a sharp increase in intracranial pressure that, if left unmanaged, can result in brain stem herniation and, ultimately, death (Vincent and Berre 2005). Specific guidelines have been developed with regard to the monitoring and assessment of intracranial hypertension following pediatric TBI (Adelson et al. 2003; Vincent and Berre 2005).

Another common complication of TBI is early posttraumatic seizures, which occur in about 3%–9% of children with head trauma and often involve focal status epilepticus, sometimes associated with mass lesions (McLean et al. 1995). Children who experience early posttraumatic seizures have been found to show worse outcomes than those who do not experience seizures (Chiaretti et al. 2000). Younger children seem especially vulnerable to early posttraumatic seizures. The occurrence of seizures soon after injury does not clearly place children at risk for later epilepsy, which occurs in about 2% of the survivors of pediatric head injury. Posttraumatic epilepsy is more common in children with penetrating injuries or depressed skull fractures, among whom the incidence is approximately 10%. It is also more likely in children with pronounced cerebral edema (Chiaretti et al. 2000). Most posttraumatic seizures occur within the first 2 years postinjury. Specific guidelines have been developed for the acute management of posttraumatic seizures in children (Adelson et al. 2003).

Assessment of Postacute Recovery

Several measures have been developed to assess postacute recovery from pediatric TBI. The Ranchos Los Amigos Levels of Cognitive Functioning Scale (RLCF; Hagen et al. 1972) is a scale commonly used by rehabilitation professionals to assess postacute functioning. The RLCF was developed for the monitoring of adults with TBI but is commonly used in pediatric rehabilitation units. The scale includes eight levels that are thought to parallel the pattern of cognitive recovery following TBI (see Table 27–3). Although the RLCF has been found to predict outcomes after TBI in adult populations, such as return to work (Cifu et al. 1997), little empirical support exists for its use in pediatric TBI. Many rehabilitation units also use measures of functional recovery. The Functional Independence Measure for Children (Msall et al. 1994) is a standardized assessment of self-care, motor, and cognitive skills often used in pediatric rehabilitation settings from infancy through 18 years of age. It has received empirical support in general pediatric trauma (Willis et al. 2006) as well as in pediatric TBI (Di Scala et al. 1992; Rice et al. 2005).

EPIDEMIOLOGY

Incidence

Accurate statistics regarding the incidence and prevalence of TBI in the United States are difficult to obtain. Not surprisingly, incidence rates varied significantly among the nine published studies reviewed by Kraus (1995), with an average annual incidence of 180 per 100,000 children per year in children younger than 15 years of age. The Centers for Disease Control and Prevention (CDC) reported population data on TBI across the life span during a 6-year period and found that approximately 475,000 TBIs occurred annually in children ages 0–14 years (Langlois et al. 2006). Approximately 435,000 of these cases required emergency department visits and 37,000 required hospital admission.

TABLE 27–3. Ranchos Los Amigos Levels of Cognitive Functioning

Level I	No response
Level II	Generalized response; reacts to environment but not a specific response
Level III	Localized response; reacts in a specific manner to a stimulus
Level IV	Confused and agitated; unable to cooperate; may be aggressive, combative, or incoherent
Level V	Confused, inappropriate/nonagitated; may wander if mobile; is able to respond to simple commands; needs external structure
Level VI	Confused, appropriate; goal-directed behavior emerges; consistently follows simple instructions
Level VII	Automatic, appropriate; does well in familiar settings but is confused in unfamiliar settings; impaired judgment and slow learning
Level VIII	Purposeful, appropriate; can function independently but perhaps not as well as before injury; deficits in higher-order cognitive skills

The most common causes of head trauma are transportation-related incidents, including those involving motor vehicles and bicycles, and falls. Together, transportation-related trauma and falls typically account for between 75% and 80% of all brain injuries in published studies (Kraus 1995). Other causes of injury may include assaults and sports participation. The distribution of causes varies significantly as a function of children's ages (Kraus 1995). Infants and young children are especially likely to be injured in falls. Among older children, sports and recreational accidents and pedestrian or bicycle collisions with motor vehicles account for an increasing proportion of head injuries. Adolescents are especially likely to be injured in motor vehicle accidents.

The incidence of TBI varies significantly according to demographic factors. Boys are at considerably higher risk for closed head trauma than are girls (Langlois et al. 2006). In published studies, the ratio of boys to girls rises from approximately 1.5 to 1 for preschool children to approximately 2 to 1 for school-age children and adolescents (Kraus 1995). The change appears to reflect a sharp increase in head injuries among males and a gradual decrease among females (Kraus et al. 1986). Kraus found that the incidence is relatively stable from birth to age 5 years, with injuries occurring in about 160 per 100,000 children in this age group. After age 5, the overall incidence gradually increases until early adolescence and then shows rapid growth, reaching a peak incidence of approximately 290 per 100,000 by age 18 (Kraus et al. 1986). The CDC population data suggest a bimodal distribution of TBI occurrence across childhood, with peaks during the preschool and high school years (Langlois et al. 2006).

Mortality and Morbidity

Traumatic injuries are the leading cause of death among children and adolescents, and about 40%–50% of the deaths resulting from trauma are associated with TBI (Kraus 1995). Kraus cited a mortality rate of approximately 20 per 100,000 among children in this age group, based on national health statistics. Recent CDC population data documented an average of approximately 2,600 deaths from pediatric TBI each year during a 6-year period (Langlois et al. 2006). Overall, mortality rates are lower among children than among adults (Goldstein and Levin 1987). The mortality rate is highest among children with severe injuries and is virtually nil among those with mild injuries.

PSYCHOSOCIAL ISSUES

Children recovering from TBI experience a variety of psychosocial complications. One line of research has investigated the development of psychiatric disorders after childhood TBI (see Max et al. 1997a, 1998e). One specific disorder that has been proposed is postconcussion syndrome. An alternative approach has been to focus on the development of psychosocial sequelae of pediatric TBI within several distinct but related domains, such as social, behavioral, adaptive, and family functioning (see Yeates 2000).

Psychiatric Comorbidity

Several studies have reported a risk of new psychiatric disorders following pediatric TBI (Brown et al. 1981; Max et al. 1997a, 1998c). For instance, Bloom et al. (2001) found that 58% of their sample devel-

oped a novel psychiatric disorder after a TBI. Max et al. (1997b, 1997c, 1997d, 1998e) conducted a series of studies following the development of new psychiatric disorders in a cohort of children with TBI at 3, 6, 12, and 24 months postinjury. They found 46% of the participants met criteria for a new psychiatric disorder at 3 months, 24% at 6 months, 37% at 12 months, and 35% at 24 months postinjury. The most common psychiatric diagnoses were oppositional defiant disorder (ODD), attention-deficit/hyperactivity disorder (ADHD), and organic personality syndrome (now termed *personality change due to TBI*). Factors that predicted the presence of a psychiatric disorder at 2 years postinjury included injury severity, preinjury family functioning, and preinjury psychiatric history. Max et al. (2000, 2001) conducted additional studies specifically addressing the diagnosis of personality change due to TBI. These studies documented that personality change due to TBI is relatively common after severe TBI but rare after mild/moderate TBI. Interestingly, the development of personality change has been found to be predicted by severity of injury, adaptive and intellectual deficits, and secondary ADHD but not by measures of psychosocial adversity, such as family functioning (Max et al. 2000).

The occurrence of externalizing behavior disorders, such as ADHD, ODD, and conduct disorder (CD), has been replicated in other studies. Max et al. (1998d) investigated the prevalence of disruptive behavior disorders following TBI and found that 42% of their sample developed ADHD after the injury and 34% developed ODD/CD. Children who developed ODD/CD had significantly more impaired family functioning than those who did not develop one of these disorders. A separate study showed that persistent ODD symptoms were related to injury severity, whereas ODD symptoms during the first year postinjury were more related to psychosocial variables (Max et al. 1998a). Additional studies have documented the emergence of ADHD symptoms following pediatric TBI (Levin et al. 2007; Massagli et al. 2004; Yeates et al. 2005).

Investigators have also examined the emergence of internalizing disorders following pediatric TBI and have documented the emergence of obsessive-compulsive symptoms (Grados et al. 2008; Vasa et al. 2002), generalized anxiety (Luis and Mittenberg 2002; Vasa et al. 2002), separation anxiety (Luis and Mittenberg 2002; Vasa et al. 2002), and depressed mood (Luis and Mittenberg 2002) after pediatric TBI. Max et al. (1998b) examined the development of posttraumatic stress disorder (PTSD) symptoms following pediatric TBI and found that few children develop full diagnostic criteria for PTSD, although PTSD symptoms are common. Additional studies have documented the emergence of PTSD symptoms after TBI (Gerring et al. 2002; Levi et al. 1999). Predictors of postinjury PTSD symptoms are injury severity and premorbid internalizing symptoms (Gerring et al. 2002; Max et al. 1998b) as well as social disadvantage (Levi et al. 1999).

Postconcussion Syndrome

Postconcussion syndrome is a controversial construct currently included in DSM-IV-TR (American Psychiatric Association 2000) as a disorder proposed for further study. This proposed disorder includes a variety of postconcussive symptoms, which in adults have been characterized as consisting of somatic complaints (e.g., fatigue, headache, dizziness), cognitive difficulties (e.g., attention and memory disturbances), and emotional problems (e.g., mood and anxiety problems).

Mittenberg et al. (1997) examined the occurrence of postconcussion syndrome in children and found that children who experienced TBI showed more postconcussive symptoms than a control group of children with orthopedic injuries. Injury severity and self-report of child anxiety were related to the expression of symptoms. In addition, the rate of postconcussive symptoms was similar to that found in a group of adults matched for injury severity. Yeates et al. (1999) studied the incidence of postconcussive symptoms in children following mild TBI and found that these children showed elevated levels of certain symptoms, such as inattention and fatigue, when compared with uninjured siblings. In addition, children who displayed these symptoms also showed neuropsychological deficits in attention and executive functions as well as increased behavioral dysfunction and reduced motivation. Yeates et al. (2009) examined longitudinal trajectories of postconcussive symptoms in children with mild TBI as compared with children with orthopedic injuries. They found that children with mild TBI, particularly those with more severe injury, were more likely to demonstrate trajectories showing high acute levels of symptoms, as well as persistent increases in postconcussive symptoms, in the first year postinjury.

Medical practitioners need to understand the possible expression of postconcussive symptoms following concussion or mild TBI, because children of-

ten present to medical professionals for advice following sports-related concussions. Unfortunately, our knowledge of the medical complications following mild TBI in children is incomplete, making it difficult to offer empirically supported guidelines for the clinical care of these children (Homer and Kleinman 1999). Medical professionals need to be aware of several issues regarding the management of multiple concussions in children (Kirkwood et al. 2006) and the relevant guidelines for disposition, including return to play (Committee on Quality Improvement et al. 1999; Kamerling et al. 2003).

Social Outcomes

Childhood TBI often results in problems with social functioning. This is not surprising, given that the neuropathology associated with TBI often involves the frontal and temporal regions, which have been implicated in social behavior (Yeates et al. 2007). Cognitive explanations for a link between TBI and later problems with social functioning have also been offered (Yeates et al. 2004). Numerous studies have documented adverse social outcomes following childhood and adolescent TBI. Bohnert et al. (1997) investigated friendships and social outcomes and found that children with TBI were perceived by their parents as less socially competent with peer relations, especially in the context of severe TBI. Gender effects were also found such that boys with TBI were less likely than girls with TBI to maintain preinjury friendships. Andrews et al. (1998) found that children with TBI had lower self-reported ratings of self-esteem and higher ratings of loneliness than a control group. Warschausky et al. (1997) found that children with TBI generated fewer solutions when confronted with hypothetical peer dilemmas than did children without TBI. Janusz et al. (2002) extended these findings by investigating the social problem-solving skills of children following TBI and found that children with severe TBI chose less developmentally mature social problem-solving strategies than children without TBI. Dennis et al. (2001) examined the neuropathological correlates of TBI-related social problems and determined that children with severe frontal lobe injury were more likely to have problems with social discourse. Finally, Yeates et al. (2004) compared the short- and long-term social outcomes of TBI and found that children with TBI experienced worse social outcomes than an orthopedic-injured control group. Children with severe TBI had more adverse social outcomes than did children with moderate TBI. In addition, these authors found that the relation between TBI and social outcomes was moderated by environmental variables (Yeates et al. 2004). More specifically, poor social outcomes following TBI were exacerbated by poor family functioning, lower socioeconomic status, and lack of family resources.

Neurobehavioral Outcomes

Pediatric TBI is associated with a host of neurobehavioral problems, although research in this area is often confounded by the high incidence of preinjury behavioral problems in children with TBI (Bloom et al. 2001; Brown et al. 1981). Asarnow and colleagues (Asarnow et al. 1995; Light et al. 1998) found that children with mild TBI displayed higher rates of preinjury behavioral problems than did children with no injury. In contrast, their preinjury behavioral functioning did not differ from that of children with injuries not involving the head. The latter finding is consistent with previous research suggesting that the presence of premorbid behavioral problems actually increases the likelihood of traumatic injuries (Brown et al. 1981). Thus, although severe head injuries increase the risk of behavioral disturbance, it is also likely that behavioral disturbance increases the risk of head injury. Bloom et al. (2001) found that children with preinjury psychiatric disorders, such as ADHD and anxiety disorders, are more likely to experience a head injury than are children without preinjury psychiatric disorders.

Fletcher et al. (1990) did not find an increased rate of externalizing behavioral problems in children with TBI. Barry et al. (1996) found that children with TBI displayed more somatic, cognitive, and behavioral symptoms than did children with orthopedic injuries and that the total number of symptoms correlated positively with injury severity. Andrews et al. (1998) found an increased rate of aggressive and antisocial behaviors in children with TBI. Yeates et al. (2001) investigated the rate of neurobehavioral symptoms in the first year following TBI and found high rates of neurobehavioral symptoms. Cognitive/somatic symptoms (e.g., fatigue, headache, inattention) tended to decline in the first year, whereas emotional/behavioral symptoms (e.g., aggression, impulsivity) tended to increase over time, especially in children with severe TBI and in those with poor family functioning. Taylor et al. (2002) found that behavioral problems were more likely to occur following severe TBI and in socially disadvantaged families. Schwartz et al. (2003) investigated the long-term persistence of behavioral problems af-

ter childhood TBI and found that injury severity, low socioeconomic status, and preinjury behavioral problems predicted the persistence of behavioral problems 4 years post-TBI. Kinsella et al. (1999) found an increased risk of behavioral problems in severe, but not moderate or mild, TBI. In addition, they found that poor parental coping strategies predicted the occurrence of behavioral problems following TBI. Taken together, these studies indicate that behavioral problems are common after childhood brain injury and that the occurrence of these problems varies as a function of injury severity and environmental factors, such as family functioning.

Adaptive Functioning

Fletcher et al. (1990) found that children with severe TBI exhibited problems in adaptive functioning, whereas those with moderate and mild TBI did not exhibit these problems. In contrast, Andrews et al. (1998) found that adaptive weaknesses were present across all levels of brain injury in their sample. Taylor et al. (1999) also found deficits in adaptive functioning following TBI, especially in the presence of family dysfunction. Levin et al. (2004b) determined that children with TBI involving the frontal lobes had a higher frequency of adaptive deficits in daily living skills and social skills than did children without frontal lesions following TBI.

Family Functioning

The role of family functioning during the recovery from pediatric TBI is often overlooked, despite evidence that family functioning is often negatively affected after TBI and may play an important role in moderating the outcomes of TBI. For example, Yeates et al. (1997) investigated the role of preinjury family functioning in the expression of cognitive and behavioral outcomes after pediatric TBI. These authors found that the effects of TBI on memory and adaptive functioning were buffered by above-average family functioning and exacerbated by below-average family functioning. In addition, children with severe TBI who came from lower-functioning families showed less rapid rates of recovery than those from higher-functioning families (Yeates et al. 1997).

Wade et al. (1998) found that parents of children with severe TBI reported higher levels of parental stress and psychological symptoms in the first year postinjury than did parents of children with orthopedic injuries. The long-term consequences of TBI on family functioning have also been investigated. Wade et al. (2002) found that injury-related family stress and burden declined from baseline but were still evident in families with severe TBI 4 years postinjury. Wade et al. (2003) investigated the rate of conflict and criticism in parent-adolescent interactions after TBI and found that the rate of these negative interactions increased as injury severity increased. This line of research suggests that health care professionals who consult with children with TBI should consider a family-centered approach when providing recommendations regarding medical and psychosocial interventions.

Cognitive Outcomes

Children with TBI experience a wide array of neuropsychological and academic deficits. A comprehensive review of these deficits is beyond the scope of this chapter, but a brief overview is provided. The interested reader is referred to other sources for a more comprehensive coverage of this topic (Anderson et al. 2001; Yeates 2000).

Neuropsychological Functioning

Longitudinal studies have documented multiple neuropsychological deficits during the acute stage of TBI recovery, with most recovery occurring during the first year postinjury, although persistent deficits in attention, memory, and processing speed have been documented (Van Heugten et al. 2006; Yeates et al. 2002). Mild TBI is generally not associated with declines in intellectual functioning (i.e., IQ); however, children with moderate to severe TBI typically show declines in IQ (Anderson et al. 2000). Deficits on IQ tests following TBI are more evident on tasks measuring nonverbal or performance IQ rather than tasks measuring verbal or crystallized IQ (Yeates 2000). Anderson et al. (2000) examined the recovery of IQ after pediatric TBI and found that children with severe injuries displayed more pronounced deficits in intellectual ability. They also found that recovery of intellectual ability was minimal in young children (i.e., <7 years) following severe TBI, whereas older children experienced more recovery of intellectual skills after severe injury.

With regard to language skills, spontaneous mutism and expressive language deficits are common immediately after TBI (Levin et al. 1983), but overt aphasic disorders rarely persist after acute recovery. Ewing-Cobbs et al. (1987) found deficits in naming, expressive functions, and written language following

pediatric TBI, whereas receptive language skills were not as affected. Children with TBI also display difficulties with multiple higher-order social aspects of language, such as pragmatics and discourse (Chapman 1995; Dennis and Barnes 1990). Language deficits following pediatric TBI typically improve over time, with the most improvement seen after severe injuries (Catroppa and Anderson 2004).

In the nonverbal domain, deficits are apparent on both perceptual and constructional tasks. Although relatively few studies have included measures of visuoperceptual or visuospatial skills that do not involve motor output, children with TBI have shown deficits on tasks involving facial discrimination (Levin and Eisenberg 1979), picture matching (Klonoff et al. 1977), and visual-spatial judgment (Verger et al. 2000). Visual-motor constructional skills are also often negatively affected by TBI (Van Heugten et al. 2006; Yeates et al. 2002).

Ewing-Cobbs et al. (1998b) examined long-term attention problems following TBI and found that younger age of injury and severity of injury were related to the development of attention problems. Yeates et al. (2005) investigated long-term attention deficits following pediatric TBI and found that children with severe TBI displayed problems with cognitive and behavioral aspects of attention, especially when premorbid attention problems existed. Deficits in attention often persist in the long term after pediatric TBI (Catroppa et al. 2007).

Verbal memory deficits following TBI have been found on measures of auditory working memory (Levin et al. 2004a; Roncadin et al. 2004), list learning (Wiegner and Donders 1999; Yeates et al. 1995), and story recall (Catroppa and Anderson 2002) as well as on parent interviews of day-to-day memory functioning (Ward et al. 2004). Long-term verbal memory deficits have also been documented and are predictive of postinjury academic functioning (Catroppa and Anderson 2007). Interestingly, several studies have documented deficits in explicit memory (i.e., conscious recollection) after childhood TBI, whereas implicit memory (i.e., procedural memory) is typically not affected by TBI (Ward et al. 2002, 2004; Yeates and Enrile 2005). Fewer studies have examined nonverbal memory after TBI, although deficits have been reported on the reproduction of simple and complex geometric shapes (Yeates et al. 1993).

Levin et al. (1995) studied executive functions following TBI and found that children with TBI displayed deficits on a variety of tasks meant to assess executive functions, such as planning, verbal fluency, and cognitive flexibility. Interestingly, the magnitude of deficits on executive function tasks has been shown to correlate with the volume of lesions in the frontal lobes but not with extrafrontal lesion volume (Levin et al. 1994, 1997). Executive deficits have also been documented using parent report during the postacute and long-term recovery phases of TBI (Mangeot et al. 2002; Sesma et al. 2008). Young children and those with severe injuries are particularly vulnerable to executive deficits after TBI (Anderson and Catroppa 2005).

Children with TBI also demonstrate deficits in corticosensory and complex motor skills. Levin and Eisenberg (1979) found that approximately 25% of children with severe injuries displayed deficits on tests of stereognosis, finger localization, and graphesthesia. Deficits in fine motor skills (Roth 2001) and gait/balance (Katz-Leurer et al. 2008) have also been documented following TBI.

Academic Functioning

Given the litany of neurocognitive deficits described here, it is not surprising that pediatric TBI is often associated with declines in academic performance (Ewing-Cobbs et al. 2004; Taylor et al. 1999, 2002). These children often receive special education assistance (Ewing-Cobbs et al. 1998a; Taylor et al. 2002, 2003; Yeates et al. 2002), although these services may be limited by issues regarding special education classification, delayed school reintegration, and classroom placement (Taylor et al. 2003). Taylor et al. (2002) found that severe TBI has a negative long-term influence on academic achievement and that recovery is influenced by the family environment. Miller and Donders (2003) found that performance on measures of neuropsychological functioning explained a large majority of the variance in educational outcome following TBI. Ewing-Cobbs et al. (2004) examined long-term academic outcomes following TBI and found that academic deficits persist, especially in children injured at a young age. Catroppa and Anderson (2007) found that premorbid academic functioning and verbal memory were the best predictors of postinjury academic functioning.

Evidence-Based Treatments

The research regarding empirically supported treatments for the psychosocial and cognitive sequelae of pediatric TBI is relatively limited (for a review, see Donders 2007). However, in the past two decades,

investigators have begun to study medical, rehabilitative, psychological/behavioral, and cognitive treatments for this population.

The literature on the use of psychotropic medications in the treatment of neurobehavioral sequelae of pediatric TBI is quite limited compared with the literature for adult TBI. Jin and Schachar (2004) conducted a systematic review of the literature on the use of methylphenidate in the treatment of ADHD symptoms after pediatric and adult TBI and found only modest evidence of efficacy. In contrast, Mahalich et al. (1998) found that the short-term use of methylphenidate after pediatric TBI led to improvements in multiple neuropsychological measures of attention and concentration.

Patrick et al. (2003) found that the use of dopamine agonists accelerated the coma recovery of a group of children following TBI. Amantadine, a specific dopamine agonist, has been hypothesized to positively influence the cognitive and behavioral outcomes following TBI directly via its dopaminergic properties and to possibly act as a neuroprotective mechanism through its action on glutamate receptors (Green et al. 2004). Green et al. (2004) investigated the use of amantadine in pediatric TBI and found some subjective improvements but little objective evidence of effectiveness. Beers et al. (2005) examined the effectiveness of amantadine on parent report and neuropsychological test performance of executive functions after TBI and found improvements on parent ratings compared with a placebo group but no differences on performance-based measures. The examination of medication treatments following pediatric TBI is an area in clear need of further investigation.

Comprehensive reviews of the inpatient and outpatient rehabilitation of children with TBI have been published elsewhere (Anderson and Catroppa 2006; Beaulieu 2002; Ylvisaker et al. 2005a). The goals of rehabilitation ultimately involve the promotion of recovery of adaptive, cognitive, motor, and behavioral skills. Unfortunately, relatively few published studies have investigated the rehabilitation of pediatric TBI (Anderson and Catroppa 2006; Beaulieu 2002). A distinction has been made between restorative and compensatory rehabilitative strategies (Anderson and Catroppa 2006). Restorative strategies involve direct training in deficient cognitive skills, whereas compensatory strategies teach the child to compensate for his or her deficits by using alternate strategies to complete a task. Studies have suggested that restorative approaches can be effective for training attention and memory skills and that compensatory strategies are more useful in less severe injuries (Anderson and Catroppa 2006). The inclusion of family members in the rehabilitation of children with TBI has been supported by many studies, as has the integration of home and school services following discharge from inpatient rehabilitation (Ylvisaker et al. 2005a).

Outcome studies of the effectiveness of psychological and behavioral treatments on the emotional and behavioral problems that follow pediatric TBI are rare despite the high incidence of these problems in this population. Empirical support exists for treatments of behavioral and social problems following pediatric TBI (Warschausky et al. 1999; Ylvisaker et al. 2005b). More specifically, operant conditioning has been found to be effective in decreasing aggressive behaviors following TBI in children and adolescents, and school-based social interventions have received empirical support as well (Warschausky et al. 1999). In contrast, few outcome studies have focused on treatments for internalizing problems (e.g., depression and anxiety) after TBI.

Treatment programs addressing the remediation of specific neurocognitive deficits following TBI have been developed. Unfortunately, few published outcome studies have examined the efficacy of cognitive remediation programs in pediatric TBI. Laatsch et al. (2007) conducted a systematic evidence-based review of cognitive and behavioral treatment studies of pediatric TBI and determined that cognitive remediation for attention skills was supported by the literature, as was the involvement of family members as active members of the treatment team. Catroppa and Anderson (2006) conducted a review of intervention studies of executive deficits following childhood TBI and concluded that few methodologically sound outcome studies had been conducted in this area, although they found some support for specific interventions. For a comprehensive review of cognitive remediation in pediatric populations, see Butler (2007).

School Reintegration

School reintegration after pediatric TBI is a crucial step in the rehabilitation process. Medical professionals caring for these children need to have a working knowledge of the laws and procedures that govern the provision of special education services for children with TBI. A child with TBI may qualify for special education services under the Individuals With Dis-

abilities Education Act (2004). Special education services for a child with TBI would include the development of an Individualized Education Plan, which outlines the individual goals for the child's education and the intervention team's plan for addressing each goal. An Individualized Education Plan may include classroom accommodations, resource room instruction, or individual therapies (e.g., physical, occupational, and speech-language therapies). If formal special education services are not needed, children with disabilities may receive less individualized accommodations under Section 504 of the Rehabilitation Act of 1973. An excellent review of the relevant special education laws as they pertain to children and adolescents with neurological involvement is presented by Maedgen and Semrud-Clikeman (2007).

Concluding Comments

Pediatric TBI results in a complex array of neuropathological and neurochemical changes as well as multiple medical complications. The management of these children typically requires an interdisciplinary approach, which frequently involves mental health professionals. These consultants need to have a working knowledge of the acute and postacute medical complications of TBI as well as the underlying mechanisms that drive the emotional, behavioral, and cognitive difficulties that these children often experience. This chapter provides a brief review of these medical factors.

Children with TBI experience a wide variety of neurobehavioral sequelae affecting functioning in multiple domains, including cognitive, behavioral, social, adaptive, and academic outcomes, and across multiple environmental contexts, including home, school, and recreational settings. Traditional psychiatric diagnoses may not capture the broad array of emotional and behavioral problems that often occur after TBI, although children with TBI often display symptoms of specific externalizing and internalizing disorders. Injury severity is a strong predictor of cognitive outcomes, whereas behavioral outcomes are often also related to environmental factors, such as family functioning (Fletcher et al. 1990). For this reason, consultants need to obtain information regarding both injury severity and family functioning. Child and family premorbid functioning should also be documented as soon as possible, because preinjury functioning is also a predictor of many outcomes of TBI (Bloom et al. 2001; Catroppa and Anderson 2007; Yeates et al. 2005).

Treatments for the negative sequelae of TBI have only recently begun to become a focus of empirical investigation. These treatment methods include pharmacological, rehabilitative, behavioral, and cognitive approaches. The use of psychotropic medications for pediatric TBI has received equivocal empirical support, and further research is needed. Direct remediation of cognitive deficits may be effective in some cases, but research also supports the inclusion of family members and school officials in TBI rehabilitation. School reintegration is also a crucial step in the long-term management of pediatric TBI. Thus, the literature supports a biopsychosocial model of the outcomes of TBI that can only be addressed through multiple levels of intervention.

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PART IV

Treatment

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28

Individual Psychotherapy

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Emotional and behavioral responses in children and adolescents with physical illness are the result of the interplay between developmental, psychological, physiological, and family factors. The psychological reaction to any physical illness or disability can be viewed as a transitional process that often begins with shock and disbelief, proceeds through feelings of sadness and anger, and ends with a youngster's successful or unsuccessful efforts at adaptation to the implications of being ill. Physiological changes associated with the disease process itself may also affect the brain, resulting in emotional and behavioral changes that further compromise the child's adjustment.

Individual psychotherapy is an important treatment option for emotional and behavioral problems in physically ill children. Treatment targets the enhancement of coping mechanisms that promote continued psychological development and adaptation to illness (see Table 28–1). Effective psychotherapy in the pediatric setting can help patients understand the meaning of and responses to their illness, improve treatment adherence, and enhance psychosocial functioning. However, there is a relative paucity of empirical evidence that supports the efficacy of any psychotherapeutic modality in children and adolescents with physical illness. This chapter reviews existing data drawn from psychotherapy intervention studies and clinical consensus. Although the focus is on individual psychotherapy, data suggest the importance of involving the parents in the child's treatment. While difficulties in family functioning have not consistently been reported, parents are vulnerable to emotional distress and communication problems that have been shown to interfere with treatment adherence (Dolgin et al. 2007; Gerhardt et al. 2003; King 2003; Noll et al. 1994, 1995). Parental psychoeducation may be helpful in improving psychosocial outcomes and alleviating parental distress (Beardslee et al. 1993; Drotar 2000; Sahler et al. 2005). Issues related to family therapy and the treatment of parents of physically ill children are covered in Chapter 29, "Family Interventions."

Models of Psychotherapy

Psychotherapy can provide a time and place where patients can effectively vent feelings of fear, anger, or sadness. Common elements of the interaction include support, reassurance, empathic validation, advice, suggestion, and explanation as well as introspective exploration of dysphoric feelings such as demoralization or hopelessness (Goldberg and Green 1985). Psychotherapy is generally more easily accepted by children and their families when provided within the framework of routine ongoing medical care (see Table 28–2).

For families struggling with the burden of frequent outpatient visits and/or hospitalizations, the simple pragmatic issues such as scheduling appoint-

TABLE 28–1. Goals of psychotherapy with the physically ill child

1.	Establishing a new social network with other youth with similar medical diagnoses
2.	Facilitating the expression of emotions related to the illness and its treatment
3.	Increasing understanding by education about the illness and its treatment
4.	Allowing the child the opportunity to reprioritize both short- and long-term life goals
5.	Identifying and communicating the needs of parents and family members
6.	Facilitating communication with health care providers
7.	Managing symptoms such as anticipatory anxiety, nausea, pain, refusal of treatment, or excessive sick role behavior
8.	Facilitating the child's connection to his or her school and peer group
9.	Facilitating discussion of issues related to fears about death and dying

ments can be overwhelming. However, when the therapist is integrated into the patient's medical team, access to treatment is improved and the stigma associated with mental health care is minimized. Furthermore, therapists who work as part of a medical team have greater access to the treating physicians along with enhanced knowledge of the medical issues associated with the physical illness. There are a number of different models of psychotherapy, each with its own theoretical basis and techniques, that may be applicable in the pediatric setting.

Supportive Psychotherapy

Supportive psychotherapy (also called client-centered or humanistic therapy) is directed at minimizing the patient's level of emotional distress through empathic listening (Rogers 1951). The therapeutic relationship itself is used to promote the child's emotional growth and healing. Typically, the therapist provides education, encouragement, and acceptance rather than trying to uncover unconscious motivations and conflicts. Reassurance is provided by pointing out patient strengths and by clarifying illness misconceptions. The therapy is focused on the "here and now" in an effort to provide the patient with symptomatic relief by dissipating powerful emotions that have emerged in the context of the illness.

The therapist actively works to process negative emotions (e.g., anxiety, sadness, anger) and to facilitate adaptive functioning (Green 2000). In the pediatric setting, supportive psychotherapy is generally brief (i.e., during a single visit), although it may also be prolonged and ongoing. Successful supportive psychotherapy enhances a child's self-esteem, which is often negatively affected by the physical sequelae of the illness (Green 2000). Lane (2008) has shown that helping patients develop increased emotional awareness can lead to diminished somatic symptoms across many different illness groups. In addition, supportive psychotherapy has been used to reduce negative emotions in parents facing pediatric physical illness (Sahler et al. 2005).

Insight-Oriented Psychotherapy

In contrast, insight-oriented psychotherapy aims to help patients acknowledge and put into perspective painful feelings of loss or conflict that are brought up in the context of their illness (Green 2000). Patients are helped to become more aware of previously unrecognized or repressed emotions. Insight-oriented psychotherapy depends to a significant degree on the patient's ability to tolerate increased symptoms of anxiety that commonly emerge in the therapeutic process. Insight-oriented therapy is generally believed to have limited applicability in the inpatient pediatric setting for several reasons: 1) acutely ill patients have a diminished capacity for self-expression or self-examination as a result of physiological effects that occur during acute illness exacerbations; 2) patients may be emotionally overwhelmed by their illness such that they cannot tolerate the additional anxiety that is generated using an insight-oriented psychotherapy; 3) the brief time available to intervene in a pediatric setting does not readily lend itself to this more reflective and time-consuming treatment modality; and 4) children may not have the cognitive capacity required to participate as a result of developmental or physiological factors or because of emotional regression that commonly accompanies an acute physical illness. Nevertheless, Szigethy et al. (2002) demonstrated the potential usefulness of this approach in children with somatoform disorders.

TABLE 28–2. General issues across psychotherapies for physically ill children

Issue	Consideration
Setting	
Inpatient	Limitations with privacy and risk of interruptions requiring flexibility on the part of the therapist
Outpatient	Couple timing and location of appointments with medical visit to decrease time burden and feelings of stigma
Duration	Session often of shorter duration and increased frequency Dependent on child's illness severity, physical symptoms, and level of consciousness
Consistency	Dependent on degree of psychological impairment, although outpatient follow-up during acute illness phase is recommended Therapist flexibility required in terms of timing and location of appointments Consistent availability of the therapist in times of increased stress or uncertainty (e.g., disease flares, surgery) Importance of integration of mental health services with the medical treatment and communication with the pediatric team

Narrative Therapy

Narrative therapy emphasizes the patient's personal story or narrative of their illness. It has been shown to be strongly associated with psychological adaptation (Leventhal et al. 1980). The therapist encourages the patient to relate his or her illness narrative, which in children typically centers on five pervasive themes: 1) *identity* (the symptoms the child sees as part of their illness); 2) *cause* (the child's personal ideas about the etiology of the illness); 3) *timeline* (how long the child feels that the illness will last); 4) *consequences* (the child's anticipated effects of the illness); and 5) *cure/control* (how the child expects to recover from or control the illness) (Walker et al. 2006). In physically ill children with co-occurring depression, damaged self-concept, illness-related fears, and passive coping mechanisms with respect to disease are common narrative themes (Polanec and Szigethy 2008).

Weingarten (1998) described three illness narrative types: 1) *stable* (the illness trajectory is unchanged with regard to outcome, i.e., the person is neither better nor worse); 2) *progressive* (improvement over time); and 3) *regressive* (deterioration over time). The therapist's role is to help patients identify their themes and help reframe negative narratives into those that are more positive and progressive (Rabinowitz et al. 1994).

The therapist helps patients "make meaning" of their stories and correct misperceptions or misattributions in each of the five illness themes. Studies have shown positive effects in patients who have the opportunity to narrate their stories (Suedfeld and Pennebaker 1997). For instance, Pennebaker (1997) had participants write about a traumatic or stressful event for 15–20 minutes each day for 3–4 days and found that the writing task helped subjects improve emotional regulation by facilitating attention to and habituation to uncomfortable emotional experiences. Schwartz and Drotar (2004) have shown that patients who experience greater feelings of control over their emotions are better able to integrate difficult emotional experiences and report lower levels of distress. Although the sharing of illness narratives on appropriate Web sites (e.g., www.experiencejournal.com) has not been tested for efficacy, parents who have read Web-based stories of others experiencing similar illness difficulties report increased feelings of satisfaction (DeMaso et al. 2006).

It is feasible to implement narrative strategies utilizing a family systems perspective. The illness narrative becomes the family's story of their child's illness and its impact on the family system. Although there are few empirical data, many clinicians and family members report benefits from a narrative therapy approach in terms of improved family communication and adaptation to the challenges faced by the family.

Cognitive-Behavioral Therapy

Cognitive-behavioral therapy (CBT) is a problem-oriented treatment that seeks to identify and modify maladaptive behavior and cognitions. It is based on the premise that patients and their families develop cognitive distortions (e.g., passive locus of control, learned helplessness) and/or maladaptive

behaviors (e.g., inactivity, poor self-soothing) that adversely affect their functioning (see Table 28–3). For example, the belief that important medical information is being withheld may lead a child to the misconception that the prognosis is hopeless and undermine the willingness of the child to cooperate with medical treatment. CBT can be used to address specific emotional responses that result in distress about an illness or interfere with its treatment as well as to promote more positive coping behaviors. It also can be used to address disabling comorbid mood or anxiety symptoms. CBT techniques can also be utilized to help children differentiate factors that are realistically under their control from those that are not. For example, Weisz et al. (1994) found that children with leukemia who used secondary coping techniques (i.e., attempts to minimize the impact of an objective stressor) to deal with painful but necessary medical procedures reported better adjustment than those children who used primary coping techniques (i.e., attempts to alter the objective stressor itself). Finally, relaxation and hypnosis have been used to target symptoms of anxiety and pain and to improve immune functioning (Gold et al. 2007; Noll et al. 1994).

TABLE 28–3. Common cognitive distortions in pediatric illness

Belief that
Nothing will change the outcome of my illness.
I have no control of my illness.
Minor physical symptoms herald the return of my illness.
My illness is a punishment for bad behavior.
I will not be able to resume school or social activities.
I am different compared with other children.
Fear about
Inevitable progression of my illness.
Inevitability of pain.
Becoming a burden to my family.
Friends will not want to associate with me.
Medical information is being withheld.
I will not be able to reach my goals.
My symptoms will embarrass me in public.

Source. Adapted from Shaw and DeMaso 2006.

Group Therapy

Group therapy has been found to be useful in physically ill adults who have a shared diagnosis or illness-related issues (Gore-Felton and Spiegel 2000; O'Dowd and Gomez 2001). The targets of group interventions include attitude and behavior changes that result in health and psychosocial outcomes. The experience of heightened social support and reduced feelings of isolation afforded by peers with a similar illness provides the foundation for group therapy. Although the evidence base for group therapy in children with physical illness is small, Plante et al. (2001) reported positive effects from skill-building groups for youth with asthma, diabetes, and obesity. There may be specific difficulties in establishing pediatric groups. For example, immunocompromised children may not be permitted to interact with other physically ill patients, and those with cystic fibrosis may be instructed to avoid contact due to fears about the acquisition of drug-resistant infections. Adolescents in particular may express ambivalence about participating in group therapy due to perceived stigmatization or not wanting to see themselves as sick or disabled. Parents may express concerns about the participation of their children in a group in which they may be exposed to the discussion of topics related to relapse and death.

Groups follow different theoretical models. Educational groups have been used to disseminate information and introduce preventive health care practices (e.g., adolescents with high-risk sexual behaviors) (Gore-Felton and Spiegel 2000). By contrast, cognitive-behavioral groups typically provide problem-focused skills to help build coping skills. Support groups combine educational exchanges with social support and have been shown to improve quality of life in teens with chronic illness (Szigethy et al. 2006). In all situations, it is important that groups for physically ill children utilize developmentally appropriate activities (i.e., young children may have art projects, storytelling, or therapeutic play as opposed to verbal discussion).

SELECTION OF A PSYCHOTHERAPEUTIC STRATEGY

Factors that may influence the selection of a psychotherapy strategy include the nature of the psychological problem (e.g., pain, anxiety, somatization), the level of personal functioning, the degree of psychological insight, illness perception, and interper-

sonal skills. The assessment should take into account the child's level of cognitive and emotional development, intellectual capacity, and ability to assume responsibility. The assessment should include a comprehensive evaluation of parental understanding of the disease and its impact on the broader family system.

Children who are flexible and who have a wide repertoire of coping responses are more likely to benefit from an insight-oriented treatment approach. By contrast, patients who have a greater tendency to use denial, avoidance, and other less adaptive coping strategies are more likely to respond to supportive and/or CBT approaches. The choice of treatment may also be influenced by the stage of the child's illness. For example, treatment at the time of diagnosis or during a relapse may require a supportive approach in contrast to insight-oriented psychotherapy during more quiescent phases of the illness. The child's belief about his or her illness, influenced by the child's cognitive development, is another important factor to consider in designing a therapeutic approach (see Table 28–4).

At times, an integrative approach including psychopharmacology is necessary (Szigethy et al. 2006). Circumstances in which adjunctive psychotropic medication should be considered include 1) the failure to respond to psychotherapy; 2) the presence of severe psychiatric comorbidity (e.g., mood disorders or eating disorders); 3) the presence of acute agitation or psychotic symptoms; and 4) a family history that includes a first-degree relative who has responded positively to medications. The reader is referred to Chapter 30, "Psychopharmacology in the Physically Ill Child," for a fuller discussion of psychopharmacological considerations.

Therapeutic Use of Play

In childhood, play is a major means of communication. The direct and indirect (reactive) effects of a physical illness can interfere with the child's ability to play, and restoration of the ability to play may indicate improvement in illness or response to psychotherapy. Play provides a medium in which the experience of the child's illness can be more easily understood and mastered. Play materials may include stuffed animals or dolls, art materials, and medical supplies. There are also a growing number of resources available using fictional illness stories to help children work through illness-related conflicts using displacement (Crohn's and Colitis Foundation of America 2007; Thomson 2005). Actual medical objects may be introduced to help desensitize the child and provide a sense of mastery. Sourkes (1998) described several play therapy techniques that can be used with physically ill children.

Selected Psychotherapy Issues in Pediatric Illness

Illness as a Grieving Process

The bereavement model has been used to help conceptualize the process of adaptation to physical illness and to guide treatment intervention. Schneider (1984) emphasized "the need to discover and accept what has both been lost and what has been left, in addition to what is possible that would not have been possible if the loss of health had not occurred" (p. 9). It is important to realize that the acceptance of illness is a process and that numerous events (e.g., relapse or developmental transitions) may trigger the grieving process. Ongoing losses in a chronic illness can complicate the process and extend the time needed to grieve.

Physical illness may involve loss in the following areas: independence, sense of control, privacy, body image/healthy self, relationships, roles inside and outside the family, self-confidence, self-esteem, productivity, self-fulfillment, future plans, fantasies of immortality, hindered movement, familiar daily routines, uninterrupted sleep, ways of expressing sexuality, and pain-free existence (Lewis 1998). Many of the assumptions of the child's daily life, including the sense of future, can be shattered by the diagnosis of an illness. Youngsters may experience overwhelming threats and fears including threats to narcissistic integrity and self-esteem, regressive fear of strangers on whom the patient must rely, separation anxiety, fears of loss of love and approval, fear of loss of control of bodily functions, and fear of pain and humiliation, as well as guilt and the fear of retaliation—reflecting the unconscious belief that illness may be a punishment for past behavior (Lipsitt 1996; Strain and Grossman 1975). Common emotional reactions to physical illness and how the therapist can help the child deal with these feelings are summarized in Table 28–5.

Adolescents with severe physical illness may have fragile self-esteem due to delays in physical growth or puberty maturation. Medical procedures can further impinge upon the adolescents' heightened concern about appearance, especially when procedures

TABLE 28–4. Considerations for psychotherapy related to children's conceptions of illness

Age (y)	Concepts and beliefs about illness	Therapy suggestions
<7	Belief in the power of magical thinking Tendency to define illness as occurring only when they are told they are ill; limited ability to understand functions of organs Belief that illnesses are caused by concrete actions and can be avoided by obeying a rigid set of rules Expectation that recovery from illness occurs either automatically or by the rigid adherence to rules	Probe child's beliefs about why he/she is sick or needs to go to the hospital (e.g., punishment) Ask child questions to make sure he/she understands what was said Let child know it is okay to have many feelings about diagnosis (fear, frustration, anger) Express feeling through play, drawing and painting, role-playing (e.g., playing doctor)
8–10	Some ability to explain mechanisms of physical causality Belief that outside factors both cause (e.g., germs) and cure illness, with limited understanding of how body heals itself Expectation that recovery from illness occurs by "taking care of themselves" and allowing medicines to act on the illness Tendency to be more passive about health care	Probe for anxiety and helplessness from loss of control from procedures or illness symptoms, fear of bodily harm, and death Use emotion-focused coping strategies (strategies aimed at regulating emotional responses to a stressor) Incorporate child's motivation for the need of mastery and competence Use behavioral techniques (distraction)
10–12	Ability to think hypothetically and to fill in gaps in knowledge with generalizations from prior experience Greater ability to understand physiological functions of the body and that there are many interrelated causes of illness Understanding that illnesses are caused and cured as a result of the complex interaction between host and agent factors Understanding that the body's response is critical if treatment is to be effective Very limited ability to understand concepts of prevention	Probe for regression to earlier coping strategies (e.g., magical thinking) in times of stress (e.g., procedures) or discomfort such as attributing events in their lives to their own thoughts, feelings, and behaviors, and infer causal links between events that occur in close physical or temporal proximity Educate child about misconceptions about the reasons for a procedure; for the child who may have difficulty in understanding concepts like quantity or duration ("this will only hurt a little"), the choice of words is important Hypnosis can be a helpful intervention for pain management or anxiety related to illness or procedures
13–17	Denial can still be present but overall more cognitive awareness of long-term illness consequences Developing a sense of autonomy from family and forming close peer relationships that foster their sense of identity; thus may become nonadherent in an effort to regain a sense of control and independence in the medical context Consolidating identity in academic, vocational, peer relationship, and sexual realms; may have greater grief reaction and pessimism if these pursuits are interrupted by physical illness	Involve child in treatment planning; foster active coping using both cognitive (e.g., reframing) and behavioral (relaxation, activities) strategies Explore stress management to negotiate future illness episodes and help consolidate coping skills for transition to adulthood Ability for abstract thinking allows greater benefit from insight-oriented therapy and exploration of illness narrative

Source. Adapted from Bibace and Walsh 1981; King 2003; Perrin 1984; Shaw and DeMaso 2006.

TABLE 28–5. Common emotional reactions to physical illness and therapist tasks

Emotion	Characteristics	Therapist tasks
Denial	Often the first response to illness to deal with feelings of being overwhelmed May be adaptive if it does not interfere with medical adherence Common during illness remission Can result in decreased motivation for psychotherapy	Identify and determine if adaptive or maladaptive for child's coping with illness Help child mitigate distress, verbalize feelings about illness, and/or master fears
Anger	Frustration and resentment in the context of feeling out of control and illness-related losses Irritability possibly due to sleep deprivation in hospital, pain, and medication side effects Often projected onto family or medical team May lead to oppositional behaviors such as medical nonadherence	Identify source and help child process feelings Allow child to safely metabolize or discharge angry feelings
Sadness/depression	Situational versus direct biological consequence of illness (e.g., cytokines) or treatment (e.g., steroids) Associated with increased frequency of somatization	Assess for persistent depression or pathological grief Educate about relationship with illness symptoms
Anxiety	Often premorbid trait Situation specific (e.g., painful procedures or fear of parental abandonment) May lead to increased somatization	Help child regulate emotional responses to illness stressors Explain medical procedures and treatments to decrease child's misconceptions Use relaxation and guided imagery approaches

involve loss of functioning (e.g., colostomy). The acceptance of authority and relinquishment of control needed to undergo procedures can be difficult for adolescents and may foster feelings of helplessness and dependence (Van Horn et al. 2001).

Anticipatory Bereavement

The death of a child disrupts the natural family life cycle. Children are supposed to outlive their parents, not the other way around. Decisions related to treatment during the terminal phase of an illness can be excruciating for parents who on one hand do not wish for their child to suffer but on the other hand cannot tolerate thoughts of ending treatment.

Psychotherapy with the dying child is differentiated from more routine psychotherapy by the simple fact that the patient is confronting the concrete reality of death and loss rather than unrealistic fears and fantasies. Patients are generally aware that death is approaching, with the unknown being its time of occurrence. Nevertheless, awareness of death is a fluid rather than static state (Sourkes 1998). Children tend to "dose themselves" regarding the degree to which they can discuss their illness (i.e., one minute crying and the next found playing a game). The level of awareness may fluctuate depending on their medical status. Therapy provides the opportunity for the expression of grief and integration of their life experiences. It provides an opportunity for discussing quality-of-life issues as well as facilitating the child's expression of their own wishes for what is left of their life. As the risk of mortality increases in different pediatric illness populations, there are three common fears: fear of pain, fear of being alone, and fear for the well-being of others (parents/friends) after the child's death.

Children and adolescents can derive great comfort from the safety of a therapeutic relationship in which there is the opportunity to discuss their awareness of impending death. The therapist "bears witness" to the child's extraordinary situation and responds within the context of that reality (Coles 1990). A shared "knowledge" of the fine line that separates living from dying, whether implicit or ex-

plicit, becomes the containment of the psychotherapy (Sourkes 1992).

The development of anticipatory bereavement suggests a patient's greater recognition of his or her poor prognosis. The grief related to the impending loss of important relationships becomes manifest in an increased sensitivity to separation without specific references to death or in the form of direct and explicit discussion about death (Sourkes 1992). There may be themes of presence and absence or disappearance and return. Patients can project their concerns onto significant adults as well as show concern about the emotional well-being of their parents or loved ones after their death. There may be fears about being replaced and resentment of healthy siblings. As death approaches, children often turn inward and withdraw from the external world. Normal responses at this time can include retreat from physical contact, quietness, and irritability. It is common for the patient to withdraw from the therapeutic relationship. In the terminal phase, the consultant may only get to see the child in the presence of the parents. This may, however, be a time where important disclosures are made by the child.

In work with physically ill patients, the therapist must possess a high threshold for witnessing and tolerating pain, particularly pain involving separation and loss (Sourkes 1992).

The therapist may have feelings of guilt about his or her own health or that of his or her loved ones in relation to the patient's illness or the therapist's own ability to move on quickly after watching a child die. This guilt may intrude on the therapeutic process, causing the consultant to withdraw instead of focusing on the patient's feelings of anger and isolation (Shaw and DeMaso 2006).

Evidence-Based Treatments

Although there are a growing number of studies assessing the effects of psychosocial interventions on various outcomes in children with physical illness, there are few studies that meet the Chambless criteria for efficacy (Beale 2006; Chambless and Hollon 1998). Chambless criteria were created to rate interventions as "well-established," "probably efficacious," or "promising." Well-established interventions have at least two valid between-group design studies or at least nine single-subject studies demonstrating efficacy. Ongoing challenges in evaluating psychotherapy studies with physically ill children include differences in research design, intervention modality, assessment instruments, techniques of analysis (e.g., differences in how the effect size is calculated), and study populations. Table 28–6 summarizes examples of representative reviews of randomized, controlled trials evaluating the efficacy of psychotherapy in physically ill children and adolescents.

Cognitive-Behavioral Therapy

CBT has the strongest empirical support when compared with other psychological treatment modalities. The results cross a wide variety of general medical conditions including irritable bowel disease, somatoform disorders, functional dyspepsia, inflammatory bowel disease, fibromyalgia syndrome, cystic fibrosis, juvenile rheumatoid arthritis, and polycystic ovary disease (Christian and D'Auria 2006; McQuaid and Nassau 1999; Rofey et al. 2008; Szigethy et al. 2004). CBT has been found useful for adverse effects of treatments (e.g., chemotherapy-induced nausea) and in decreasing maladaptive behavioral responses during medical procedures (Band and Weisz 1988).

Beale (2006) reviewed 19 randomized psychotherapy trials, most of which tested CBT and educational interventions in children with sickle cell, cancer, diabetes, and cystic fibrosis. The mean effect size across a variety of physical illness and psychological outcomes was 0.71 (range, 0.28–3.23; SD = 0.61) with a few studies being "probably efficacious" but most of the studies only meeting Chambless criteria as "promising." Yorke et al. (2007) reviewed 12 randomized psychotherapy trials utilizing CBT techniques in children with asthma and found mixed results in all outcome measures, although some studies showed significant findings in both physical illness and psychological outcomes. There was no significant difference in effect size across different illness groups or type of outcome (e.g., disease symptoms, psychological adjustment, self-care).

There is growing literature supporting CBT efficacy in studies not included in meta-analytical reviews. For example, behavior therapy in youth with asthma and cancer and group skill-building therapy for children with asthma, diabetes, or obesity met criteria for well-established efficacy (McQuaid and Nassau 1999; Plante et al. 2001). Another randomized, controlled trial comparing CBT with standard medical care in children with recurrent abdominal pain found significantly less abdominal pain both by child and parent report as well as significantly fewer school absences (Robins et al. 2005). Szigethy et al. (2007) showed that CBT with an illness narrative

focus was more effective than a treatment-as-usual condition in improving depression and global functioning in youth with inflammatory bowel disease and mild depression. Not only did overall depressive severity improve, but neurovegetative symptoms (e.g., fatigue, appetite changes, sleep changes) usually attributed to the inflammatory disease process itself also improved significantly immediately after treatment (Szigethy et al. 2009). In another study of 66 adolescents with chronic fatigue syndrome, participants randomized to CBT had significantly decreased fatigue, improved physical functioning, and better school attendance over a longer period of 2 years compared with a wait-list control group (Knoop et al. 2008). Interestingly, rating of severity of maternal fatigue was a significant predictor of treatment outcome.

Hypnotherapy

In hypnotherapy, therapeutic suggestions are given to patients when they are in a hypnotic trance. Hypnosis is an altered state of consciousness in which the patient may be more receptive to such suggestions (Olness and Kohen 1996). Hypnotherapy includes specific goals (e.g., mastery, ego-strengthening, decreased unpleasant sensations) and techniques (e.g., relaxation, visual imagery, age regression, unconscious exploration) utilized while a child is in a state of focused concentration. Hypnosis has been shown to be superior to medications in the treatment of pediatric migraines (Hammond 2007; Olness et al. 1987). Preoperative hypnosis in children with elective surgical procedures was found to shorten postoperative hospital stay and decrease reports of anxiety and subjective pain compared with usual treatment (Lambert 1996). One randomized, controlled trial of hypnotherapy compared with standard medical care for pediatric irritable bowel disease demonstrated a significant reduction in abdominal pain at 1-year follow-up (Vlieger et al. 2007). Relaxation and self-hypnosis may directly influence physical parameters and symptoms including peak expiratory flow rate in pediatric asthma and nausea/vomiting in youngsters undergoing cancer-related chemotherapy (Hackman et al. 2000; Jacknow et al. 1994; Kohen 1987).

Education

Bauman et al. (1997) reviewed 15 studies (11 using a randomized, controlled design) with a range of interventions (e.g., social support, coping skills, relaxation), most of which included some form of patient education. The sample included children ages 0–21 years old with a diverse group of general medical illnesses (e.g., asthma, cancer, epilepsy). There was a significant change in at least one outcome measure in 67% ($n = 15$) of studies reviewed. There was significant improvement in self-esteem, self-efficacy, or social competence in four studies, with one study showing improvement in locus of control and another improvement in family functioning. Children with cancer showed a significant improvement in the knowledge and self-management of their disease as well as increased support and coordination of care.

In a comprehensive meta-analytic study of 32 controlled clinical trials using educational interventions for self-management in children with asthma, education was associated with moderate improvement in pulmonary function, self-efficacy, school absences, and emergency department visits (Guevara et al. 2003). The effects on asthma-related morbidity were greatest in children with more severe asthma.

In a review of 12 studies using psychoeducational interventions across a variety of pediatric physical illnesses, there was evidence of effectiveness of interventions that had a cognitive behavioral component on outcomes such as self-efficacy, disease management, family functioning, psychosocial well-being, and competence (Barlow and Ellard 2004). Psychoeducational interventions included written information, interactive computer learning models, social skills, and disease management training.

Education has resulted in pain reduction for chronic headaches, improved lung function, decreased school absenteeism for asthma, and improved metabolic control in diabetes. No reviews of psychoeducational interventions were found for either parents or siblings. One small open trial found a peer support camp for siblings of children with cancer in Australia reported decreased anxiety and fear of disease as well as improved social competence and acceptance (Sidhu et al. 2006). Randomized, controlled trials with active comparison groups are needed to confirm the efficacy of these interesting preliminary findings.

Social Skills Training

Social skills training is designed to help children with peer relationships. Several intervention studies have focused on social skills training and social problem solving for children with chronic medical conditions. In youth with diabetes, in comparison with interventions targeting psychoeducation alone,

TABLE 28–6. Summary of reviews of randomized, controlled trials (RCTs) of psychotherapy in children with chronic illness

Study	Study type	Intervention	Group studied	Outcomes	Significant effects
Yorke et al. 2007	Review of 12 RCTs	CBT; relaxation	Children with asthma (n=18–112); ages 6–17 years	Health care utilization; lung function; asthma symptoms; psychological symptoms	Decreased emergency department visits; decreased asthma severity and symptoms; increased coping; decreased depression
Beale 2006	Review of 19 RCTs	CBT; education	Children with sickle cell, cancer, diabetes, cystic fibrosis (n=5–121); ages 3–22 years	Physical illness symptoms and physiological variables; illness knowledge; psychological adjustment; self-care/ coping attitude	Significant effects found across outcomes without moderation by illness type or therapy type
J.R. Smith et al. 2005	Review of 57 RCTs	Education	Children and adults with asthma; 36 studies included children	Health outcomes and costs	Overall significant reduction in asthma symptoms, particularly for more severe asthmatics; in children, mixed results for self-care and no significant impact on emergency department visits
Chen et al. 2004	Review of 22 studies (not all RCTs)	CBT; social support	Sickle cell disease	Pain; behaviors related to adherence; health care utilization	CBT "probably efficacious"
Barlow and Ellard 2004	Review of 12 reviews of RCTs or CCTs	Psychoeducation with emphasis on disease management	Chronic pain; asthma; chronic fatigue syndrome; encephalomyelitis; diabetes; juvenile rheumatoid arthritis; cancer	Disease management	Evidence of effectiveness for interventions incorporating CBT techniques on self-efficacy, disease management, family functioning, psychosocial functioning, social competence, knowledge, and hope
Guevara et al. 2003	Meta-analysis of 32 RCTs or CCTs	Education with emphasis on self-management Combination of group and individual interventions	Children with asthma (n = 3,706); ages 2–18 years	Lung function; asthma morbidity; health care use	Improvement in lung function, self-efficacy, school absence, and visits to emergency department; no differences in number of asthma flares or severity

TABLE 28–6. Summary of reviews of randomized, controlled trials (RCTs) of psychotherapy in children with chronic illness *(continued)*

Study	Study type	Intervention	Group studied	Outcomes	Significant effects
Plante et al. 2001	Review of 125 studies, including a few RCTs	Various group therapies	Children with asthma, cancer, cystic fibrosis, diabetes, HIV, encopresis, headache, seizures, and musculoskeletal disorders	Emotional support; adaptation; education; symptom reduction	A few studies that focused on adaptation/skill development met Chambless criteria for "well established" for asthma, diabetes, and obesity
McQuaid and Nassau 1999	Review of 30 studies (not all RCTs)	Relaxation/CBT; biofeedback; family; psychoanalysis; social skills training	Children with asthma, diabetes, and cancer (n = 1–54); ages 6–17 years	Asthma symptoms; glycemic control; chemotherapy-related side effects	EMG biofeedback efficacious for emotionally triggered asthma and distraction/relaxation for children undergoing chemotherapy
Walco et al. 1999	Review of 12 studies (not all RCTs)	CBT	Children with cancer, musculoskeletal disorders, and sickle cell disease (n = 1–15); ages 8–31 years	Self-reported pain; medication use; socialization; daily activities; health care utilization; psychosocial outcomes	CBT most promising for pain management, but not all studies proved efficacy
Kibby et al. 1998	Meta-analysis of 42 studies ranging from descriptive studies to RCTs	Eclectic (behavioral, psychodynamic, education)	Chronic headache; juvenile rheumatoid arthritis; cancer; diabetes; asthma; cystic fibrosis; renal disease; congenital heart disease (mean sample size = 25.8 [(SD = 31.7); mean age = 10.34 years [SD = 3.36 years])	Multiple outcomes in areas of behavioral and emotional domains, disease management and prevention, and health promotion	Overall effect size was 1.12, with maintenance of gains for at least 1 year; older females were most likely to benefit from interventions targeting behavioral/emotional outcomes
Bauman et al. 1997	Review of 15 studies (11 were RCTs)	Mainly educational but also social support, coping skills, and relaxation	Children with asthma, cancer, and epilepsy (n = 20–200); ages 0–21 years	Broad range of outcomes across studies including behavioral, locus of control, family functioning, self-esteem, social competence, and social support	11 studies showed significant positive effect in at least one psychosocial outcome; 4 studies with mixed results

Note. CCT = clinical controlled trials; EMG = electromyelography.

skills training interventions decreased stress and improved knowledge, adherence, social skills, and quality of life (Plante et al. 2001). These interventions can be delivered in child/adolescent groups, child/adolescent groups with a separate group for parents, or family groups in which multiple families (parents and children) meet together. They can also have secondary targets of reducing psychological side effects of the disease or of improving family functioning. It is important to note, however, that children with most chronic illnesses, with the exception of those with brain involvement (e.g., brain tumors, neurofibromatosis), do not have social functioning deficits (Reiter-Purtill et al. 2009). Of note, although social skills training is purported to develop social skills and then improve functioning with peers, we could not locate any studies that provided social skills training for children with a chronic illness and demonstrated changes in social functioning from the perspective of peers (social acceptance or social reputation). This work needs to be done.

Summer Camps

Another promising and popular intervention for children with medical illnesses is summer camps. These camps can be residential or day programs and provide age-appropriate activities (e.g., crafts, swimming, campfires) to children within particular illness groups. Qualitative ratings of these programs by participants and their parents have been positive (Silvers et al. 1992). Improvements in illness-related knowledge, health-related quality of life, and social and physical activity following the camp have also been reported (Bluebond-Langner et al. 1990; Shepanski et al. 2005; K.E. Smith et al. 1988). However, many studies of summer camps to date have lacked control groups and employed small sample sizes, so more research is needed in order to determine to what extent these interventions are helpful and in which domains of adjustment (Plante et al. 2001).

Computer/Internet/Experience Journal

In addition to these group interventions for physically ill children, an increasing number of interventions have focused on the use of electronic media to increase support for physically ill children and their families. Perhaps to combat social withdrawal from family and friends, parents of children with pediatric illnesses often informally talk with other parents about their experiences, which can provide support and reduce isolation (Gonzalez-Heydrich et al. 1998). In addition to family support groups, several computer-based interventions have been useful in providing support related to medical illnesses (e.g., Bucher and Houts 1999). One such intervention, the Experience Journal, has been shown to be safe and efficacious in multiple studies (www.experience-journal.com; DeMaso et al. 2000, 2006). Grounded in theoretical research on preventive interventions, narrative therapy, and social support, the program makes the experiences of contributing children, parents, and health caregivers available via the Internet to families who may be facing similar issues and provides the opportunity for individuals to contribute their own narratives. It was designed to foster the creation of an electronic community that enhances self-understanding and family understanding.

Unclassified Interventions

There are several studies of psychosocial interventions that are either eclectic (e.g., combining several different therapy modalities) or not sufficiently described to allow categorization. Kibby et al. (1998) reviewed 42 studies using a variety of psychosocial interventions (e.g., behavioral, psychodynamic, educational) focused on disease management, emotional and behavioral problems, health promotion, and prevention across a variety of pediatric illnesses. The majority of the studies focused on reduction of disease symptoms. The overall effect size (which combined both between-subject and within-subject analyses) across studies was 1.12 with maintenance of treatment gains for at least 1 year.

Outcomes were classified as psychological, physiological, medical services, procedural distress, knowledge, or psychosocial problems. Behavioral interventions were most commonly described with an effect size of 1.20. In addition, it was determined that disease type, severity, or duration did not alter the effectiveness of the interventions. Limitations noted included a lack of random assignment in many studies, thus introducing assessment bias; limited documentation of disease severity; high attrition rates; and eclectic treatment approaches with interventions that had no empirical support. Another example of eclectic individual therapy is a study that utilized an intervention that included relaxation, education, and self-esteem training in Venezuelan children with asthma and found that those receiving the intervention had a greater reduction in immune

response to allergens, fewer asthma attacks, and increased pulmonary function compared with a treatment-as-usual group (Castés et al. 1999). Plante et al. (2001) reviewed 125 studies of group interventions that had the goals of emotional support, psychoeducation, adaptation/skill development, and symptom reduction in children with chronic physical illness. The studies collectively supported a positive effect of group psychosocial interventions on the identified outcome goals. More specific conclusions, however, were not obtained given the range of studies that included both descriptive studies and randomized, controlled trials. Of the four intervention types, only the symptom reduction groups met Chambless criteria for efficacy in terms of disease knowledge, management, and problem solving in children with diabetes or obesity and "promising" criteria for children with cystic fibrosis, encopresis, and chronic headaches. One important question that remains unresolved for children with chronic physical illness is the relative cost-effectiveness and efficacy of group versus individual therapy.

There is a growing literature on the effects of psychotherapy on the pediatric immune system (Nassau et al. 2008). In addition to the Castés et al. (1999) study cited earlier, Kern-Buell et al. (2000) found that biofeedback-assisted relaxation reduced asthma severity and improved pulmonary function and inflammation in 16 adolescents and young adults ages 13–30 years old with asthma compared to a wait-list control group. Another study examined the effects of disclosure of their disease status to friends in 64 children with HIV (ages 8–18 years) (Sherman et al. 2000). Those children who disclosed their HIV status demonstrated a greater increase in $CD4^+$ T cells, suggesting a slowing of disease progression. It was noted that most participants in this study contracted their HIV from transfusion and thus may not have had the same degree of stigma in disclosure as those who contracted the disease from their mother during pregnancy.

Another randomized, controlled trial examined the effects of relaxation alone versus relaxation with immune suggestion versus attention control on salivatory secretory immunoglobulin A (sIgA) in 90 Australian children ages 8–12 years (Hewson-Bower and Drummond 1996). Concentrations of salivatory sIgA increased in the two active conditions but not in the control condition, suggesting a therapeutic effect of hypnosis and relaxation on immune functioning. An effect size could not be calculated for this study because standard deviations of outcome scores by group were not provided. In yet another study, Hewson-Bower and Drummond (2001) compared two active treatments (stress management versus guided imagery focused on the immune system) with a wait-list control condition in 35 children with upper respiratory tract infections. No differences between the three conditions were found in terms of the number of symptomatic episodes; however, the two active treatments had shorter episodes and elevated salivatory sIgA levels. Collectively, these studies suggest that psychological interventions may alter immune functioning, and larger-scale studies are warranted to elucidate the effects on disease progression.

Limitations of Psychotherapy Research

Several major caveats exist with regard to the conclusions that can currently be drawn from the existing body of literature describing psychotherapy research in physically ill children and adolescents. These include the use of small and heterogeneous study samples, variations in age and developmental status across studies, poorly defined therapeutic interventions without measures of treatment fidelity, different locations of treatment settings (inpatient versus outpatient), variable follow-up periods, and wide variation in the internal and external validity of both treatment interventions and outcome measures. In many cases, outcome measures have not been standardized, and many were not sensitive to treatment change. In other studies, treatment interventions are not described in sufficient detail, and there are significant differences with respect to treatment intensity and duration and/or presence of a theoretical construct (e.g., self-efficacy or empowerment). Studies and meta-analyses also varied in how they defined effect size, with some studies comparing pre- and posttreatment changes within patients, whereas others compared the active treatment with a control condition. In addition, cultural and socioeconomic differences across pediatric illness populations need to be better characterized so that results can be interpreted based on the composition of specific pediatric subpopulations.

Concluding Comments

Psychotherapy interventions play an important role in helping youngsters and their families cope with the challenges of physical illness. There is growing

empirical support for a variety of therapy modalities in pediatric populations on both emotional and medical outcomes across many physical illnesses. Most studies to date have focused on the reduction of adverse disease-related consequences and emotional symptoms as well as the management of disease symptoms or treatment-related distress.

However, there is still a paucity of studies targeting health promotion and prevention. There is an ongoing need for methodologically sound randomized, controlled trials with larger sample sizes and longitudinal follow-up so as to demonstrate the potential efficacy of psychotherapy interventions in physically ill children. Future studies are needed to demonstrate the potential cost benefits of these interventions to allow support for their more widespread use in the pediatric setting. Nonetheless, despite numerous methodological weaknesses in existing studies, there is a sufficiently strong evidence base to support the integration of psychotherapy treatment as part of comprehensive pediatric care in physically ill children and adolescents.

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29

Family Interventions

John Sargent, M.D.

Pediatric psychosomatic medicine requires communication and collaboration between families and the health care team. Families bring their children for care and are responsible for implementing recommended treatment plans. An understanding of family organization and function, the role of culture, and the impact of general medical conditions is an essential knowledge base for the effective care of physically ill children (Walsh 2006a).

Families in the pediatric setting experience the vulnerability of their children and cope with their inability to protect their children from disease (DeMaso and Meyer 1996). Successful adaptation requires parents to develop a good understanding of the illness and recognize its potential complications and treatment. (In this chapter, *parents* refers to the child's primary caregivers, regardless of whether they are the biological or adoptive parents or legal guardians.) Parents may have fears about survival, poor outcome, and alteration of lifestyle, which may be manifested as anxiety, guilt, depression, or anger. Because of their own inability to cure their children and the necessary reliance on health care providers, parents may be obliged to surrender control and give up their traditional caregiver roles. They can become preoccupied with medical details while psychosocial factors are ignored, considered a lower priority, or deemed irrelevant. Family responses may vary from sharing control with clinicians, to entrusting clinicians without reservations, to neither ceding nor sharing control (DeMaso and Meyer 1996).

The mental health consultant should have the skills to engage family members, establish effective methods of communication, empathize with and support the family, and enlist family members in the child's treatment. The consultant should be able to intervene in family interactions to improve family functioning while recognizing situations in which referral for more formal family therapy may be indicated. This chapter reviews family resiliency, family responses to pediatric illness, and evidence-based interventions for families of children with physical illness.

Family Resiliency

Resiliency is the capacity of a family to successfully withstand adversity. It is a feature of relationships that leads to personal growth and enhances family functioning (Walsh 2006b). Several aspects of family interaction are often associated with resiliency in the face of the challenges related to a child's physical illness (see Table 29–1).

Emotional and instrumental support from within the family as well as support from extended family members, friends, and colleagues is important. Parenting relationships characterized by emotional validation and collaboration allow for effective communication around critical assessment events and treatment plans. In contrast, parental distress and conflict generally have the opposite effect, interfering with the emotional support and validation that

TABLE 29–1. Selected coping characteristics of resilient families facing pediatric physical illness

Effective and positive communication between parents as well as between parents and children
Helpful emotional and instrumental support from extended family members, friends, and colleagues
Active problem-solving approaches and strategies
Effective use of advice and information
Illness meaning sought and established through linking factual information about a physical illness with the family's own unique personal experience
Flexibility in the use of a range of coping strategies
Effective working relationship with the medical team

parents of an ill child require. Single parents may be in particular need of outside emotional support given the heightened challenges of rearing and caring for a physically ill child. The ability to be flexible in the use of a range of coping and parenting approaches can only further enhance a family's capacity to respond to adversity. The reader is referred to Chapter 2, "Adaptation and Coping in Chronic Childhood Physical Illness," for further discussion.

As noted, there are different types of working relationships between families and their medical team (DeMaso and Meyer 1996). Those that are collaborative and characterized by trust can promote family resiliency, whereas those with ineffective communication and disagreement can interfere with a family's ability to respond and deal with their child's physical illness. The care of physically ill children must include attention to family resiliency and efforts to build on identified strengths while at the same time addressing vulnerabilities that interfere with and impede successful adaptation.

CHALLENGES OF PEDIATRIC PHYSICAL ILLNESS

Physical illness in childhood creates predictable challenges for the family (see Table 29–2). Family members must manage their emotional reactions at the same time that they are acquiring and integrating new information about their child's illness and its treatment. This information is often complex and may be presented in a confusing manner by the child's medical team. It must not be forgotten that the challenges of pediatric physical illness always occur in the context of other life challenges that a family may be facing and thus will only further heighten and add to the stress experienced within a family.

An understanding of the challenges faced by families can be enumerated by adhering to the national guidelines for the mental health assessment of the family (see Table 29–3) (American Academy of Child and Adolescent Psychiatry 2007). These guidelines provide a review of family communica-

TABLE 29–2. Challenges for families adapting to pediatric physical illness

Learning about the illness and the tasks required to manage the illness
Managing emotional reactions of family members to the illness
Maintaining family life while managing the illness
Maintaining expectations, structure, and limits for all children in the family
Accepting the child's functional and developmental limitations associated with the illness
Promoting autonomy and self-care of the ill child
Ensuring time for healthy siblings
Ensuring time for adult experiences and satisfaction with adult relationships
Obtaining and utilizing needed emotional and instrumental supports/resources
Dealing with financial obligations related to illness care by direct costs and/or interference with employment
Developing and maintaining an effective working relationship with the child's medical team

TABLE 29–3. American Academy of Child and Adolescent Psychiatry Practice Parameter for the Assessment of the Family

Principle 1. The psychiatric assessment of a child or adolescent must include both historical and current information about the family and its functioning, typically gathered from the child and primary caregiver(s).
Principle 2. The family assessment of a child or adolescent must include an observation of the child's interaction with caregiver(s).
Principle 3. The family interview can comprise interviews with individual family members, groups of members, or the entire family.
Principle 4. When the clinical history suggests interactional problems, the family members in daily contact with the child should be interviewed, with the goal of establishing an understanding of the family context of symptomatic behaviors.
Principle 5. The family interview should include questioning regarding family risk factors for specific disorders.
Principle 6. The family evaluation should provide enough data for a clinician to characterize adequately the family's structure, level of communication, belief system, and regulatory functioning.
Principle 7. The family assessment is enhanced by a family developmental history, a marital/relationship history, and an individual parent history, including a history of psychiatric disorders in family members.
Principle 8. For complex cases, the clinician should consider ancillary techniques to gather and organize relevant data about family functioning.
Principle 9. The evaluation of the family requires the clinician's sensitive awareness of cultural differences.
Principle 10. A comprehensive family assessment should lead to treatment interventions that interrupt family functions that may precipitate, predispose, or maintain clinical problems and potentiate family functions that promote health and optimize disease management.
Source. American Academy of Child and Adolescent Psychiatry 2007.

tion patterns and role flexibility related to such issues as the parents' capacity to set limits on the ill child as well as provide attention to healthy siblings. Belief systems about the physical illness as well as cultural beliefs may influence illness care (Walsh 2006a). Assessment should include an observation of interactions among family members as well as the degree of emotional support with extended family members. Effective family coping depends on strengths in the areas of communication, boundary setting, role flexibility, and emotional support.

The medical team is a critical family resource in responding to the challenges of the child's illness, proving particularly helpful in the promotion and maintenance of hope. Given the importance of this working relationship, it is important to have a clear understanding of the respective roles and treatment goals. The medical team should model effective communication with open and direct discussion of the diagnosis, course, and potential outcome of the disease throughout the course of the illness. In doing so, the medical team should carefully consider the impact of the illness on both child and family functioning.

Influence of Physical Illness Course and Prognosis

Three phases of the course of chronic illness, each of which requires different skills and responses on the part of family members and health care providers, have been described: 1) crisis; 2) chronic; and 3) terminal (Rolland 1987).

Crisis Phase

The crisis phase is the period immediately prior to and following the diagnosis of an illness. Medical activities are directed toward controlling symptoms and illness progression. This phase is characterized by shock and bewilderment, closely followed by feelings of grief regarding the loss of the healthy child. This is a time when there may be an oscillation between denial of the illness and acceptance of permanent change. The crisis phase represents a time during which a family may search for meaning in an effort to obtain a sense of mastery. This can be a time when families may turn to religious and spiritual support. Families may respond to their "need for meaning" in different ways, including 1) resigna-

tion (assuming a passive role in the search for meaning by resigning themselves to circumstances); 2) reconciliation (a more active approach in which patients or families may believe that there is a reason for the illness which they are not aware of but which they are able to accept); and 3) remonstration (in which there is a continued search for meaning throughout the course of the illness) (Taylor 1995).

The family coping tasks during the crisis phase may include 1) obtaining and retaining information about the illness; 2) explaining the illness to healthy siblings and family members; 3) mobilizing support from friends and extended family; 4) managing the emotional reactions to the illness (e.g., anxiety and/or depression); and/or 5) temporarily reallocating family resources (Jacobs 2000). Additional tasks may include learning how to live with pain and disability and adapting to repeated visits and/or hospitalizations in the pediatric setting.

Pediatric physical illness and its treatment often necessitate other family problems being temporarily placed on hold. If these issues have previously been problematic or difficult to negotiate, the centrality of the physical illness may serve the role of helping the family avoid dealing with other important issues. This appears particularly true in parents who have unresolved marital issues. The illness may be used to regulate marital distance or parental conflict. Parenting can become an adversarial process should the illness polarize and fragment the family such that opposing sides are taken regarding illness-related issues. The opposite may also happen, in which the illness can lead to greater recognition of the strengths, cohesiveness, and competency within a family.

Chronic Phase

Unfolding after the initial diagnosis, the chronic phase involves the readjustment to having a physical illness. This is a maintenance period with the goal of minimizing the likelihood of relapse through appropriate medical care. Social support and rehabilitation are important to help reduce disability and maximize functioning. Illnesses can have stable, progressive, and/or episodic courses of varying time length. For instance, in the treatment of cancer, families enter a phase in which they hope for long-term remission while remaining aware of the potential for recurrence. As fears about recurrence lessen, patients may increasingly be defined as long-term survivors. If the illness is ultimately fatal, the chronic phase becomes a period of "living in limbo."

It is not unusual for ill children to be at different phases in their reaction to their illness after treatment ends. Family members may want to move on and to restore a sense of normality that may not be possible for the child. On the other hand, families may experience a sense of abandonment by the medical team due to the reduction in frequency of clinic visits. Family members may mourn the loss of past and future opportunities and maintain patterns of behavior from the crisis phase that have the potential to reinforce the child's sick role. In a study of mothers facing pediatric heart disease, their concerns were reliably grouped into five categories: medical prognosis, quality of life, psychosocial functioning, effects on family, and financial issues (Van Horn et al. 2001). Distress about most concerns decreased postdischarge, as did mothers' anxiety and depressed moods. Mothers' perceptions of medical severity were associated with distress about psychosocial issues postdischarge.

In this phase, families with adaptive coping mechanisms are generally able to prevent the illness from interfering with or dominating family life. The goal should be to restore a sense of normalcy by reestablishing family routines that accommodate the demands of the child's illness. It is important wherever possible for the family to accept the permanent changes brought about by the illness and to positively redefine the developmental trajectory of the child and family.

For some illnesses, the chronic phase is the endpoint of the disease course, and a transition plan to adult medical care is necessary (Carter and McGoldrick 2005). In general, discussions about transition in responsibility from parents to adolescent and from pediatric services to young adult and ultimately adult care should begin in early adolescence. Negotiation about the issues connected with shifting greater responsibility to the chronically ill young person should be integrated into discussions at medical appointments. These negotiations are often influenced by specific illness conditions and medical team/family relationships as well as the child's developmental capacity and trajectory. Concerns that may benefit from family therapy include heightened parental anxiety, overinvolvement of the family, adolescent denial and rejection of self-care, and/or family disagreement regarding the appropriate division of self-care and family care responsibilities.

The transition in care from the pediatric health care setting to the adult setting can be delicate and complicated, requiring a graduated plan and consid-

erable patience on everyone's part. Frank discussion between the medical team and the family regarding the patient's capacities and options should characterize these conversations. These discussions may include consideration of education and career choice, sexuality, illness inheritance, life expectancy, and capacity for and degree of independence to be expected. Successful transition generally includes consideration of vocational choice and intimate relationships, which can present unique challenges for parents and the ill child.

Conflict about any of these issues can arise and thus may require thoughtful negotiation and at times intervention by the mental health consultant. Indications for such intervention may include 1) poor adherence to the illness treatment regimen, 2) mistrust in the health care team/family relationship, 3) poor goal setting and planning in team/family interactions, 4) family dissatisfaction with medical care, 5) poor involvement of children and adolescents in their own care, and 6) confusion and miscommunication about the child's and family's situation.

Terminal Phase

Illness relapse and progression despite treatment are accompanied by the child's deterioration and ultimate demise. This is clearly an emotionally challenging time for the patient, the family, and the medical team. Physical deterioration combined with the need for decisions about the continuation and intensity of care is emotionally challenging for all. Entry into the terminal phase can portend a complex and difficult period in the relationship between the family and medical team. These relationships have the potential to become conflictual and polarized. Medical decisions to limit or withhold care can be problematic. Second opinions may be sought, and all-or-nothing decisions may be desired. Respectful and collaborative plans are sought but may be difficult to achieve. In these situations, the involvement of the mental health consultant and/or referral to a family therapist can be helpful. Yet, at the same time, the strength of the working relationship between the medical team and family often proves useful in successfully navigating the terminal phase and leads to the greatest acceptance of and meaning in the child's death.

Family Logistical Concerns

There are important logistical concerns that require a family's attention during the course of their child's physical illness. These family concerns can be categorized as 1) material needs, 2) relationship issues, 3) preexisting psychosocial concerns, and 4) individual family member responses. These concerns can be exacerbated by the development and subsequent management of a physical illness in childhood. The medical team and/or mental health consultant should identify these concerns during the initial assessment and ongoing care of the patient.

Families may feel overwhelmed at the time of illness diagnosis as a result of the need to make significant changes in their family structure and routines (see Table 29–4). Families may require basic logistical support and guidance (e.g., understanding and accessing health insurance, respite care, and visiting nurse care). It can be helpful to families to identify resources for them in their communities (e.g., afterschool programs, summer camps) or alert them to family support networks related to the physical illness (e.g., the Juvenile Diabetes Foundation and the Cystic Fibrosis Association) (Madsen 2003).

Assisting Family Members With Emotional and Behavioral Adaptation

The successful integration of illness management into family routines requires parents to respond to a number of illness- and non-illness-related tasks (see

Table 29–4. Logistical resources for families facing pediatric physical illness

Mutual support organizations—disease or problem associated
State financial supports—children with special health care needs
Federal financial supports—Social Security disability funds
Activities for unique populations—Special Olympics, blind athletics
Mutual support groups for children and youth
Support for obtaining or maintaining health insurance coverage
Advocacy opportunities—locally, statewide, and nationally

TABLE 29–5. Nonillness and illness tasks facing families with pediatric physical illness

Non-illness-related family tasks
1. Maintaining family connections
2. Maintaining family morale and a sense of meaning
3. Ensuring attention to parental relationships and opportunities for intimacy
4. Providing attention, encouragement, and supervision for siblings
5. Ensuring opportunities for play, recreation, and enjoyment
6. Ensuring adequate financial resources
7. Maintaining connections to extended family, community supports, and friendships
8. Continuing with family spiritual life
9. Dealing with other important family stresses—other family illness, moving, job loss, or job change
Illness-related family tasks
1. Developing a shared understanding of the illness
2. Resolving disagreements about the child's condition or care
3. Developing routines that embed illness care into family life as much as possible
4. Assigning and monitoring illness tasks, especially making sure that the ill child can be and is responsible for his or her tasks
5. Building some flexibility in parental roles and avoiding rigid role definition
6. Developing a shared view that illness management builds family competence
7. Communicating with siblings about the illness and their experience of the illness
8. Experiencing, communicating about, and managing emotional reactions to the illness
9. Collaborating effectively with the medical team
10. Ensuring that all members of the family and medical team are known to and engage with each other

Table 29–5). Meetings with the medical team may provide an opportunity for discussion and resolution of potential disagreements among family members. The medical team should be alert to fears, frustrations, and feelings of anger and sadness related to the illness and, in doing so, honor the feelings of individual family members and be aware of the potential for these reactions to strain family relationships.

Physical illness can result in limitations to a child's autonomy and the development of parental overprotectiveness. Parents can benefit from guidance in establishing and/or maintaining limits with the ill child while simultaneously supporting age-appropriate efforts at individuation. Special events, celebrations, and outings often can be scheduled to recognize accomplishments. In situations in which the illness course leads to medical deterioration, decreasing function, or death, the family requires compassion, availability, and honesty on the part of the medical team. The degree to which the team is engaged, supportive, and accepting may be helpful to the family, even in the context of their own feelings of anger, despair, and helplessness. At such times, the medical team becomes witness to the family's experience and models acceptance of the child's medical outcome.

Siblings

It is important for parents to also give attention to their healthy children, supporting them in their emotional reactions and promoting their development and adaptation. Although current research suggests that siblings do appear to experience negative effects from an ill sibling, serious psychopathology or behavioral problems have generally not been identified (Barlow and Ellard 2006; Sharpe and Rossiter 2002).

In all studies sibling problems were rated as more problematic in parent reports compared with sibling self-reports. Sharpe and Rossiter (2002) found a modest negative effect in siblings resulting in greater amounts of depression, lower self-concept, and poorer overall psychological functioning as well

as difficulties with peer relationships. These negative effects were greater among siblings living with children whose illness required complex daily treatment regimens. Barlow and Ellard (2006) noted an increased frequency of anxiety and posttraumatic stress symptoms as well as school absences. Nevertheless, many siblings appeared to cope adequately, and some were noted to demonstrate significant resilience and empathy as a result of their experience of living with an ill sibling.

Given the current state of research, including the absence of longitudinal studies and the mixed populations studied, it is best to view siblings of chronically ill children as an "at risk" group requiring assessment and monitoring by their parents. However, these youngsters may demonstrate significant strengths that will prove valuable to them in their lives based on their unique childhood experience.

Evidence-Based Approaches to Family Intervention

Given the family's central role in responding to and managing pediatric physical illness, family interventions have been implemented in the following categories: 1) education programs; 2) psychoeducational programs; and 3) psychotherapy. The range of outcomes measured in these interventions has included illness knowledge and management, physiological measures of disease activity, and psychological well-being of the ill child, siblings, and parents.

These interventions have also been classified based on the study sample (e.g., families experiencing poor medical outcomes or families either with or without problems with behavioral adaptation in the ill child or family members). Interventions are generally designed to prevent psychosocial problems, to enhance general adaptation, and/or to decrease specific problems identified at the time of the intervention.

Family Education Programs

Education programs have been developed to enhance parent, ill child, and sibling understanding of the illness, its treatment, and its effects on the ill child. The goals of these programs include improved illness outcome and successful integration of illness care into family life. Following the diagnosis of an illness, parents and the child (depending on the child's developmental level and cognitive capacity) are provided with verbal and/or written material concerning the illness, its course, and the usual necessary home care. There may be a wide variation in the materials used, the intensity of the instruction, and the evaluation of the material learned or illness management skills. Given the need for in-home care in many pediatric chronic illnesses, research has been conducted to evaluate the effectiveness of standardized education programs carried out with various family members and conducted by a range of pediatric professionals.

One such program focused on families with children with insulin-dependent diabetes mellitus (Laffel et al. 2003). This program included standardized teaching about the illness that focused on methods of family illness problem solving, including responses to elevated or low blood sugar, and assisted family members in keeping diabetes-related records. Among the children in the study group, diabetes control was improved and medical complications reduced. Other similarly designed and structured education programs have shown an increase in illness knowledge and enhanced illness management behavior among families (Boschen et al. 2007). However, one meta-analysis of 11 self-management teaching programs for pediatric asthma (Bernard-Bonnin et al. 1995) found no reduction in school absenteeism, frequency of asthma attacks, hospitalizations, or emergency department visits, and the authors concluded that future programs should focus more on intermediate outcomes such as behavior. Nonetheless, the consensus generally is that education programs should be a routine component of the care of the physically ill child.

Family Psychoeducational Approaches

Family psychoeducational programs have been developed to improve overall family functioning in addition to improving illness-related outcomes for the ill child. These programs may be directed at the ill child, the parents, or the siblings or a combination of these. Goals include enhanced psychosocial functioning of the ill child or siblings, prevention of poor psychosocial outcomes, improved family relationships, and empowerment of the parents.

Psychoeducational programs are the most frequently described and investigated family interventions for families with a child with chronic physical illness. These programs are directed at reducing family distress, preventing ill child and sibling maladaptation, and reducing the family burden of illness management. Programs focus on efforts to improve parental empowerment as well as to build confidence and competence in the affected child. A wide range of programs have been found to have

beneficial effects and demonstrated efficacy. Key elements of effective programs include formal structure, established curricula, involvement of parents and ill child or siblings, standardized assessment of baseline behavior, and follow-up evaluation of program goals.

Ireys et al. (2001) evaluated an education and support program for 193 mothers of children ages 7–11 years diagnosed with diabetes, sickle cell anemia, cystic fibrosis, or moderate to severe asthma. This 15-month intervention was designed to enhance mothers' mental health by linking mothers of school-age children with selected chronic illnesses with mothers of older children with the same condition and included telephone contacts, face-to-face visits, and special family events carried out by experienced mothers. Results of the study included significant reductions in maternal parental anxiety after program completion. In a study of child outcomes in the same cohort of families, results showed significant benefits in child adjustment, assessed using measures of anxiety, depression, and self-perception, particularly for children who presented with low baseline reports of physical self-esteem (Chernoff et al. 2002).

Mendenhall (2002) reviewed 12 randomized, controlled trials of psychoeducational programs for families of children with diabetes mellitus and identified program effectiveness in improving diabetic control. Campbell (2003), in his review of family interventions, emphasized the benefits from these programs but noted that programs had greater beneficial effect for families with children with more severe or complicated illness. Mellnyk et al. (2004) developed and evaluated the Creating Opportunities for Parent Empowerment (COPE) program for mothers with young children (ages 2–7 years) with a variety of chronic illnesses. This program focused on educating mothers about illness care and child emotions and behavior during and after hospitalization as well as enhancing parental child management skills. Results at 1-year follow-up demonstrated markedly decreased problematic behaviors in study children compared with children whose mothers did not participate in the COPE program.

Barlow and Ellard (2004) reviewed 12 psychoeducational intervention studies, including samples of children with asthma, chronic fatigue syndrome, diabetes, juvenile arthritis, and chronic pain. Overall, studies showed evidence of effectiveness on such variables such as self-efficacy, self-management of disease, family functioning, psychosocial well-being, reduced isolation, social competence, knowledge, hope, school absenteeism, health care utilization, and disease control. A number of gaps and limitations were identified across all disease categories, including inadequate description of the interventions, small sample sizes, and lack of evidence regarding cost-effectiveness (Barlow and Ellard 2004).

Several psychoeducational programs have been demonstrated to be effective in enhancing sibling knowledge about their sibling's illness as well as decreasing or preventing sibling psychosocial difficulties. In a randomized three-group study, Williams et al. (2003) tested the efficacy of a structured teaching and psychosocial intervention provided for siblings of children with chronic illness attending a 5-day residential summer camp. Subjects receiving the full intervention reported favorable outcomes on measures of sibling knowledge about illness, behavior problems, social support, self-esteem, attitude, and mood that were sustained over a 12-month follow-up period. Lobato and Kao (2002, 2005) described a structured psychoeducational program that they used with siblings in two groups ages 4–7 and 8–13 years. In evaluations of this program, siblings were found to have increased knowledge of their siblings' illness, increased sibling connectedness, and decreased rates of negative adjustment at 3 months' follow-up. Weeklong summer camp educational and social experiences for siblings have also been shown to have beneficial effects (Sidhu et al. 2006). These effects included improvement in measures of self-acceptance and social competence.

In summary, psychoeducational programs demonstrate moderate improvement in illness outcome and psychosocial functioning among ill children, siblings, and parents. The beneficial effects occur across illnesses and appear to be greater when illness care requires daily interventions and when illnesses have greater severity. However, situations in which there are significant relationship problems or behavior issues require more individualized and intensive treatment, including family therapy.

Family Psychotherapy

Family therapy has been described for situations in which family relationships are conflictual, the ill child or a sibling is exhibiting poor emotional or behavioral adaptation, or the family is having significant difficulty setting limits that ensure effective illness care or satisfactory developmental outcomes for the ill child or siblings. Methods of family therapy to address poor parenting, poor parental collab-

TABLE 29–6. Indications for referral for family therapy

Marked family distress
Poor collaboration and communication with the medical team
Disabling emotional and/or behavioral symptoms in the ill child and/or siblings
Marked marital stress involving the ill child and/or siblings
Problems ensuring that the ill child adheres to the treatment regimen
Exhaustion, anxiety, burnout, and/or depression in one or both parents

oration, and poor parent-child relationships have also been described.

Family therapy has been used in the treatment of behavior and relationship concerns in pediatric physical illness and pediatric psychosomatic disorders for the past 30 years (Minuchin et al. 1978; Sargent 1983). There are a variety of family therapy techniques such as structural family therapy (Minuchin 1974; Minuchin et al. 1978), narrative therapy (White 2007; White and Epston 1990), and collaborative therapy (Madsen 2003) that may hold promise with these families. However, although benefits in terms of improved physical symptoms, family function, and child psychosocial outcomes have been well described (Gustafsson et al. 1986; McDaniel et al. 1992; Ryden et al. 1994; Sargent 1997; Weihs et al. 2002), there are no randomized clinical trials of family therapy for children with chronic pediatric physical illnesses. Although there are clear clinical indications for referral for family therapy (see Table 29–6), trials of family therapy for this population are urgently needed.

Cost-Benefit Analysis

Cost-benefit analyses of family interventions for families with pediatric physical illness have not been published. Reducing the cost of illness care, including preventing hospitalizations or medical or psychiatric complications of the illness, would result in significant cost reductions for these families and society. Costs of education or psychoeducational programs are generally modest, especially if carried out by case managers, child life specialists, or experienced parents. Potential benefits to families include a more satisfying family life and improved functioning and developmental outcomes for the ill child or siblings. Family therapy for individual families with serious difficulties is often time intensive and can be costly. The effectiveness of the therapy in achieving improvement in specific goal-related areas must be demonstrated through research to enable a thorough cost-benefit analysis. In the absence of these data, family therapy is warranted based on the significance of the difficulties and the availability and accessibility of experienced and knowledgeable clinicians.

CONCLUDING COMMENTS

The care of pediatric physical illnesses always involves the family. It is always a collaborative effort between the medical team and the family. Successful navigation of the challenges of the physical illness in childhood involves establishing a balance between illness care and a satisfying family life for all members. At times this balance is not present. In these situations, offering family-centered care, paying attention to family strengths and sources of resilience, providing the family access to concrete resources, mediating family team conflicts, and providing family therapy can lead to improved outcomes for the children and their families as well as a more satisfying experience of care for the medical team.

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Psychopharmacology in the Physically Ill Child

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Psychopharmacology is a tool used in the pediatric setting to help patients gain relief from emotional and behavioral distress while aiding their coping and adaptation to physical illness and medical or surgical treatments. High rates of comorbidity between childhood psychiatric and physical disorders ensure that psychopharmacological issues will present in pediatric settings ranging from the primary care clinician's office to the critical care unit (Spady et al. 2005; Stoddard et al. 2006).

Little literature is available to guide psychotropic prescribing in physically ill children and adolescents. Significant interindividual responses should be expected across medication classes (Cutler et al. 2008; Li et al. 2008). Further limitations arise when addressing situations involving young children, for whom case reports often are the only existing literature (Gleason et al. 2007). Careful monitoring within a clinical relationship that supports the collection of valid and reliable data on treatment effects should be the current standard of care (Myers and Winters 2002).

When present, physical disease factors that produce psychiatric symptoms should be treated directly. Often, distressing cognitive, emotional, and/or behavioral symptoms experienced by physically ill children do not meet full diagnostic criteria for a discrete mental disorder yet nevertheless impair functioning and interfere with recovery. These symptoms are targets for medication intervention when there is no response to available evidence-based psychosocial interventions, there is a significant risk of harm, or there is significant functional impairment (Gleason et al. 2007). Commonly encountered target symptom dimensions include agitation, anxiety, disorientation, perceptual disturbance, insomnia, fatigue, mood dysregulation, and pain (Galloway and Yaster 2000).

The choice of medication should be guided by an understanding of developmental pharmacokinetics

and pharmacodynamics, desired medication effects, potential adverse effects, risks of drug interactions, available nonpharmacological treatment options, and interplay of medications with disease processes.

Informed consent should be obtained prior to treatment and should include a developmentally informed discussion with patients and families of the indications, therapeutic alternatives, anticipated benefits, and potential risks of medication (Frank et al. 2008). This discussion should note the U.S. Food and Drug Administration regulatory status for an intended use and any special warnings. Care must be taken to maximize participation and understanding on the part of the patient and his or her parents and health care providers.

Developmental Pharmacokinetics and Pharmacodynamics

Developmental pharmacokinetics focuses on the measurable physical and chemical properties of medications as they are absorbed, distributed, metabolized, and eliminated by the human body at different ages (Robinson and Owen 2005). Pharmacodynamics outlines the mechanisms and clinical manifestations of a drug's pharmacological effects as exerted via drug-receptor binding and receptor function/signaling at the intracellular and intercellular levels. Developmental pharmacodynamic research is needed to learn how the ontology of brain anatomy, neural circuits, hormones, receptors, and neurotransmitters interacts with and influences responses to psychotropic drugs across the life span (Carrey and Dursun 1997).

Absorption

Medications can be administered by several routes including oral, intravenous, intramuscular, subcutaneous, rectal, transdermal, or sublingual. Drug bioavailability describes the rate and extent to which a medication's active ingredients are absorbed and made available for therapeutic action. The rate of absorption is influenced by drug formulation, drug interactions, and gastric motility. Properties that affect absorption over time include the surface area, mucosal integrity/function, gastric acidity, and local blood flow. In general, gastric absorption is increased when the stomach is empty, although gastrointestinal side effects are often increased when medications are taken without food. Drugs given orally that are absorbed through the gastrointestinal tract may be altered by first-pass hepatic metabolism. Sublingual and topical administration of drugs minimizes the first-pass effect, and rectal administration reduces the effect by 50%. Intravenous drug delivery offers 100% bioavailability and generally results in a more rapid therapeutic effect.

Distribution

Serum pH, blood flow, protein binding, fat solubility, and degree of ionization influence the distribution of a medication (Buxton 2006). With the exception of lithium, methylphenidate, and venlafaxine, psychoactive drugs are 80%–95% bound to proteins, either albumin or α_1-glycoprotein. Divalproex sodium and barbiturates tend to bind to albumin, whereas the tricyclic antidepressants (TCAs), amphetamines, and benzodiazepines bind to globulins. In general, only the unbound drug is pharmacologically active. Decreases in protein binding increase the availability of the drugs for therapeutic action and may increase medication side effects. Drugs with a narrow therapeutic range, such as divalproex sodium, may be more susceptible to alterations in protein binding.

Albumin binding is decreased in many physical illnesses including cirrhosis, pneumonia, malnutrition, acute pancreatitis, renal failure, and nephrotic syndrome. In these conditions, albumin-bound drugs with a low therapeutic index may increase in concentration, causing toxicity. In contrast, in hypothyroidism albumin binding may be increased. α_1 Glycoprotein plasma concentrations may increase in patients with Crohn's disease, renal failure, rheumatoid arthritis, surgery, burns, and trauma. If protein binding is affected by disease, it may be necessary to make adjustments to medication dosages.

Distribution is also affected by body tissue composition and fluid shifts. Lipophilic drugs will have a more extensive volume of distribution in individuals with higher body mass percentages of adipose tissue. Changes in cardiac output and the intravascular to extravascular fluid shifts that are encountered in the context of burns or trauma have also been demonstrated to affect drug distribution (Han et al. 2007).

Metabolism

Drugs are primarily metabolized in the liver and gastrointestinal tract and then excreted through the kidneys. Water-soluble drugs are readily excreted by the kidneys, but fat-soluble drugs tend to accumulate until they are converted into water-soluble

compounds or metabolized by the liver into inactive compounds. After absorption from the gastrointestinal system, these drugs pass through the liver prior to entering the systemic circulation where they undergo first-pass metabolism in the liver and intestinal wall. Hepatic metabolism may be either phase I or phase II metabolism (Buxton 2006).

Phase I metabolism, which involves oxidation via the cytochrome P450 mono-oxygenase system, reduction, or hydrolysis, prepares the drug for excretion or further metabolism by the phase II pathways. Phase II metabolism consists of conjugation of the drug or its metabolites with hydrophilic compounds in the glucuronidation, acetylation, or sulfation pathways. This produces a form of the drug that is more readily excreted. First-pass metabolism can result in significant changes in the activity of a medication and may explain why there is often a significant difference in potency when medications are given parenterally rather than orally.

Hepatic metabolism may be limited by the blood flow that delivers the drug to the hepatic metabolizing enzymes as well as the intrinsic capacity of the enzymes involved in metabolism. Hepatic blood flow may be altered in liver disease due to portosystemic shunting and may be increased in chronic respiratory illness, acute viral hepatitis, and diarrhea and in conjunction with certain medications (e.g., clonidine). In practice, however, only severe cirrhosis has clinically significant effects on hepatic blood flow. Hepatic metabolism is also affected by enzyme inhibition or induction caused by specific medications. Although hepatic diseases, such as acute viral hepatitis, may limit phase I metabolism, liver disease generally does not have clinically significant effects on glucuronide conjugation reactions due to its large reserve of enzymes.

Elimination

Drugs and their metabolites may be excreted through the kidneys as well as into bile, feces, sweat, saliva, or tears. Lithium, gabapentin, amantadine, and topiramate are primarily excreted through the kidneys without hepatic metabolism. The half-life is a measure of the amount of time needed to excrete half of the drug from the plasma. It determines the frequency of administration that is required so that, at steady state, drug concentrations do not fluctuate widely. The half-life of highly protein-bound psychoactive drugs is greatly increased. Although the kidneys are primarily involved in drug elimination, renal disease may also impact drug absorption, distribution, and metabolism.

Drug-Drug Interactions

Consideration of drug-drug interactions is essential in situations where multiple medications are used simultaneously to address co-occurring conditions. Safer et al. (2003) have reported a rising trend in the use of multiple, potentially interacting psychotropic medications to treat children and adolescents with psychiatric morbidities, whereas Robinson and Owen (2005) found the use of multiple medications to be a common cause of patient morbidity.

Pharmacokinetic drug-drug interactions can influence drug concentrations through changes in absorption, distribution, metabolism, or excretion. Pharmacodynamic interactions can involve alterations in the pharmacological response to drugs that might occur through alterations in drug-receptor binding, receptor function, and signaling at the intracellular or intercellular levels. Both pharmacokinetic and pharmacodynamic properties are likely to be developmentally dependent on changes in factors such as body composition, organ system physiology, cell turnover, and target receptor characteristics (Carrey 2001; Carrey and Dursun 1997).

Cytochrome P450 System

The hepatic cytochrome P450 system is a family of enzymes that is responsible for oxidative phase I metabolism. The major cytochrome P450 enzyme families that are active in humans are CYP1, CYP2, and CYP3. These families are further divided into subfamilies that include 1A2, 2C9, 2C19, 2D6, 2E1, and 3A4 (Lewis and Ito 2008).

Substrates are those agents that are metabolized by the cytochrome enzyme subsystems. An inhibitor may decrease or block enzyme activity required for drug metabolism and cause an elevated concentration of the circulating drug with potential to increase therapeutic or toxic effects. An inducer increases metabolic enzyme activity and results in a decreased concentration of circulating substrate drug and an increased concentration of metabolites (Pelkonen et al. 2008; Zhou 2008). This may lead to decreased therapeutic effect or to increased toxicity due to the elevation of toxic metabolite concentrations. Knowledge of whether a drug has an inhibitory or inductive effect on a specific enzyme may help predict potential drug interactions.

Uridine Glucuronosyltransferases

Phase II metabolism usually follows phase I metabolism and generally plays a minor metabolic role. Lamotrigine, morphine, and lorazepam are primarily metabolized by phase II metabolism. These reactions are conjugation reactions in which water-soluble molecules bind with the drug to make it more easily excreted. The most common phase II enzymes are the uridine glucuronosyltransferases (UGTs). Classified into 1A and 2B, the UGT enzyme systems also have substrates, inhibitors, and inducers (e.g., glucuronidation of lorazepam is competitively inhibited by the nonsteroidal anti-inflammatory drugs [NSAIDs]).

P-Glycoproteins

P-glycoproteins participate in the transport of substances out of cells into the gastrointestinal tract, bile, blood, and urine (Hennessy and Spiers 2007). They are involved in blocking gastrointestinal absorption and are part of the first-pass effect, functioning as "gatekeepers" for CYP3A4 metabolism. P-glycoproteins may have a role in prevention of drug uptake from the blood to the brain (Lin and Yamazaki 2003; Linnet and Ejsing 2008). The P-glycoprotein transporter does not affect drug metabolism but rather influences drug bioavailability by removing P-glycoprotein substrates and returning them to the gut lumen or the bloodstream. P-glycoprotein inhibitors antagonize this process and precipitate retention of P-glycoprotein substrates. For example, omeprazole, which is an inhibitor of the P-glycoprotein transporter system, may lead to increased serum concentrations of carbamazepine, a substrate for this system.

Identification of Drug Interactions

Most pharmacokinetic drug-drug interactions involve the effect of a drug on the cytochrome P450–mediated metabolism of another agent (Sandson et al. 2005). For these interactions to have clinical importance, the drug needs to have a narrow therapeutic index and only one primary P450 enzyme involved in its metabolism. The metabolism of drugs that are substrates of multiple cytochrome P450 enzyme subfamilies is not usually altered to a clinically significant degree by the inhibition of one P450 enzyme because metabolism can proceed through the remaining unaffected metabolizing enzymes.

The practitioner should remain mindful of the potential for significant P450-mediated interactions when a new drug is introduced to an established medication regimen. Drugs with a narrow therapeutic index that are metabolized through a single P450 pathway are particularly vulnerable to such interactions. The addition or removal of drugs that inhibit or induce cytochrome P450 enzyme activity might require substrate dosage adjustments to maintain clinical efficacy and minimize potential toxic side effects. Clinical monitoring for signs of treatment-emergent toxicity and, when possible, laboratory monitoring of drug levels are both elements of safe clinical practice when the risk of drug interactions is suspected.

Drug interactions that affect renal elimination are important when an active drug is excreted primarily through the kidneys. Changes in urine pH may modify elimination of specific drugs. For example, drugs such as antacids that alkalinize the urine may reduce the excretion of drugs such as amphetamines and TCAs.

Psychotropic Medication Use in Physical Illness

Hepatic Disease

Drugs that can act as hepatocellular toxins (e.g., acetaminophen, alcohol, and isoniazid) will cause elevations in liver transaminases. Mild alanine aminotransferase (ALT) and aspartate aminotransferase (AST) elevations are common and usually benign. They require investigation only if elevated two to three times above baseline. Other drugs, such as valproic acid, can impair the metabolic machinery of the cell disproportionate to the degree of hepatocellular damage. In patients with valproate-induced liver injury, low albumin, high prothrombin time (PT), and high ammonia may be seen without much elevation in liver transaminases (Bjornsson 2008).

Still other drugs (e.g., chlorpromazine and erythromycin) cause cholestasis without much hepatocellular injury or elevation in ALT or AST (Glasova and Beuers 2002; Hautekeete 1995; Velayudham and Farrell 2003). Although elevations in bilirubin or alkaline phosphatase in adults suggest involvement of the biliary tract, in children and adolescents, alkaline phosphatase is routinely elevated by related release from bones. Thus, in pediatric patients, assay of γ-glutamyl transpeptidase is a better indicator of cholestasis and should be measured along with bilirubin.

Hepatic disease may affect drug distribution due to changes in hepatic blood flow, effects on protein

binding, and changes in volume of distribution due to peritoneal ascites (Beliles 2000b). The effects are reduced medication availability for metabolism and a resultant increase in serum drug levels. In acute hepatitis, there is generally no need to modify dosing because metabolism is only minimally altered and the change is transient. In chronic hepatitis and cirrhosis, however, there is destruction of hepatocytes and the likely need to modify medication dosages.

Cirrhosis may distort liver architecture and alter hepatic blood flow. In severe disease, portosystemic shunting may affect 60% or more of portal vein flow that diverts circulating drugs away from the liver, resulting in decreased drug extraction and first-pass metabolism (Bosch 2007). In contrast, hepatic blood flow may be increased in viral hepatitis and in chronic respiratory problems. Medications with high baseline rates of liver clearance (e.g., haloperidol, paroxetine, sertraline, nefazodone, venlafaxine, TCAs, and midazolam) are significantly affected by alterations in hepatic blood flow.

Produced in the liver, albumin and α_1-glycoprotein may be reduced in infectious and inflammatory hepatic disease, whereas protein levels may be elevated as a result of surgery, trauma, or cirrhosis. Elevated bilirubin levels are found in acute viral hepatitis and primary biliary cirrhosis (Crosignani et al. 2008; Farrell 1998). Bilirubin has a strong affinity for albumin binding sites and may displace medications (e.g., divalproex sodium and phenytoin). In steady-state situations, changes in protein binding may result in elevated unbound active drug even in the presence of normal serum drug concentrations. Because it is often difficult to predict changes in protein binding, it is important to maintain attention to the effects of psychotropic medications and not rely exclusively on serum drug concentrations.

It is often necessary to use lower dosages of medications in patients with hepatic disease. Initial dosing of medications should be reduced in patients with hepatic disease, and titration should proceed slowly. For drugs that have significant hepatic metabolism, intravenous administration may be preferred (see Table 30–1). Parenteral administration of drugs avoids first-pass metabolic effects, such that the dosing and action of drugs are similar to those in patients with normal hepatic function.

Gastrointestinal Disease

Gastrointestinal disease primarily affects drug absorption (Beliles 2000b). Examples of conditions that affect absorption include diseases affecting gastrointestinal motility, surgical alteration of the gastrointestinal tract (e.g., bypass surgery, G-tube and J-tube placement), short bowel syndrome, and celiac disease. Any conditions that divert blood away from the gastrointestinal tract, for example, congestive heart failure or shock, may also affect absorption. Administration of antacid medications may similarly reduce gastric absorption.

Gastric motility may be affected by a number of general medical conditions and by specific medications. For example, gastric motility is delayed in patients with diabetes mellitus, gastritis, and pyloric stenosis. Anticholinergic medications delay gastric motility. A number of medications are given to increase gastrointestinal motility, including metoclopramide and propantheline (Greiff and Rowbotham 1994; Grover and Drossman 2008). Cisapride was a frequently used medication for this indication but was voluntarily removed from the U.S. market in 2000 due to concerns over QTc prolongation. In general, slowed gastrointestinal motility results in better absorption of poorly soluble drugs, and vice versa. Enteric-coated preparations of medications are likely to have increased rates of drug absorption in patients with reduced gastric acidity. Orally administered drugs may be poorly absorbed in patients with malabsorption syndromes. If absorption is an issue, liquid formulations of drugs and alternative routes of administration, including sublingual, intramuscular, and intravenous, may be preferred. Gastrointestinal disease affecting the large intestines generally has little effect because most medications are absorbed more proximally.

Medications with anticholinergic side effects can slow gastrointestinal motility, affecting absorption and causing constipation. By contrast, selective serotonin reuptake inhibitors (SSRIs) increase gastric motility and may cause diarrhea (Trindade et al. 1998). SSRIs have the potential to increase the risk of gastrointestinal bleeding, especially when coadministered with NSAIDs (de Abajo et al. 2006; Loke et al. 2008). Using extended- or controlled-release preparations of medications may reduce gastrointestinal side effects, particularly where gastric distress is related to rapid increases in plasma drug concentrations.

Renal Disease

Renal insufficiency results from a functional loss of nephrons. Although generally transient and reversible as in acute renal failure, the loss may be permanent and lead to dialysis in chronic renal failure.

TABLE 30–1. Medication use in hepatic disease

Medication class	Impact of hepatic disease on drug dosing	Potential drug effect on liver function
Antidepressants	Antidepressants that are metabolized by phase I hepatic oxidative metabolism require an approximately 50% dosage reduction. Doses of bupropion should not exceed 75 mg/day in patients with cirrhosis. Trazodone requires dosage reduction due to prolonged clearance of trazodone in patients with hepatic disease.	TCAs may exacerbate hepatic encephalopathy by anticholinergic action. Nefazodone use is contraindicated in hepatic disease. Minor elevations in transaminases are common and usually benign. Sertraline's short half-life and less potent inhibition of CYP 2D6 make it the preferred SSRI in hepatic disease.
Antipsychotics	Atypical antipsychotics that are metabolized by phase I hepatic oxidative metabolism require dosage reduction.	Chlorpromazine is associated with intrahepatic cholestasis and obstructive hepatic disease. Low-potency drugs may precipitate hepatic encephalopathy in patients with cirrhosis. Discontinue clozapine in patients with marked transaminase elevations or jaundice.
Anxiolytics/hypnotics	Benzodiazepine half-lives are increased in hepatic disease. Lorazepam, oxazepam, and temazepam require no dosage adjustment in hepatic disease because they are metabolized by phase II hepatic oxidative metabolism. Zaleplon and zolpidem require dosage reduction.	Avoid use of benzodiazepines in patients at risk of hepatic encephalopathy.
Mood stabilizers	Carbamazepine, divalproex, lamotrigine, and topiramate require dosage reduction and close monitoring. No dosage adjustment is required for gabapentin or lithium.	Divalproex sodium is associated with hepatic failure in 1 in 40,000 cases. Carbamazepine is associated with hepatitis. Carbamazepine and valproic acid are contraindicated in patients with preexisting hepatic disease.
ADHD medication treatments	Atomoxetine requires 25%–50% reduction in dosage.	

Note. ADHD = attention-deficit/hyperactivity disorder; CYP = cytochrome P450; SSRI = selective serotonin reuptake inhibitor; TCA = tricyclic antidepressant.

Source. Beliles 2000b; Jacobson 2002; Robinson and Owen 2005.

The pharmacodynamic effects of renal failure include increased receptor activation, whereas pharmacokinetic effects include delayed drug clearance (Beliles 2000b). Renal insufficiency may result in decreased drug absorption from the small intestine due to the gastric-alkalinizing effects of increased ammonia levels that develop in the presence of excess urea. Renal insufficiency may increase the volume of distribution of water-soluble or protein-bound drugs with a consequent reduction in plasma levels. Plasma protein binding may be reduced in nephrotic syndrome as a result of decreases in albumin. Displacement of highly protein-bound drugs may result in increased availability of these drugs for renal filtration and excretion. Renal insufficiency may also be associated with decreased first-pass metabolism and influence hepatic clearance due to cytochrome P450 inhibition (Dreisbach and Lertora 2003; Michaud et al. 2005). Renal excretion or clearance is reduced in renal failure and is

significant for drugs that are cleared primarily by renal excretion. Renal blood flow may be altered by changes in glomerular vasculature, severe dehydration, and conditions affecting other organ systems (e.g., cirrhosis).

In general, initial dosages of medications should be reduced or dosing intervals lengthened in patients with renal failure (see Table 30–2). However, with the exception of lithium and gabapentin, psychotropic medications do not require significant dosing adjustments in patients with renal failure (Levy 1990). Nevertheless, it is important to monitor serum concentrations in renal insufficiency, particularly for medications with a narrow therapeutic index. Lithium may be given to renal transplant recipients; however, cyclosporin may elevate serum lithium levels by decreasing lithium excretion, necessitating a dosage adjustment. Patients with renal failure and those on dialysis appear to be more sensitive to TCA side effects, possibly due to the accumulation of hydroxylated tricyclic metabolites (Lieberman et al. 1985).

Hemodialysis

During hemodialysis, there may be an initial lowering of the plasma drug concentration, followed by a rebound after dialysis. Most psychotropic medications are highly protein bound and not significantly cleared by dialysis. In contrast, lithium, gabapentin, and topiramate are completely removed by dialysis, with the common practice being to administer these medications after dialysis (Levy 1990). Drugs with a narrow therapeutic index should be avoided wherever possible in dialysis patients. In addition, patients on dialysis often have significant fluid shifts and are at risk of dehydration, with neuroleptic malignant syndrome being more likely in these situations (Kunishima et al. 2000). Another common issue is that of orthostatic hypotension that occurs particularly following dialysis.

Cardiac Disease

Cardiac disease may influence the pharmacokinetics of medications. For example, congestive heart failure may result in decreased perfusion of drug absorption sites both in the gastrointestinal tract and in skeletal muscle, affecting drugs given both orally and by intramuscular injection (Beliles 2000b). Sympathetic activity may redistribute blood flow to the brain and heart, reducing perfusion of the liver, kidneys, and other organs, with the potential to affect drug distribution. Local edema may also reduce epithelial permeability and increase drug absorption. Cardiac patients are commonly treated with anticoagulant medications (e.g., warfarin) that are highly protein bound. In these situations, it may be necessary to reduce the dosage of highly protein-bound psychotropic agents to reduce the potential risk of elevated levels of anticoagulants (Sayal et al. 2000).

Cardiovascular effects of psychotropic medications may include orthostatic hypotension, conduction disturbances, and arrhythmias (see Table 30–3). Orthostatic hypotension is one of the most common cardiovascular side effects that complicate the use of TCAs. If TCAs are used in cardiac disease, nortriptyline is thought to be less likely to result in orthostatic hypotension. Trazodone may result in orthostatic hypotension and exacerbate myocardial instability. As a result, SSRIs and bupropion are preferred as antidepressant agents in patients with cardiac disease.

There is the potential for increased morbidity and mortality in patients with preexisting cardiac conduction problems (Kovacs and Arora 2008). Thioridazine and pimozide should be used cautiously in patients with conduction problems. Similarly, intravenous haloperidol has been associated with QTc prolongation, torsades de pointes, and depressed cardiovascular function (Beliles 2000a). Some of the calcium channel–blocking agents such as diltiazem and verapamil may slow atrioventricular conduction and may theoretically interact with a TCA. Patients with Wolff-Parkinson-White syndrome who have a short P-R interval (less than 0.12 seconds) and widened QRS interval associated with paroxysmal tachycardia are at high risk of life-threatening ventricular tachycardia that may be exacerbated by the use of a TCA.

Quinidine-like effects of TCAs (Witchel et al. 2003) and the antipsychotic agents (McIntyre and Jerrell 2008) may lead to prolongation of the QTc interval with increased risk of ventricular tachycardia and ventricular fibrillation, particularly in patients with congenital heart disease (McNally et al. 2007). Patients with a baseline QTc interval of greater than 440 msec should be considered at particular risk. The range of normal QTc values in children is 400 msec ±25–30 msec. A QTc value that exceeds two standard deviations (>450–460 msec) is considered too long and may be associated with increased mortality (Labellarte et al. 2003). An increase in the QTc from baseline of greater than 60 msec is also associated with increased mortality.

TABLE 30–2. Medication use in renal disease

Medication class	Impact of renal disease on drug dosing	Potential drug effect on renal function
Antidepressants	TCAs, nefazodone, and SSRIs require no dosage adjustment except in severe renal insufficiency. Venlafaxine requires 25%–75% reduction in dosage due to reduced renal clearance.	Patients with renal insufficiency are more susceptible to TCA side effects, especially sedation and anticholinergic effects.
Antipsychotics	Risperidone requires dosage reduction.	Antipsychotic agents are generally safe.
Anxiolytics/hypnotics	Benzodiazepines, especially chlordiazepoxide, require dosage reduction due to increased half-life in renal insufficiency. Lorazepam and oxazepam are preferred due to the absence of active metabolites.	Barbiturate use should be avoided due to the risk of excessive sedation.
Mood stabilizers	Lithium, topiramate, and gabapentin require 50%–75% reduction in dosage. Divalproex sodium requires no dosage adjustment.	Lithium is contraindicated in acute renal failure but is considered safe in chronic renal failure with dosage adjustment. Lithium requires dosage reduction in patients on hemodialysis. Lithium should be given after dialysis.

Note. SSRI = selective serotonin reuptake inhibitor; TCA = tricyclic antidepressant.

Source. Beliles 2000b; Jacobson 2002; Robinson and Owen 2005.

Respiratory Disease

The benzodiazepines are the psychiatric medications of the most concern in patients with pulmonary disease due to the risk of respiratory depression (see Table 30–4). There is particular concern in patients who retain carbon dioxide. SSRIs and buspirone are good alternative medications for the treatment of anxiety. Consideration should be given to possible airway compromise due to acute laryngospasm when dopamine-blocking agents such as antipsychotic or antiemetic medications are used. Nonselective β_1/β_2-adrenergic blockers such as propranolol can precipitate bronchial constriction and are contraindicated in persons with asthma.

Neurological Disease

Significant comorbidity rates have been noted to occur between neurological and psychiatric disorders (Pellock 2004). Central nervous system side effects of psychotropic medications can mimic the signs and symptoms of neurological disorders, confound diagnostic assessment, and influence treatment decisions. Care must be taken to differentiate symptoms of a primary neurological disorder and medication side effects when psychopharmacological treatment occurs in the presence of neurological disease (Haddad and Dursun 2008).

Epilepsy

Epilepsy, a pattern of chronic recurrent seizures, is commonly encountered by the psychiatrist consulting to the pediatric setting. Childhood prevalence rates of epilepsy are estimated to range between 0.5% and 1%. Comorbidity rates of psychiatric disorders and epilepsy have been estimated to run as high as 60%, with attention-deficit/hyperactivity disorder (ADHD), depression, and anxiety being the most commonly associated comorbidities (Plioplys et al. 2007; Torres et al. 2008). Psychotropic medications can be used safely in the presence of epilepsy following consideration of potential interactions between the psychotropic agent of choice, the seizure disorder, and the indicated anticonvulsant treatment. Any behavioral toxicity of anticonvulsants used either alone or in combination should also be considered before proceeding with psychotropic treatment. Simplification of combination

TABLE 30–3. Medication use in cardiac disease

Medication class	Potential drug effect on cardiac function
Tricyclic antidepressants (TCAs)	Increased cardiac morbidity and mortality due to arrhythmias. Side effects in healthy individuals are limited to orthostatic hypotension. Nortriptyline is preferred TCA due to lower likelihood of hypotension. Potential for delayed cardiac conduction, increased heart rate, and heart block. Prolonged P-R interval, QRS duration, and QTc interval. Potential for torsades de pointes in persons with preexisting conduction disturbances. Potential for ventricular tachycardia or fibrillation in Wolff-Parkinson-White syndrome.
Selective serotonin reuptake inhibitors	Isolated reports of bradycardia and atrial fibrillation with fluoxetine. Citalopram and escitalopram are not recommended in cardiac disease involving prolonged conduction times.
Antipsychotics	Orthostatic hypotension is associated with use of clozapine, quetiapine, and low-potency antipsychotics. Pimozide, thioridazine, mesoridazine, droperidol, sertindole, ziprasidone, and high-dosage intravenous haloperidol carry risk of prolonged QTc interval.
Anxiolytics/hypnotics	Benzodiazepines and buspirone are thought to be free from cardiovascular effects.
Mood stabilizers	Lithium may cause sinus node dysfunction or first-degree atrioventricular block. Carbamazepine is associated with atrioventricular conduction disturbances. Lamotrigine is associated with QTc interval prolongation. Divalproex sodium is thought safe.
Psychostimulants	U.S. Food and Drug Administration warns against use of psychostimulants in patients with structural and other serious cardiac disorders. Although methylphenidate and amphetamines may be safe at low dosages, consultation with a cardiologist is recommended.

Source. Beliles 2000b; Robinson and Owen 2005.

anticonvulsant therapy or a change to another agent may result in a reduction of behavioral, cognitive, or emotional symptoms and obviate the need for psychotropic intervention.

Antipsychotics are known to lower seizure threshold, with low-potency agents and clozapine possessing more proconvulsant properties. Stimulants are purported to be safe and effective for many patients to treat ADHD in the context of epilepsy; however, they can also exacerbate seizures in some patients. Thorough informed consent is indicated so that parents can be alert to any effect on seizures (Torres et al. 2008). Clomipramine, maprotiline, and bupropion possess significant seizure-inducing properties and should be avoided when the risk of seizures is present. Data on clinically relevant pharmacokinetic and pharmacodynamic interactions of anticonvulsant drugs and psychotropics are inconclusive at this time and warrant monitoring for future developments.

MEDICATION SELECTION AND TARGET SYMPTOMS

Psychotropic medications are selected to address target symptoms that cause significant subjective distress or functional impairment (Green 2007). Target symptoms are often specific dimensions of a psychiatric diagnosis (e.g., sad mood as a symptom of depression). Target symptoms may also be a common shared dimension of multiple psychiatric disorders. For example, sleep disturbance can be a symptom common to depressive disorders, bipolar disorder, delirium, substance abuse, adjustment disorders, or sleep disorders. Target symptoms may also be present when full categorical criteria for a

TABLE 30–4. Medication use in respiratory disease

Medication class	Potential drug effect on respiratory function
Antidepressants	Monoamine oxidase inhibitor may interact with sympathomimetic medications used in asthma treatment. Necessary to monitor anticholinergic side effects. Tricyclic antidepressants and selective serotonin reuptake inhibitors generally do not cause problems.
Antipsychotics	Potential exists for laryngeal dystonia that may affect respiratory status. Clozapine has been associated with respiratory arrest and depression as well as allergic asthma. Necessary to monitor anticholinergic side effects.
Anxiolytics/hypnotics	Respiratory depression and failure are possible with benzodiazepines. Consider obtaining baseline blood gases prior to use of benzodiazepines. Oxazepam, lorazepam, and temazepam have fewer respiratory depressant effects. Buspirone, zolpidem, and zaleplon are thought to be safe.

Source. Beliles 2000b; Jacobson 2002; Robinson and Owen 2005.

psychiatric disorder are not met. A target symptom approach to prescribing should take into account differential diagnosis, possible symptom etiologies, and existing evidence of both clinical safety and effectiveness pertaining to the symptoms being treated. Table 30–5 presents a suggested framework for target symptom identification.

Acute Agitation

Acute agitation is a heightened state of anxiety, emotional arousal, and increased motor activity that occurs not uncommonly in the pediatric setting, for example, in states of acute intoxication, sedative withdrawal, and delirium, as well as in the context of emergency department evaluations or in patients with primary mood and psychotic disorders (Jibson 2007). Patients with organic brain syndromes or with cognitive impairments may also be at higher risk of such behaviors. In these situations, rapid control of agitation is needed to prevent harm or injury to both the patient and staff.

Unfortunately, there are no published studies that compare psychopharmacological treatments of the acutely agitated child seen in emergency department settings (Hilt and Woodward 2008). Dorfman and Kastner (2004) reported on the frequency of current medication choices in the emergency department and found that benzodiazepines, haloperidol, and histamines were the most commonly used agents in order of frequency of use. Extrapolating data from adult studies, it is clear that the two most common categories of psychiatric medications include antipsychotics and benzodiazepines, either alone or in combination. Some data suggest that the combination of medications, most commonly haloperidol with lorazepam, is more effective than one alone (Battaglia et al. 1997). Medication choice may also be influenced by whether the patient is willing and able to take oral medications.

Benzodiazepines

Although the benzodiazepines differ in potency, speed of onset of action, and route of administration, there are no data to support the use of one specific benzodiazepine over another in terms of therapeutic efficacy. Lorazepam, which is available in oral, intramuscular, and intravenous formulations, is the most frequently used benzodiazepine for treatment of acute agitation, and at least one study in adults has shown that it had comparable efficacy with intramuscular haloperidol (Salzman et al. 1991). Intramuscular midazolam also has been used to treat acute agitation with superior results compared with both haloperidol and lorazepam, although midazolam's short duration of action may limit its utility (Nobay et al. 2004; Rund et al. 2006). Limitations on the use of benzodiazepines in pediatric patients may occur as a result of both excessive sedation and behavioral or emotional disinhibition.

Antipsychotic Agents

Antipsychotic agents are widely used in the treatment of acute agitation, delirium, mania, and psychosis. Traditionally, haloperidol has been one of the most commonly used antipsychotic agents, and

TABLE 30–5. Target symptom approach in pediatric consultation

Target symptom	Medication considerations
Acute agitation	Antipsychotic agent
	Benzodiazepine
	Diphenhydramine (younger children)
Anxiety	Benzodiazepine
	Antidepressant
	Buspirone
	Gabapentin
	Clonidine
Delirium	Antipsychotic agent
Depression	Selective serotonin reuptake inhibitor
	Norepinephrine selective reuptake inhibitor
	Stimulant
Fatigue	Stimulant
	Modafinil
Insomnia	Diphenhydramine
	Benzodiazepine
	Trazodone
	Hypnotics (e.g., zolpidem or zaleplon)
	Amitriptyline
	Mirtazapine
Pain	Tricyclic antidepressant
	Norepinephrine selective reuptake inhibitor (e.g., duloxetine)
	Analgesic
	Gabapentin
Psychosis	Antipsychotic agent
Withdrawal	Benzodiazepine
	Buprenorphine
	Methadone
	Clonidine

there is a growing literature base that supports its safety and efficacy in intravenous use (Arrants 2001; Citrome 2002) and even one report of intranasal use (Miller et al. 2008). However, intramuscular and oral formulations of aripiprazole, olanzapine, and ziprasidone, and rapidly disintegrating formulations of aripiprazole, olanzapine, and risperidone have all been shown to be more effective than placebo and comparable in efficacy with haloperidol with or without lorazepam for acute agitation in adults with schizophrenia or mania (Andrezina et al. 2006; Daniel et al. 2001; Fulton et al. 2006; Wright et al. 2001).

Generally, current adult emergency department practices tend to favor risperidone or olanzapine for patients who are willing to take oral medications, due to the more favorable side-effect profile (Hilt and Woodward 2008). For patients requiring intramuscular administration, both ziprasidone and olanzapine have become widely acceptable alternatives to the use of haloperidol. In one study, intramuscular ziprasidone was found to be significantly

more effective than haloperidol in reducing symptoms of acute agitation (Brook et al. 2000). There has also been a single case report describing the use of intravenous ziprasidone to treat acute delirium (Young and Lujan 2004). Tollefson et al. (1997) also reported on the safe and effective use of intramuscular olanzapine. Droperidol, once a popular medication choice in the emergency department setting, is now rarely used after concerns arose about cardiac toxicity, although the evidence supporting this relationship has more recently been questioned (Rund et al. 2006).

Anxiety

Symptoms of anxiety in physically ill patients are significantly elevated compared with the general pediatric population (Colon and Popkin 2002). Commonly encountered diagnoses include generalized anxiety disorder (GAD), separation anxiety disorder, and posttraumatic stress disorder (PTSD) as well as specific phobias and anxieties related to the medical treatment environment. Although there are several comprehensive reviews of pharmacological treatments for pediatric anxiety disorders, there is little empirical evidence regarding the treatment of anxiety in the physically ill child and adolescent (Reinblatt and Riddle 2007; Waslick 2006).

Benzodiazepines

Although there is strong empirical support for the use of benzodiazepines to treat anxiety in adults, there are very few data for children (Rickels et al. 1990). There are some small nonrandomized open-label trials of both alprazolam and clonazepam for children with school refusal, GAD, and separation anxiety disorder (Bernstein et al. 1990; Graae et al. 1994; Simeon et al. 1992). However, there is currently insufficient evidence to support the use of benzodiazepines in pediatric anxiety disorders (Waslick 2006). This fact is somewhat at odds with the fairly widespread clinical use of benzodiazepines in inpatient settings for patients with more acute symptoms of anxiety. Benzodiazepine use, however, may be indicated in specific situations in which there are concomitant physical symptoms such as nausea or muscle spasms that may be responsive to this category of medications. Common reported side effects of benzodiazepines include sedation, disinhibition, and behavioral dyscontrol (Barnett and Riddle 2003).

Antidepressants

Although the SSRIs have been shown to have good efficacy in adults with GAD, data on pediatric patients are limited (Reinblatt and Riddle 2007). However, there have been at least three randomized, controlled trials on the successful use of SSRIs for pediatric anxiety disorders, including sertraline for GAD (Rynn et al. 2001), paroxetine for social phobia (Wagner et al. 2004), and fluoxetine for separation anxiety disorder, GAD, and social phobia (Birmaher 2003). Rynn et al. (2007) have also demonstrated the efficacy of venlafaxine for the short-term treatment of GAD and suggest this agent as a potential second-line agent for patients who fail to respond to SSRIs. With regard to panic disorder, there is limited support for the use of both fluoxetine and paroxetine (Fairbanks et al. 1997; Masi et al. 2000). There has been one study on the use of TCAs for PTSD by Robert et al. (1999), who used low-dosage imipramine to treat acute stress disorder symptoms in children with burns and found particular benefits for sleep problems.

Propranolol

There are some data to support the use of propranolol in both adult and pediatric patients with PTSD. Famularo et al. (1988) studied the use of propranolol in 11 PTSD patients with agitation, hyperarousal, and a history of sexual or physical abuse and reported significant reductions in symptoms of both hyperarousal and intrusiveness.

Buspirone

Buspirone is an azapirone anxiolytic with a primary indication for chronic generalized anxiety (Varley and Smith 2003). It has little potential for abuse or physical dependency and is considered an agent of choice when risk for substance abuse accompanies a need to treat anxiety. The anxiolytic effects of buspirone can take weeks to be felt, thus requiring adjunctive treatments when acute anxiety must be addressed. Buspirone metabolism and clearance are decreased in hepatic and renal disease.

Depression

Numerous studies have shown increased rates of depression in physically ill children and adolescents, including patients with inflammatory bowel disease, cancer, and asthma (Apter et al. 2003; Mrazek 2003; Szigethy et al. 2004). First-line treatment for

depression should include nonpharmacological interventions. However, for children who present with moderate or severe depressive symptoms or with impaired functioning, treatment should incorporate medications, generally in combination with psychotherapy such as cognitive-behavioral therapy (Boylan et al. 2007) or interpersonal psychotherapy (Mufson et al. 2004). To date, there have been no studies on the use of antidepressants for the treatment of mild depression in children or adolescents.

Antidepressants

The majority of controlled treatment study data for antidepressant efficacy in youth are for SSRIs, which have become the drug treatment of choice for depression due to their effectiveness, safety, and side-effect profiles (Brent et al. 2008; Flanagan 2008; Kersun and Elia 2007). There have been several randomized, controlled trials demonstrating the efficacy of the SSRIs in treating children and adolescents with major depression (Boylan et al. 2007; Bridge et al. 2005).

By contrast, studies of the TCAs have shown no greater efficacy compared with placebo, and they are not currently recommended due to their unfavorable side-effect profile and risk of lethality following overdose (Boylan et al. 2007). However, clinical indications for their use at lower dosages exist for specified situations, for example, enuresis and migraine prophylaxis. There are data to support the use of venlafaxine in the treatment of adolescents with major depression (Bridge et al. 2005) and bupropion for children with comorbid major depression and ADHD (Daviss et al. 2001).

Medication algorithms for childhood major depression have been developed to guide treatment, including the Texas Children's Medication Algorithm Project (Hughes et al. 2007). In the case of the physically ill child, there may be specific circumstances that influence the choice of a therapeutic agent. The choice of a specific antidepressant is usually directed by consideration of its side effects, half-life, and potential drug interactions. For example, in children with chronic pain syndromes, venlafaxine may have dual benefits in terms of its demonstrated antidepressant and analgesic actions (Kiayias et al. 2000). For patients with low energy or attentional issues, bupropion may have additional benefits. For patients on multiple medications for their physical illness, where drug interactions are a concern, escitalopram may have benefits over other SSRIs commonly recognized as first-line agents, including fluoxetine.

Psychostimulants

Psychostimulants have long been recognized to have euphoric and alerting properties that suggest their usefulness in treating depressive disorders (Orr and Taylor 2007). The available literature, primarily from studies with adults, suggests that psychostimulants have useful antidepressant properties and may be used as adjuncts to standard antidepressants in refractory depression, particularly in physically ill patients or those with terminal illness.

In a Cochrane database review, Candy et al. (2008) identified 24 randomized, controlled trials on the use of psychostimulants, including dexamphetamine, methylphenidate, methamphetamine, pemoline, and modafinil, to treat depression. Three studies suggested that psychostimulants used as monotherapy significantly reduced short-term depressive symptoms as well as symptoms of fatigue. The authors concluded that there may be specific clinical situations, including the physically ill child, in which psychostimulants may play a particular role.

Fatigue

Fatigue and depression may coexist in patients with cancer and other physical diseases, and considerable overlap of symptoms often occurs. Cancer-related fatigue is often experienced with additional symptoms, including sleep disturbance, pain, and depression, and may arise as a result both of the cancer itself and as a side effect of cancer treatment (Carroll et al. 2007). Breitbart and Alici-Evcimen (2007), in a review, reported that the prevalence of cancer-related fatigue ranges from 4% to 91% depending on the specific cancer population studied and the methods of assessment. These findings have led many researchers to examine the role of psychotropic medications to treat fatigue. Most of the research, however, has been based on work with adult patients, and results of studies listed must be interpreted cautiously before extrapolating treatment guidelines for pediatric patients.

Psychostimulants

Psychostimulant medications are commonly used as agents to treat symptoms of fatigue and depression in physically ill patients (Pliszka 2007). In a Cochrane database review, Minton et al. (2008) reviewed the existing data on the use of psychostimulants to treat cancer-related fatigue in adult patients during the years 1948–2007. The authors identified

two studies that met criteria for inclusion in their review, and based on the participation of 264 subjects, they concluded that the findings were significant enough to support the use of methylphenidate to treat cancer-related fatigue (Bruera et al. 2006; Fleishman et al. 2005). Although there are fewer data on other diseases, Breitbart et al. (2001), in a randomized, controlled study of adults with HIV, found that psychostimulants improved both fatigue and quality of life in subjects. There is also interest in the use of modafinil, approved for the treatment of narcolepsy, in the management of fatigue in physically ill adults. Studies on patients with breast cancer and brain tumors have both shown positive responses to modafinil (Carroll et al. 2007).

Carroll et al. (2007) reviewed seven clinical trials of methylphenidate for the treatment of cancer-related fatigue and concluded that although methylphenidate was shown to improve fatigue in open-label studies in patients with cancer, there were mixed results for double-blind studies using methylphenidate and dexmethylphenidate. These authors also noted the importance of considering potential side effects of psychostimulants, including irritability, anorexia, insomnia, labile mood, nausea, and tachycardia, when making treatment decisions. Auret et al. (2009), in a more recent randomized, controlled trial, looked at the effect of methylphenidate on 50 adult patients with advanced cancer who were receiving palliative care. Although subjects reported a transient improvement in the fatigue levels on the second day of the study, there was no evidence to suggest any sustained improvements in fatigue or quality of life.

Antidepressants

In the Cochrane database review, Minton et al. (2008) found no data to support the use of antidepressants for cancer-related fatigue. Breitbart and Alici (2008) in a recent review came to similar conclusions; however, they did report that paroxetine may show benefit for fatigue, but primarily when it is a symptom of clinical depression. There have also been two open-label studies on the use of the sustained-release preparation of bupropion, which has psychostimulant-like effects, showing benefits for the treatment of cancer-related fatigue (Cullum et al. 2004; Moss et al. 2006).

Insomnia

Insomnia is a common complaint and referral question in children and adolescents with associated medical conditions, such as asthma, cystic fibrosis, rheumatic disorders, chronic pain, and cancer, or as a complication of treatment (Mindell et al. 2006). In a chart review of 9,440 pediatric inpatients, Meltzer et al. (2007) found that 6% of all hospitalized children were prescribed medications for sleep, with antihistamines the most frequently prescribed medication (36.6%), followed by benzodiazepines (19.4%) and hypnotic agents (2.2%). There are, however, few studies and data to guide or support the use of pharmacological approaches to sleep disturbance in the context of pediatric illness (Owens et al. 2005).

Although nonpharmacological measures are recommended as first-line approaches, medications should be considered when nonpharmacological and sleep hygiene approaches have been ineffective and pain is managed adequately. Agents used to treat insomnia include the benzodiazepines, nonbenzodiazepine hypnotics, antihistamines, chloral hydrate, melatonin, and trazodone (Meltzer et al. 2007). Clonidine has been used at night to promote sleep in children with ADHD (Prince et al. 1996).

Diphenhydramine

Various studies have been done to evaluate the usefulness of diphenhydramine in sleep disorders of both adults and children, and in general, data suggest its usefulness in decreasing both sleep latency times and nighttime awakenings (Pelayo and Dubik 2008). However, at least one study of infants ages 6–15 months found no benefit for diphenhydramine over placebo (Merenstein et al. 2006).

Chloral Hydrate

Chloral hydrate is a commonly used sedative-hypnotic and can be prescribed to both children and adults with good effect and minimal toxicity (Loewy et al. 2006). However, children with obstructive sleep apnea, wheezing, and brain stem disorders may be at increased risk for respiratory compromise. Respiratory suppression may also occur in overdose situations, with deep stupor and coma. Chronic use of chloral hydrate for insomnia is usually discouraged due to concerns about the side effects and tolerance (Pelayo et al. 2004).

Melatonin

Melatonin is a commonly used sleep medication that is thought to possess both a phase-setting effect and a direct hypnotic effect (Pelayo and Dubik 2008). In a case series of 15 neurologically impaired children

with chronic sleep disturbances, including fragmented sleep and delayed sleep phase, Touitou (2001) reported a significant subjective improvement in sleep. Two other pediatric studies have also demonstrated beneficial effects of melatonin in terms of a reduction in initial insomnia and enhanced total sleep time (Van der Heijden et al. 2007; Weiss et al. 2006). The National Sleep Foundation has warned against using melatonin in patients who have immune disorders or lymphoproliferative disorders and in those taking corticosteroids or other immunosuppressants, given its ability to enhance immune function (Touitou 2001).

Benzodiazepines

Benzodiazepine hypnotics, including lorazepam, have been used extensively in adults with insomnia and appear to alter the normal sleep stages referred to as sleep architecture (Pelayo et al. 2004). Despite their widespread use in inpatient pediatric settings, benzodiazepine hypnotics are not recommended for children with insomnia unless they are being used concomitantly for other primary psychiatric conditions or as part of treatment for other physical symptoms, such as nausea.

Nonbenzodiazepine Hypnotics

The nonbenzodiazepine sedatives zolpidem, eszopiclone, and zaleplon are used in the treatment of insomnia. These agents are rapidly absorbed and have short half-lives (Pelayo and Dubik 2008). Their use in children is considered "off label," and therefore no official dosing guidelines are available. These newer medications preserve the overall sleep architecture and do not typically have the insomnia rebound effects experienced with benzodiazepine hypnotics when they are abruptly stopped. Blumer et al. (2008) studied the use of zolpidem in a sample of 21 children and found it to be well tolerated, although further efficacy studies are still needed. Eszopiclone is a more recently approved medication with a longer half-life than zolpidem and zaleplon, that theoretically may be helpful in children because they typically sleep longer than adults. To date, there are no published studies of eszopiclone use in children (Pelayo and Dubik 2008).

Trazodone

Trazodone is an antidepressant with sedating properties that is used primarily for the treatment of insomnia (Jayaram and Rao 2005; Mendelson 2005). However, despite its fairly widespread use, the data on the effectiveness of trazodone in normal subjects are limited, and there is little evidence to suggest that trazodone improves sleep in patients without a mood disorder (Roth 2009). Furthermore, no safety data exist on trazodone used at hypnotic dosages, and there are reported associations with cardiac arrhythmias and priapism (James and Mendelson 2004). Available data also suggest that tolerance to its hypnotic effects may develop (Roth 2009).

Mirtazapine

Mirtazapine is a tetracyclic antidepressant that appears to have utility in the treatment of insomnia. Kim et al. (2008) found that mirtazapine helped reduce symptoms of nausea, sleep disturbance, and pain and improved quality of life and symptoms of depression in adult cancer patients. Similar results were reported by Cankurtaran et al. (2008), although to date there have been no studies in pediatric patients. Mirtazapine may be a particularly effective treatment option in physically ill patients who have disease- or treatment-related physical symptoms, including poor appetite and pruritus (Shaw et al. 2007).

Psychiatric Medications Used in the Treatment of Pain

The term *analgesic adjuvants* refers to the group of medications that have primary indications for nonpain diagnoses but have demonstrated efficacy for pain treatment. Although they are often used in combination with opioids and anti-inflammatory agents, these medications may have their own direct analgesic effect, and they may also be used as single agents for specific types of pain. The analgesic adjuvants are classified based on the category of medication to which they belong (Golianu et al. 2007).

Antidepressants

TCAs and serotonin–norepinephrine reuptake inhibitors have been used as adjuncts in the pharmacological treatment of pain (Carter and Sullivan 2002). TCAs have been found to be superior to placebo in the treatment of pain (Carter and Sullivan 2002). Evidence suggests that TCAs have a direct analgesic effect that is separate from their efficacy in treating depression or insomnia. Different mechanisms have been suggested that include increased

availability of serotonin, endogenous opioid peptide release, and direct action on opioid receptors (Gray et al. 1998). TCAs may also potentiate the action of opioids, allowing a reduction in chronic opioid requirements. The effect of TCAs on pain reduction and improved sleep is more rapid (3–7 days) and occurs at lower dosages (0.1–0.2 mg/kg/day) than is expected in the treatment of depression.

Amitriptyline is one of the most widely studied TCAs and has been found to be effective in a wide range of pediatric pain syndromes including migraine, peripheral neuropathies, phantom limb pain, fibromyalgia, and pain related to the invasion of nerves by tumors. Studies have emphasized the helpfulness of even low dosages as well as the benefit from sedative effects of amitriptyline. Nevertheless, there is no theoretical or empirical basis to suggest that amitriptyline has any unique efficacy in pain management compared with other TCAs. Where sedation is problematic or the patient is particularly susceptible to anticholinergic side effects, imipramine and nortriptyline are alternate considerations.

Although there has been interest in the use of the SSRIs, they have generally not been found to be as effective as the TCAs in pain treatment. There is some indication of moderate selective efficacy (e.g., in diabetic neuropathy but not other neuropathic pain) (Kishore-Kumar et al. 1990) as well as evidence of analgesic effects of SSRIs (Boyer 1992; Finley 1994), with clear clinical effects for problems such as fibromyalgia (Arnold et al. 2002). Citalopram has also been found to be effective in the treatment of recurrent abdominal pain in children (Campo et al. 2004). Mirtazapine, a piperazinoazepine, is a novel antidepressant with serotonergic and noradrenergic properties that has case reports describing headache and other pain-reducing effects (Bendtsen and Jensen 2004).

There has been increasing interest in the serotonin–norepinephrine reuptake inhibitors, including venlafaxine and duloxetine, which some authors have suggested are at least as effective as the TCAs with fewer side effects (Goldstein et al. 2004). Venlafaxine has been used effectively in the treatment of adults with headache, neuropathic pain, fibromyalgia, diabetic peripheral neuropathy, and reflex sympathetic dystrophy (Dwight et al. 1998; Kiayias et al. 2000; Taylor and Rowbotham 1996). This group of medications may be of particular benefit to patients with comorbid mood and anxiety disorders.

Anticonvulsants

Anticonvulsants are also often advocated as analgesic adjuvants. They suppress neuronal firing and have been successfully employed for the treatment of neuropathic pain states, including trigeminal neuralgia and peripheral neuropathies (Backonja and Serra 2004). Other indications include central pain states such as thalamic pain syndrome, postsympathectomy pain, diabetic neuropathy, migraine headaches, phantom limb pain, and peripheral neuropathies. Carbamazepine, clonazepam, and phenytoin have been widely used in the treatment of migraine and neuropathic pain, and divalproex sodium has been used for migraine prophylaxis. Newer agents such as topiramate and lamotrigine have been used for diabetic neuropathy and trigeminal neuralgia. Anticonvulsant drugs probably exert their effects by blocking voltage-dependent sodium channels and thereby interfering with the transduction and perhaps spontaneous depolarization seen in damaged neurons. Carbamazepine and phenytoin have been helpful in managing cancer pain with dysesthetic components. These drugs need to be started slowly and increased gradually, with particular attention to the development of possible side effects. With the exception of gabapentin, the anticonvulsants in general have multiple potential side effects, including behavioral changes, that may limit their use.

Antipsychotic Agents

Antipsychotic agents have long been purported to potentiate the analgesic effect of opioids (Lussier et al. 2004). Most studies employing these drugs are uncontrolled, however, and the enthusiasm for their continued use is in contrast to available literature. The phenothiazines are the most commonly employed antipsychotics for analgesia. Dundee and colleagues (Dundee et al. 1963; Moore and Dundee 1961a, 1961b) published data regarding the analgesic potency of 14 different phenothiazines in an uncontrolled trial of experimental pain. The results of these studies suggested that the action of a few potentially analgesic phenothiazines was initially antianalgesic and after 2–3 hours only mildly analgesic (Atkinson et al. 1985). Antipsychotic agents have been used in the treatment of many chronic pain syndromes, including cancer, arthritis, migraine, neuropathy, and phantom limb pain. The mechanism of action is unknown, but these medications may have a local anesthetic action in spinal nerves. Chlorprom-

azine and haloperidol have been used to treat nausea associated with the use of opiates or pain.

Benzodiazepines

Although benzodiazepines do not alter sensitivity to pain or potentiate the analgesic activity of opioids, they do decrease affective responses to acute pain and they may produce extended relief in chronic pain due to musculoskeletal disorders, perhaps as a result of their muscle-relaxant properties. Judicious use of benzodiazepines in cancer pain is appropriate for short-term relief of anxiety, but superior analgesic effects and nighttime sedation can be achieved by employing a TCA. Short-term use of benzodiazepines can be effective in postoperative pain and sickle cell crises.

Antihistaminic Agents

Hydroxyzine is an antihistaminic agent with proven analgesic properties at high dosages. It does not consistently improve analgesia obtained with opioids, but it does potentiate the effect of opioids on the affective components of pain. It appears that hydroxyzine administered intramuscularly has analgesic properties similar to those of low dosages of morphine (Beaver and Feise 1976). In addition, the sedative and antipruritic properties of this drug are useful in the setting of chronic cancer pain. Hydroxyzine similarly may have an application in the augmentation of opioids in sickle cell crises.

Psychostimulants

Psychostimulant medications are believed to have antinociceptive properties that may be mediated by norepinephrine, serotonin, or dopamine or by endogenous opioid mechanisms. Indications for psychostimulants include reduction of drowsiness caused by narcotic medications as well as the potential to reduce the dose of narcotics without diminution of their analgesic effect. Methylphenidate and dextroamphetamine have been found to be safe and effective adjuncts to opiate analgesia and have also been used in the treatment of spasmodic torticollis, spastic colon, and headaches.

Potentiation of analgesia by sympathomimetics has been well described. Caffeine is known to increase the analgesic effects of aspirin and acetaminophen, and one study suggested that dextroamphetamine doubled the analgesic potency of morphine (Forrest et al. 1977). The long-term use of these stimulants in pain has not been systematically evaluated. The use of these drugs should probably be limited to a therapeutic trial period of several days to determine efficacy for individual patients.

Medication Considerations in the Context of Surgery and Anesthesia

There are no current studies on outcomes to guide psychotropic medication treatment around pediatric surgical procedures. Huyse et al. (2006) proposed guidelines for the management of psychotropic medications around elective surgery. In doing so, they noted that there were limited systemic studies available to guide this area of clinical practice. They recommended consideration of the extent of the surgery, the patient's physical state, potential drug interactions, effects and side effects of psychotropic medications, risk of withdrawal symptoms, and risk of psychiatric recurrence or relapse when medication treatment is interrupted. Crone and Gabriel (2004) discussed the need to carefully assess changing pharmacokinetic parameters in patients undergoing organ transplantation. In the immediate preoperative period, medications may need to be administered at alternate times or via alternate routes when patients cannot take medications, food, or fluids by mouth. If medications are to be held, care should be taken to avoid discontinuation signs and symptoms.

Przybylo et al. (2003) reported in a pilot study that transient behavioral abnormalities occurred at significant rates in children undergoing general anesthesia and surgery. Behavioral changes did not prolong recovery in these cases, suggesting that postanesthesia behavioral changes usually resolve spontaneously without need for psychopharmacological interventions and were predominantly due to the short-term effects of the anesthetic agents. Kain et al. (2006) reported that higher levels of preoperative anxiety were associated with a higher incidence of emergence delirium, more postoperative analgesic use, and more complaints of pain. There have been case reports of bleeding possibly associated with SSRIs and second-generation antipsychotics (Coskun and Mukaddes 2008; Holzer and Halfon 2006; Lake et al. 2000).

Neuropsychiatric Side Effects and Catatonia

Many medications used in the treatment of children with physical illness are associated with the development of neuropsychiatric symptoms that may be-

TABLE 30–6. Manifestations of severe serotonin, neuroleptic malignant, and anticholinergic syndromes

	Serotonin syndrome	Neuroleptic malignant syndrome	Anticholinergic syndrome
Medication	Serotonin agents	Dopamine antagonists	Anticholinergic agents
Time for condition to develop	<12 hours	1–3 days	<12 hours
Mental status	Agitation, coma	Alertness, stupor, mutism, coma	Agitated delirium
Vital signs	Hypertension	Hypertension	Hypertension
	Tachycardia	Tachycardia	Tachycardia
	Tachypnea	Tachypnea	Tachypnea
	>41.1°C	>41.1°C	<38.8°C
Pupils	Mydriasis	Normal	Mydriasis
Mucosa	Sialorrhea	Sialorrhea	Dry
Skin	Diaphoresis	Diaphoresis, pallor	Erythema
Neuromuscular tone	Increased (lower extremities)	"Lead-pipe" rigidity (all muscle groups)	Normal
Reflexes	Hyperreflexia	Bradyreflexia	Normal

Source. Adapted from Boyer EW, Shannon M: The serotonin syndrome. *New England Journal of Medicine* 352:1112–1120, 2005. Copyright 2005, Massachusetts Medical Society. All rights reserved. Used with permission.

come a focus of concern. These include neuroleptic malignant syndrome, serotonin syndrome, anticholinergic syndrome, and catatonia (see Table 30–6). It is important to accurately differentiate between these syndromes in order to help develop appropriate treatment interventions.

Neuroleptic Malignant Syndrome

Neuroleptic malignant syndrome (NMS) is a rare and potentially fatal reaction that may occur during treatment with antipsychotic agents (Croarkin et al. 2008; Strawn et al. 2007). NMS has been estimated to occur in 0.2%–1% of patients treated with dopamine-blocking agents. NMS has been reported in other neurological disorders (e.g., Wilson's disease, Parkinson's disease) treated with dopamine-blocking agents. NMS may also occur in patients treated with dopamine antagonists given for nausea (e.g., metoclopramide, prochlorperazine). Malnutrition and dehydration in the context of an organic brain syndrome and simultaneous treatment with lithium and antipsychotic agents may increase the risk. Mortality rates may be as high as 20%–30% due to dehydration, aspiration, renal failure, and respiratory collapse. Differential diagnosis of NMS includes heatstroke, malignant hyperthermia, lethal catatonia, serotonin syndrome, and anticholinergic toxicity (Haddad and Dursun 2008) (see Table 30–6). There may be a 30% risk of recurrent NMS if antipsychotic agents are restarted.

Serotonin Syndrome

Serotonin syndrome is often described as a clinical triad of mental status changes, autonomic hyperactivity, and neuromuscular abnormalities, although not all of these findings are present in all patients with this disorder (Boyer and Shannon 2005; Brown et al. 2000). An excess agonism of the central and peripheral nervous system serotonergic receptors is caused by a range of drugs, including SSRIs, monoamine oxidase inhibitors (MAOIs), valproate, dextromethorphan, lithium, meperidine, and fentanyl. Drug-drug interactions that can cause serotonin syndrome include linezolid (an antibiotic that has MAOI properties) used with an SSRI, as well as combinations of SSRIs, trazodone, buspirone, venlafaxine, ondansetron, metoclopramide, and sumatriptan (Boyer and Shannon 2005). Serotonin syndrome is often self-limited and may resolve spontaneously after discontinuation of the serotonergic agents. Se-

vere cases require control of agitation, autonomic instability, and hyperthermia as well as administration of 5-HT_{2A} antagonists (cyproheptadine). The syndrome can be difficult to clinically separate from NMS or anticholinergic "toxidromes" (Choi-Kain and Pope 2007) (see Table 30–6).

Anticholinergic Syndrome

There is strong evidence to suggest a significant relationship between anticholinergic side effects of medications and the presence of symptoms of delirium (Maldonado 2008; Tune et al. 1993). The term *anticholinergic syndrome* (ACS) is commonly used to describe the constellation of symptoms noted in these patients (see Table 30–6). Central anticholinergic side effects include agitation or lethargy, hallucinations, respiratory depression, and coma. Peripheral anticholinergic side effects, by contrast, include tachycardia, mydriasis and associated blurring of vision, flushed skin, increased temperature, decreased or absent bowel sounds, urinary retention, and dry mucous membranes. Although some drugs—for example, diphenhydramine and atropine—are commonly identified as having a high anticholinergic load, there is a long list of agents with potential anticholinergic activity (Maldonado 2008). Studies have demonstrated a direct relationship between a drug's anticholinergic potential (assessed on the basis of serum anticholinergic activity) and its anticholinergic toxicity (Tune et al. 1992). Physostigmine may be used to control agitation and delirium symptoms in patients with ACS and is generally safe, provided that the electrocardiogram does not show evidence of cardiac conduction disturbances (Granacher and Baldessarini 1975). Symptoms of agitation associated with ACS may also be treated with benzodiazepines.

Catatonia

Catatonia is a relatively rare clinical finding in the pediatric setting. It may occur as part of the presentation of a primary psychiatric illness, including mood and psychotic disorders, or secondary to physical illness or medication effects (Schieveld 2006). Slooter et al. (2005) cited an incidence of 0.16 case per million in the pediatric population. Commonly cited causes of secondary catatonia are listed in Table 30–7.

The core features of catatonia include mutism, stupor, motoric immobility, negativism, excitement, catalepsy, and posturing. DSM-IV-TR (American Psychiatric Association 2000) also includes echola-

TABLE 30–7. Causes of secondary catatonia

Neurological causes
Angioma
Basilar artery thrombosis
Bilateral infarction of the anterior cingulate gyrus
Bilateral infarction of the temporal lobes
Cerebral anoxia
Closed head injury
Encephalitis or other central nervous system infection
Glioma
HIV encephalopathy
Normal-pressure hydrocephalus
Seizure disorders
Surgery involving the hypothalamus
Other medical causes
Addison's disease
Bacterial sepsis
Cushing's disease
Hyperthyroidism
Malaria
Postoperative states
Systemic lupus erythematosus
Typhoid fever
Uremia
Viral hepatitis
Vitamin deficiencies
Medications and toxins
Antipsychotic agents
Corticosteroids
Cyclobenzaprine
3,4-Methylenedioxymethamphetamine (MDMA)
Phencyclidine (PCP)
Sedative-hypnotic withdrawal
Tetraethyl lead poisoning

Source. Reprinted from Masand PS, Christopher EJ, Clary GL, et al.: "Mania, Catatonia, and Psychosis," in *The American Psychiatric Publishing Textbook of Psychosomatic Medicine.* Edited by Levenson JL. Washington, DC, American Psychiatric Publishing, 2005, p 240. Copyright 2005, American Psychiatric Publishing, Inc. Used with permission.

lia and echopraxia as potential symptoms. The term *malignant catatonia* is sometimes used for patients who have associated signs of hyperthermia or autonomic instability (Takaoka and Takata 2003). Historically, the term *lethal catatonia* has been used to describe cases of prolonged psychomotor excitement, with disturbances in autonomic function and, in its final stage, a confusional state that may resemble delirium or NMS (Castilo et al. 1989). The differential diagnosis for catatonia includes Parkinson's disease, stroke, malignant hyperthermia, and selective mutism. Hyperkinetic movement disorders, such as Tourette's syndrome and cerebral palsy, and hypokinetic movement disorders, such as Huntington's disease and Wilson's disease, should also be considered (Masand et al. 2005).

Patients with catatonia are at risk of a number of potentially serious medical complications that stem primarily from the patients' immobility and inability to communicate their symptoms. These include cardiovascular deconditioning and dysfunction with associated deep venous thrombosis, aspiration pneumonitis, decubiti, contractures, and malnutrition. The latter may necessitate nasogastric feeding or surgical gastrostomy.

First-line management of catatonia includes treatment of any identifiable underlying etiological factors and maintenance of nutrition and homeostasis. Benzodiazepines, including lorazepam, have been found to be beneficial, in particular for the motor and speech symptoms (Masand et al. 2005). Other pharmacological agents include carbamazepine and bromocriptine (Takaoka and Takata 2003). There are isolated case reports of the use of atypical neuroleptic medications (e.g., risperidone) to treat haloperidol-induced catalepsy (Delbello et al. 2000). However, electroconvulsive therapy is cited as the single most efficacious treatment, including for pediatric patients (American Psychiatric Association 2001; Takaoka and Takata 2003). In severe cases, dantrolene has been administered with electroconvulsive therapy to control the signs of hyperthermia and muscular rigidity (Nolen and Zwaan 1990).

Concluding Comments

The future of psychopharmacology within the pediatric consultation setting will be replete with needs and possibilities. There remains a paucity of information in the literature pertaining to the psychopharmacological treatment of children and adolescents with physical illness. Studies of psychotropic medications to date have excluded youngsters with comorbid general medical conditions. Clinical evidence must be grown through systematic, collaborative multisite study and reporting of current psychopharmacological practices in pediatric consultation settings. Possible associations and interactions between psychiatric and physical comorbidities and their treatments need to be delineated. These endeavors would be aided by refinements in psychiatric diagnostic classification that produce detailed, functional descriptions of disorders. Emerging research in pharmacogenetics and pharmacogenomics might eventually be translated to clinical settings to guide drug selection, improve prediction of pharmacological effects, and reduce rates of adverse drug reactions (de Leon et al. 2008; Rasmussen-Torvik and McAlpine 2007).

The current trend in the development of enantiomeric compounds has the potential to deliver the benefits of more precise symptom targeting and reduced side-effect burdens (Leonard 2001; Wainer 2001). Progress in understanding the basic pathophysiology of psychiatric disorders might soon be translated into clinical practice as psychopharmacological interventions that target disordered physiology directly. Translational therapies seem particularly close for single-gene disorders affecting the central nervous system (Berry-Kravis et al. 2008). Consultants in pediatric psychosomatic medicine, because of their collaboration with the clinicians providing care to children with these disorders, are likely to be at the vanguard of applying translational therapies as they become available. Whether pursuing or awaiting such advances in the field, today's practitioners of pediatric psychosomatic medicine must make do with the best existing evidence that young persons distressed by comorbid psychiatric and physical illnesses can gain relief through the thoughtful integration of psychotropic medication into their clinical care.

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31

Preparation for Procedures

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As part of their health care, children and adolescents often experience painful and distressing medical interventions. The Centers for Disease Control and Prevention (2008) recommends an average of 28 immunization injections during the first 6 years of life. Diagnostic tests such as venipuncture are common experiences. In addition, many children also experience more invasive, painful, and anxiety-provoking medical procedures. For example, more than 6 million children are hospitalized annually (Elixhauser 2008), with another 9.5 million children being seen in emergency departments (Bloom et al. 2009). Those with serious physical conditions are at an even greater risk for experiencing an increased number of medical procedures. Taken together, the issue of preparation for medical procedures is critical for a large population of children and adolescents.

Importance of Preparation

Preparation for hospitalization and medical procedures has four primary goals: 1) encouraging trusting relationships; 2) providing emotional support; 3) giving age-appropriate information; and 4) helping children develop coping strategies to use before and during procedures. Effective psychological interventions that focus on these goals can help youngsters and their parents cope with challenging medical interventions by providing them with an increased sense of control and mastery. This will in turn help to minimize the pain resulting from interventions as well as decrease levels of anxiety prior to and during procedures.

The management of pain and anxiety is important for several reasons. Poor management of pain in early childhood may alter neuronal circuits that process pain and result in heightened behavioral response to pain in later childhood (Ruda et al. 2000). Moreover, emotional factors such as increased anxiety, distress, anger, and depressed mood can increase pain perception and make future medical procedures and pain management more challenging (Frank et al. 1995; Kain et al. 2006). In a study aimed at exploring how preoperative anxiety in children affects postoperative variables (e.g., pain, behavioral recovery), Kain et al. (2006) found that increased anxiety before surgery is associated with increased postoperative pain, analgesic consumption, emergence of delirium, and sleep problems. Furthermore, youngsters exhibiting distress behaviors during procedures are likely to interfere with and delay the procedures. These findings suggest that effective preparation for medical procedures, focusing on the reduction of anxiety, has the potential to affect operative and postoperative course as well as children's pain experience.

Childhood medical experiences may influence future anxiety, pain, and coping with medical encounters. In a study examining the effects of childhood medical experiences on adult functioning, Pate et al. (1996) found that 1) adults' medical fear was pre-

dicted by experiencing more fear and pain as a child; 2) medical pain in adulthood was predicted by experiencing more pain as a child; and 3) greater coping effectiveness as an adult was related to having coped better during childhood. Moreover, childhood fearfulness was found to predict avoidance of medical care as an adult. These findings are significant in that they suggest that medical experiences in childhood are likely to continue to have a significant impact on individuals throughout their lives. Thus, effective preparation of children for medical interventions has the potential to facilitate successful coping with medical stressors well beyond childhood.

Factors Influencing the Effectiveness of Preparation

Several factors have been found to influence how a youngster will cope with invasive medical procedures. These include 1) past medical experience; 2) patient age; 3) temperament and coping style; and 4) parental variables.

Past Medical Experience

The adage often used in psychiatry that "past behavior is the best predictor of future behavior" is highly relevant in the context of procedural distress. Specifically, the experience of distress during a medical procedure has been found to be predictive of distress during future procedures (Frank et al. 1995). In a study investigating the relationship between medical experience and responses during a medical examination and intervention, Dahlquist et al. (1986) found that children with previous negative medical experiences demonstrated more behavioral distress than children with previous positive or neutral medical experiences. This suggests that children with a prior negative medical experience are at risk for experiencing increased distress. Conversely, a positive childhood medical experience may lead to less fear and more positive functioning during subsequent medical encounters.

Patient Age

Research has indicated that age can influence coping with a medical procedure. Studies have indicated that younger children demonstrate higher levels of distress and pain during medical procedures than older children (e.g., Dahlquist et al. 2001; Schiff et al. 2001). Younger children are more likely than older children to have misconceptions about hospitalizations and medical procedures. Moreover, due to limited cognitive abilities, younger children are likely to display difficulties with interpreting parameters of the procedure, such as duration or intensity. Taken together, these findings underscore the need for developmentally appropriate education and interventions to ensure appropriate preparation.

Temperament and Coping Style

Children and adolescents rated as more adaptable, less intense, and more positive in mood have been found to be better prepared to cope with medical procedures (Lee and White-Traunt 1996). In addition, those who display an information-seeking coping style prior to a medical procedure have had better outcomes when confronting a medical stressor than those who exhibit an information-avoidant coping style (Blount et al. 1991).

Parental Variables

Parental variables have been shown to have a significant impact on coping with procedures. Although many children appreciate having their parents with them during a medical procedure, and parents often help to coach children in the use of coping skills (Cohen et al. 1997), some studies have indicated that parental behavior, specifically anxiety and criticism, is associated with increased rates of child distress. Frank et al. (1995) found that parental behavior in the treatment room accounted for 53% of the variance in child distress behavior. Because youngsters get cues about how to think and behave from their parents, it is likely that parents who are visibly anxious may inadvertently cause their children to become more distressed. This observation suggests that when a parent is overtly anxious, his or her presence during a procedure may do more harm than good. In a study examining parental criticism and praise during procedures, Gelfand and Dahlquist (2003) found that criticism was associated with child distress. Taken together, the characteristics and behaviors of parents must be carefully considered prior to encouraging their presence during medical procedures.

Types of Preparation

Effective preparation for medical procedures includes providing information, modeling, play, and teaching of coping strategies. The remainder of this chapter reviews these strategies and provides evidence for their effectiveness.

Preparation Through Education

Fostering trust, reducing uncertainty, correcting misconceptions, enhancing the belief in his or her ability to cope with a procedure, and minimizing distress are some of the potential benefits in providing advance information about a procedure to a child (see Jaaniste et al. 2007 for a review). Providing accurate, minimally threatening information regarding upcoming procedures promotes realistic expectations that may allow children to focus on specific concrete sensations and concerns as well as develop adaptive strategies to cope with their worries.

Typically, medical preparation through education includes a developmentally appropriate verbal explanation of what the child will see, hear, feel, and smell during, before, and after the procedure. Visual materials and medical equipment are often used to enhance the learning experience. Children are further encouraged to ask questions. In such a manner, concerns that children may have can be elucidated and misconceptions corrected.

Research on the preparation of youngsters for medical procedures suggests that children who understand what will happen to them and how they should best behave cope more effectively and are more cooperative. In a study examining behavioral responses to preparation conducted prior to first bone marrow aspiration, Hubert et al. (1988) found that compared with children who were avoidant during the preparation program, children who were more involved demonstrated less distress. This finding suggests that youngsters who receive more preparation information prior to a medical procedure demonstrate better behavioral outcomes during the actual procedure.

Timing of Information

Importantly, although preparation is known to be associated with positive postprocedural outcomes, careful consideration must be given to the timing of the information provided as well as its content and format. Preparation provided too far in advance of the procedure may allow the child too much time to worry, think, and fantasize about the event, possibly leading to distorted thoughts and increased anticipatory anxiety. Too long a delay between preparation and the procedure, especially with young children, may prevent children from linking the two events. However, preparation provided too close to the procedure does not allow the child enough time to process the material, ask relevant questions, and practice coping skills.

The ideal time to prepare a child for a medical procedure greatly depends on age and developmental maturity. Kain et al. (1996b) found that children 6 years and older were least anxious if they received preparatory information 5–7 days prior to surgery and most anxious if the information was provided 1 day prior to surgery. Preparing older children for procedures about 1 week in advance allows children adequate time to process the information and to rehearse the new coping skills, without increasing anticipatory anxiety. Children younger than 6 years old usually do best if prepared 1–2 days prior to the medical procedure. In general, adolescents do best when they are included from the beginning in the decision-making process regarding the planned medical intervention.

Content of Information

The decision on how much information to give a child is influenced by age, maturity, temperament, and desire as well as the child's need for information, which is often signaled by his or her specific questions. Language used during preparation should be simple, unambiguous, and appropriate to the child's cognitive and developmental level. Content should be accurate but as least threatening as possible. Children who are given information that turns out not to be true (e.g., "You will not feel a thing" when in fact the child is liable to experience some pain) are more likely to develop a distrustful relationship with the medical team that may negatively affect future interactions.

Suls and Wan (1989) reported that preparatory information is most effective when it includes sensory information (i.e., description of the sensations a patient will likely experience) as well as procedural information (i.e., description of the actual procedure). In a study examining a preparation program in which parents of 3- to 8-year-olds read a story to their child that included both procedural and sensory information about venipuncture, Kolk et al. (2000) demonstrated that this was an effective technique for reducing anxiety both prior to and during the intervention.

Preparatory information will be most effective when it is specific rather than general, helping to facilitate a more accurate appraisal of the situation (Jaaniste et al. 2007) and thus avoid misconceptions and unnecessary or inaccurate fears. Specifically, children should be told what they will see, hear, feel, smell, and taste in the time leading up to, during, and after the procedure. It is of particular

importance to discuss what is likely to happen after the procedure to avoid any unpleasant surprises. Moreover, reminding the child that he or she will eventually return home is a frequently overlooked piece of procedural information that can help the child more adaptively cope with the stress of the intervention (see Table 31–1).

Parental Presence

There are several reasons why it is essential to include parents in the preparation process, especially for younger children. First, children are usually sensitive to how their parents respond to situations and often look to their parents for signals on how they should react. Parents who display signs of anxiety tend to exacerbate their child's level of distress. Providing information and support to parents through involvement in preparation activities is likely to reduce parental anxiety, with positive indirect benefits for their children. In addition, whereas older children are more independent, younger children frequently require more direct help from adults to understand information and utilize coping skills.

In cases in which parents remain excessively anxious following preparation interventions, parental presence may do more harm than good. In such a situation, the value of the presence of the parents should be carefully considered. It may be helpful to explore the options of other supportive adult figures to improve the child's experience with the procedure.

Preparation Through Modeling

Modeling is based on Bandura's (1977) social learning theory, which asserts that individuals learn by observing the behaviors of others and outcomes of these behaviors. Through modeling, the child may be introduced to a peer who has already gone through the same medical event and can demonstrate effective coping skills. Modeling can also be provided either through watching a film or by witnessing another child going through the same planned procedure. The effectiveness of modeling appears to be enhanced when the model is of similar age and ethnicity to the patient (Melamed et al. 1976). Modeling is likely to be particularly useful with younger children who are better able to absorb visible demonstrations of the information rather than spoken explanations (Jaaniste et al. 2007).

Although filmed modeling can be of great benefit, it is not uncommon for children to display increased anxiety subsequent to watching a preparation film. In a study examining the use of filmed modeling to prepare children for surgery, Melamed and Siegal (1975) found a significant increase in anxiety after the children watched the film. The anxiety significantly decreased, however, following a thorough interactive preparation session conducted by hospital staff. This finding suggests that film modeling should be viewed as a supplement to live interactive preparation that provides emotional support and verbal explanations. Merely watching a film does not provide the child with the active involvement that is necessary for promoting learning and memory.

Preparation Through Exposure and Medical Play

Play is a vehicle for self-expression, allowing children to express their thoughts and feelings, assimilate reality, resolve internal conflicts, and achieve mastery. Medical play allows children an opportunity to examine medical equipment that they may experience during the planned procedure. Play serves to familiarize the child with the equipment and provides the child with an opportunity of gaining mastery over the feared objects. Exposure to the equipment helps to desensitize the child, with the result that there is a less fearful reaction at the time of the procedure. Medical play is further utilized as a way to prepare children for procedures by using

TABLE 31–1. Guidelines for teaching children about medical procedures

Information should be provided in a developmentally appropriate format.
Explanations should include what the child will hear, see, and smell as well as sensations he or she will feel prior to, during, and after the procedure.
Language should be simple and nonthreatening, with no ambiguity.
The child should be encouraged to repeat back what he or she learned and to ask questions in order to correct any misconceptions.
To enhance learning and memory, visual aids and actual medical equipment should be used when available.

the equipment in role-playing with a doll or another person. This is a particularly useful activity with younger children who learn best by doing. In general, real medical equipment should be used as part of these preparation strategies. However, it is important to keep in mind that some children may find the real equipment overly threatening and may prefer toy replicas.

To examine the effectiveness of play to prepare a child for a medical intervention, Li and Lopez (2008) conducted a randomized, controlled study in which 203 children (ages 7–12 years) were assigned either to a therapeutic play intervention or to a control group that received routine informational preparation. The children in the therapeutic playgroup participated in a visit to the operating room, were shown a demonstration of anesthesia induction with a doll, and were given the opportunity to handle and play with the medical equipment. Results indicated that children who received the therapeutic play intervention reported lower levels of anxiety in both the pre- and postoperative periods than children in the information-only group. The same finding was reported for parents of the children in the two groups. Taken together, these results suggest that preparation that includes play and exposure to medical equipment is more effective in reducing both child and parental anxiety than preparation that relies solely on the provision of information.

Coping Skills Training

In addition to providing information and exposure, medical preparation of children often includes instruction in the use of coping techniques. Although coping strategies do not eliminate fear and pain, they may help children reduce their distress to a manageable level. Coping strategies help children develop a sense of self-control through learning active skills that can be used to deal with the aversive situation. The remainder of this chapter reviews research on various coping strategies commonly used with children undergoing invasive medical procedures.

Distraction

Distraction involves a purposeful refocusing of attention from the threatening, anxiety-provoking aspects of a situation to less threatening thoughts, objects, sights, or sounds. Theoretically, the more attention demanded by the distractor, the less attentional capacity is available for processing the distressing or painful stimuli. Distraction techniques are adapted according to the age and developmental level. Rocking, patting, a pacifier, or a toy with lights and sounds can help distract an infant. Toddlers respond well to blowing bubbles, party blowers, and interactive books. With older children and adolescents, distraction techniques include listening to music, playing video games, working on riddles, or watching movies or television shows during the procedure.

Distraction as a coping technique has been shown to be helpful in reducing pain and distress during medical procedures (e.g., Cohen et al. 1999; Manimala et al. 2000; Stinson et al. 2008). In a meta-analysis of psychological interventions for needle-related procedural distress in children and adolescents, distraction was found to be one of the three most efficacious coping techniques utilized to help with painful medical interventions (Uman et al. 2006).

Treatment studies have experimentally manipulated distraction and compared it with other variables thought to help during medical procedures. Through these comparisons, the use of distraction has even been found to be more effective than traditional methods of managing procedure-related pain and distress. For example, in a study with school-age children, Cohen et al. (1999) examined differential responses to a series of three immunizations utilizing a Latin square design in which all participating children were exposed to each of the three experimental conditions (i.e., typical care, distraction, and eutectic mixture of lidocaine and prilocaine [EMLA] topical anesthetic). Distraction resulted in less child distress than either typical care or EMLA.

Another study compared the effects of distraction and parental reassurance on child distress and coping during immunizations (Manimala et al. 2000). Eighty-two children (ages 3–5 years) and their parents were alternately assigned to the parental reassurance group, the parental distraction group, or a control group. Parents in the reassurance group were taught that reassuring comments can comfort the child and reduce the child's fear, anxiety, and distress. Parents were instructed on how to use reassurance and encouraged to use this method during their child's immunization. Parents in the distraction group were informed that their child would be more fearful and distressed if he or she focused on the impending injection and were thus encouraged to engage their child in distracting activities (e.g., puzzles, coloring, toys, reading, and discussing nonmedical topics). Parents were also instructed to teach and encourage their children to use a party blower prior to

and during the injection. Results indicated that children in the distraction group displayed the least amount of distress on several indexes. Moreover, children in the reassurance group displayed more verbal fear and needed to be restrained more often than children in either the distraction group or the control group. One explanation for the deleterious effects of reassurance is that rather than working to comfort the child, it may focus the child's attention on the fearful and painful aspects of the situation.

Coaching

Because children seldom spontaneously engage in coping behaviors, repeated prompting by adults is often necessary. In a study examining the effectiveness of nurse coaching and distraction on young children undergoing immunizations, Cohen et al. (1997) alternatively assigned children (ages 4–6 years) and parents to one of three groups: 1) standard care; 2) nurse coaching and cartoon distraction with no behavioral rehearsal; or 3) nurse coaching, cartoon distraction, and behavioral rehearsal. The two interventions were found to be superior and equally effective compared with standard care in terms of reducing child, parent, and nurse reports of distress as well as enhancing coping.

To determine if trained coaches are necessary for helping children cope with medical procedures, Cohen et al. (2002) conducted a study with 61 children (ages 3–7 years) undergoing routine immunizations. Children were alternately assigned to either a coping skills or a control group. Children in the coping skills group watched a video of a same-aged model engaging in "snake breathing" and positive self-statements throughout the immunization. After the video, the child was given time to practice the two skills with a trained research assistant. Children in the control group also watched a video on immunizations but were not given any specific suggestions on how to best cope. Parents in both groups did not watch the videos with their child.

Interestingly, although just before the procedure children in the coping skills group demonstrated that they had learned the requisite skills, the training did not lead to increased coping or decreased distress during the procedure. The authors suggested that this study offers evidence that training children in coping skills without the inclusion of adult coaches may be insufficient, especially for young children. However, as suggested earlier, parents who exhibit a high level of observable anxiety during their children's medical intervention often increase, rather than decrease, distress in their children (Frank et al. 1995). Thus, although most children will greatly benefit from having their parents trained as coaches, it is likely that parents with high anxiety will serve to interfere with effectiveness of coaching interventions.

Active Versus Passive Distraction

Researchers have argued that active distraction (e.g., playing with a toy or video game) that engages the child in manipulating objects or problem solving is more effective than passive distraction (e.g., watching a movie) because it utilizes more attentional resources (e.g., Dahlquist 1999). To this end, several studies have compared active and passive distraction to determine whether they are differentially effective in helping children cope with medical procedures. Dahlquist et al. (2007) examined the effectiveness of interactive versus passive distraction with 40 children (ages 5–13 years) undergoing cold pressor trials (i.e., immersion of the child's hand in cold water). Children in this study were randomly assigned to one of three groups: 1) interactive distraction; 2) passive distraction; or 3) no distraction control condition.

All children went through a baseline cold pressor trial in which pain tolerance and pain threshold were measured. During the second trial, children in the interactive group played a video game that used a joystick and virtual reality head-mounted display helmet. Children in the passive group wore the same helmet, but rather than playing the video game, they watched prerecorded footage of another child playing. To compare the relative benefits of interactive versus passive distraction in a within-subjects design, each child participated in one or two cold pressor trials. The experimental participants received a third trial of the distraction intervention they had not received in the second trial. Control participants all received a third and fourth trial utilizing each of the experimental conditions in counterbalanced order.

Results indicated that relative to their own baseline, children demonstrated higher pain thresholds and greater pain tolerance during both passive and interactive distraction. Moreover, although both distraction conditions were found to be effective, interactive distraction was superior to passive distraction. Specifically, when compared with the children in the passive distraction group, children in the interactive distraction group demonstrated significantly higher pain thresholds and tolerance.

In a less complicated design employing a more common interactive distraction tool, Patel et al. (2006) explored the efficacy of utilizing a handheld video game to reduce preoperative anxiety. One hundred and twelve children (ages 4–12 years) were randomly assigned to one of three groups: 1) parent presence; 2) parent presence and handheld video game; or 3) parent presence and oral premedication (0.5 mg midazolam). Children in the handheld video game group were allowed to play a game of their choice for at least 20 minutes prior to entering the operating room and during introduction of the anesthesia mask.

Results indicated lower levels of anxiety in children in the video game group at induction of anesthesia compared with children in the other two groups. Moreover, when comparing change in anxiety within patients (i.e., from baseline to induction of anesthesia), 63% of children in the video game group had no change or a decrease in anxiety compared with 26% in the premedication group and 28% in the parental presence only group. This finding is particularly significant because the introduction of the anesthesia mask has been shown to be one of the most stressful moments during anesthesia (Kain et al. 1996a). With interactive video game distraction, the current study was able to demonstrate reduced levels of anxiety to a greater degree than either parental presence alone or premedication.

In contrast to these findings, some studies suggest that in certain situations passive distraction may be more efficacious than active distraction. For example, MacLaren and Cohen (2005) randomly assigned 88 children (ages 1–7 years) receiving venipuncture to one of three conditions: 1) interactive toy distraction; 2) passive movie distraction; or 3) standard care. Children in the passive condition exhibited less distress than children in the interactive condition. One explanation for this finding is that children in the active condition who became overwhelmed or who were not interested in the toy simply stopped playing, whereas children in the passive condition continued to receive the distraction regardless of their willingness to interact with the stimulus. These results highlight the importance of considering individual factors (e.g., age, interest) when selecting a distraction strategy.

Taken together, it appears that the efficacy of distraction varies some across type of situation and depends on the nature of the chosen distraction technique. Specifically, multisensory, active distraction is efficacious as long as the stimulus is one that will sufficiently interest the child and keep him or her actively involved. In instances in which a video game, for example, is not available, a pop-up book or an *I Spy* book can be used to actively engage the child in a task. In the absence of these tools, the use of a passive distraction technique appears to be more effective at reducing children's distress than no distraction at all.

Relaxation

Relaxation is a behavior that is usually incompatible with the experience of anxiety, distress, or pain. Through relaxation, children can regulate their emotional and physical responses to stressful events by learning to reduce physiological changes associated with stress and pain (e.g., increased heart rate, breathing, temperature, and muscle tension). Commonly used relaxation strategies include deep breathing exercises, guided imagery, and progressive muscle relaxation. Although progressive muscle relaxation and deep breathing are intended to directly influence somatic reactions, imagery-based relaxation aims to induce somatic reactions indirectly by influencing cognitions.

In a study aimed at examining the physiological effects of relaxation training in children, Lohaus et al. (2001) found that imagery-based relaxation training led to decreased heart rate and skin conductance levels. Their findings did not indicate a similar physiological pattern for children trained in progressive muscle relaxation. The authors suggested that this may have resulted due to the activation of muscle groups associated with progressive muscle relaxation, which impacted outcome measures. They further suggested that the effects of relaxation training may be more apparent for this type of activity after the training but not during the exercise, when the measurements in this study were taken. It can also be argued that, despite these findings, progressive muscle relaxation may still be a beneficial tool for coping with medical procedures because of its distraction component in which the child is being asked to focus on something other than the noxious stimulus (i.e., the muscle groups). Moreover, many younger children are likely to enjoy progressive muscle relaxation more than imagery-based relaxation because it allows them to stay physically active.

Other studies have indicated an interaction between the effectiveness of the relaxation strategy and the age of the child. For example, in a study utilizing distraction and breathing techniques with a party blower to help children cope with chemother-

apy venipunctures, 62% of the children refused to use the party blower at some point in the study (Manne et al. 1994). Upon further analysis, the researchers discovered that the majority of children who refused to cooperate were younger children, indicating that coping techniques such as breathing may not be appropriate for this age group.

Hypnosis

Hypnosis is a state of focused attention and concentration that empowers individuals to control both their thoughts and physiological functioning. Hypnosis can be used for relief of symptoms (e.g., pain control) or for treatment of the underlying cause of the distress (e.g., anxiety). Traditional hypnosis consists of several components: 1) induction and absorption: focused attention; 2) dissociation: relative suspension of peripheral environment; 3) intensification; and 4) therapeutic suggestions: communication with an individual aimed at achieving a particular response. Importantly, hypnosis with children frequently differs from traditional methods used with adults. For example, children may not require a formal hypnotic induction because they are much more likely than adults to enter spontaneous trance states (e.g., when daydreaming or watching a favorite television program). It is generally believed that children are more susceptible to hypnosis than adults, likely due to their enhanced ability and willingness to become absorbed in fantasy, play, and imagination (Morgan and Hilgard 1973).

The choice of hypnotic method used depends on the child's specific clinical needs, interests, and developmental level. The use of pinwheels and bubbles is an easy way to induce a hypnotic trance in young children. For older children, more traditional methods with suggestions of turning down "pain switches," selective hand warming, going to a special place, and the image of "magic gloves" are often employed (Sugarman and Kohen 2007).

Hypnosis has been shown to decrease pain and anxiety and shorten lengths of hospital stay in children undergoing surgery (Lambert 1996; Liossi and Hatira 2003). Moreover, in their meta-analysis on needle-related procedural pain and distress, Uman et al. (2006) found that hypnosis is an efficacious intervention at reducing both pain and distress during needle procedures. In their review of systematic studies of acute procedural pain in children in the hospital setting, Stinson et al. (2008) also found hypnosis to be an effective nonpharmacological intervention for managing pain.

In a study aimed at assessing the combined efficacy of EMLA analgesic cream with hypnosis in the relief of lumbar puncture–induced pain and anxiety, Liossi et al. (2006) randomly assigned 45 children (ages 6–16 years) to one of three conditions: 1) local anesthetic only; 2) local anesthetic plus hypnosis; and 3) local anesthetic plus attention (i.e., meeting with a therapist). Results indicated that the combination of hypnosis and local anesthetic was superior to local anesthetic alone or with attention for reducing anticipatory anxiety and procedure-related pain, anxiety, and distress behavior. Furthermore, the benefit of hypnosis was maintained at 6-month follow-up.

Several studies have compared the effectiveness of hypnosis with other techniques such as distraction. For example, in their study of children undergoing bone marrow aspirations and lumbar punctures, Zeltzer and LeBaron (1982) found that hypnosis was superior to distraction in reducing pain and anxiety. Kuttner et al. (1988) examined the differing effects of distraction and hypnosis in the reduction of procedural pain and distress in children receiving bone marrow aspirations. Their findings indicate that hypnosis was superior to distraction for reducing distress in younger children receiving their first bone marrow aspiration. In their comparison of hypnosis and play, Katz et al. (1987) found that children randomly assigned to both groups experienced an improvement in self-reported distress over their baseline, with no difference between the groups.

Butler et al. (2005) randomly assigned 44 children (ages 4–15 years) scheduled for a voiding cystourethrography (VCUG) to either a hypnosis group or a routine care group. Children and parents in the hypnosis group participated in a 1-hour training session in self-hypnotic visual imagery 1 week prior to the VCUG. Parents and children were instructed to practice the skill several times daily in the days leading up to the procedure. In addition, the therapist who taught the children and parents was present to conduct similar hypnotic exercises during the procedure.

Results indicated significant benefits for children in the hypnosis group compared with children in the standard care group. Specifically, compared with the standard care group, parents of children in the hypnosis group reported that the procedure was significantly less traumatic than previous VCUG experiences. In addition, observational ratings of distress in children in the hypnosis group were lower, medical staff reported less difficulty conducting the pro-

cedure, and total procedure time was significantly reduced.

Reinforcement

Reinforcement is intended to reward and motivate the child for his or her cooperation during medical procedures. Reinforcement may include verbal praise, stickers or small toys, or other incentives. By pairing a positive outcome (e.g., sticker, toy) with an aversive stimulus (e.g., venipuncture), the child develops a positive association with the aversive event. In addition, by providing an incentive to engage in cooperative behaviors, the likelihood that the child will perform the behaviors again in the future is increased.

Combined Cognitive-Behavioral Interventions

Many interventions with children aimed at preparing them for medical procedures utilize more than one of the preparation techniques described here. These interventions usually fit under the rubric of combined cognitive-behavioral interventions. In a review of the literature, Powers (1999) concluded that cognitive-behavioral therapy (CBT) is a well-established and empirically supported treatment for procedure-related pain in children and adolescents. Moreover, in a more recent meta-analysis conducted for the Cochrane Collaboration (Uman et al. 2006), combined cognitive-behavioral interventions were found to be efficacious interventions for reducing needle-related procedural distress.

Jay et al. (1987) compared the effectiveness of a CBT intervention package with a pharmacological intervention (Valium 0.3 mg/kg) and a control condition. The authors utilized a repeated-measures counterbalanced design across the three conditions with 58 children receiving bone marrow aspirations. Children in the CBT group received a treatment package that included filmed modeling, breathing exercises, positive incentives, imagery/distraction, and behavioral rehearsal. Results indicated that the CBT intervention group exhibited significantly lower behavioral distress, pain ratings, and pulse rates than the control group. Moreover, except for lower diastolic blood pressure, there were no other significant differences between the control group and the pharmacological intervention group.

Kain et al. (2007) randomly assigned 408 children undergoing elective surgeries and their parents to four different preparation groups: 1) parental presence group: parents were present for the induction of anesthesia; 2) midazolam group: children received 0.5mg/kg of oral midazolam 30 minutes prior to going to the operating room; 3) ADVANCE behavioral preparation group: children and parents received a multicomponent intervention that included parental presence, video modeling, distraction activities, and instructions to parents on how to best help their children prior to the procedure and during anesthesia induction; or 4) standard care group: no preparation, parental presence, or premedication was used. Children in the ADVANCE group exhibited significantly less anxiety prior to induction of anesthesia compared with children in the other three groups and were less anxious during the induction than children in the control and parental presence groups. Moreover, children in the ADVANCE group demonstrated a lower emergence of delirium after surgery, required significantly less analgesia in the recovery room, and were discharged from the recovery room earlier than children in the other three groups.

Concluding Comments

Although many factors can affect how a child or adolescent reacts to an invasive medical intervention, it is clear that proper preparation will have important short- and long-term benefits. Despite numerous studies, it is still less clear which types of interventions are likely to be most effective in preparing a specific child. It is essential to consider the characteristics of the child (e.g., age, temperament, coping style) and the parent and the nature of the planned medical intervention when determining what type of preparation program to use. In general, most effective preparation interventions will include more than one of the techniques mentioned in this chapter.

Some parents may be hesitant to have their children participate in preparation activities or may resist efforts to provide their children with developmentally appropriate information. These parents should be made aware of the risks that unprepared children face, particularly their increased levels of vulnerability during medical procedures. Children who are not provided with accurate information prior to medical procedures are more likely to experience feelings of betrayal and loss of trust in both their parents and their medical providers. There are also potential long-term negative consequences for future interactions related to their medical care.

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