



Identification and Management of Eating Disorders in Children and Adolescents

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Eating disorders are serious, potentially life-threatening illnesses afflicting individuals through the life span, with a particular impact on both the physical and psychological development of children and adolescents. Because care for children and adolescents with eating disorders can be complex and resources for the treatment of eating disorders are often limited, pediatricians may be called on to not only provide medical supervision for their patients with diagnosed eating disorders but also coordinate care and advocate for appropriate services. This clinical report includes a review of common eating disorders diagnosed in children and adolescents, outlines the medical evaluation of patients suspected of having an eating disorder, presents an overview of treatment strategies, and highlights opportunities for advocacy.

abstract

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The guidance in this report does not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.

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INTRODUCTION

Definitions

Although the earliest medical account of an adolescent patient with an eating disorder was more than 300 years ago,¹ a thorough understanding of the pathophysiology and psychobiology of eating disorders remains elusive today. The *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)* includes the latest effort to describe and categorize eating disorders,² placing greater emphasis on behavioral rather than physical and cognitive criteria, thereby clarifying these conditions in those children who do not express body or weight distortion. *DSM-5* diagnostic criteria for several of the eating disorders commonly seen in children and adolescents are presented in Table 1.

Notable changes in *DSM-5* since the previous edition include the elimination of amenorrhea and specific weight percentiles in the diagnosis of anorexia nervosa (AN) and a reduction in the frequency of binge eating and compensatory behaviors required for the diagnosis of bulimia nervosa (BN). The diagnosis “eating disorder not otherwise specified” has been

TABLE 1 Diagnostic Features of Eating Disorders Commonly Seen in Children and Adolescents

DSM-5 Eating Disorder Diagnosis	Diagnostic Features
Anorexia nervosa (AN)	<p>A. Restricted caloric intake relative to energy requirements, leading to significantly low body weight for age, sex, projected growth, and physical health</p> <p>B. Intense fear of gaining weight or behaviors that consistently interfere with weight gain, despite being at a significantly low weight</p> <p>C. Altered perception of one's body weight or shape, excessive influence of body weight or shape on self-value, or persistent lack of acknowledgment of the seriousness of one's low body weight</p> <p>Subtypes: restricting type (weight loss is achieved primarily through dieting, fasting, and/or excessive exercise. In the previous 3 mo, there have been no repeated episodes of binge eating or purging); binge-eating/purging type (in the previous 3 mo, there have been repeated episodes of binge eating or purging; ie, self-induced vomiting or misuse of laxatives, diuretics, or enemas)</p>
Bulimia nervosa (BN)	<p>Repeated episodes of binge eating. Binge eating is characterized by both of the following: within a distinct period of time (eg, 2 h), eating an amount of food that is clearly larger than what most individuals would eat during a similar period of time under similar circumstances and a sense that one cannot limit or control their overeating during the episode</p> <p>Repeated use of inappropriate compensatory behaviors for the prevention of weight gain, such as self-induced vomiting; misuse of laxatives, diuretics, or other medications; fasting; or excessive exercise</p> <p>On average, the binge eating and compensatory behaviors both occur at least once a week for 3 mo</p> <p>Self-value is overly influenced by body shape and weight</p> <p>The binge eating and compensatory behaviors do not occur exclusively during episodes of AN</p>
Binge-eating disorder (BED)	<p>Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following: within a distinct period of time (eg, 2 h), eating an amount of food that is clearly larger than what most individuals would eat during a similar period of time under similar circumstances and sense that one cannot limit or control their overeating during the episode</p> <p>The binge-eating episodes include 3 or more of the following: eating much more quickly than normal, eating until uncomfortably full, eating large amounts of food when not feeling hungry, eating alone because of embarrassment at how much one is eating, and feeling guilty, disgusted, or depressed afterward</p> <p>Marked anguish is experienced regarding binge eating</p> <p>On average, the binge eating occurs at least once a week for 3 mo</p> <p>The binge eating is not associated with the use of inappropriate compensatory behavior as in BN and does not occur only in the context of BN or AN</p>
Avoidant/restrictive food intake disorder (ARFID)	<p>A disrupted eating pattern (eg, seeming lack of interest in eating or food; avoidance based on the sensory qualities of food; concern about unpleasant consequences of eating) as evidenced by persistent failure to meet appropriate nutritional and/or energy needs associated with 1 (or more) of the following: significant weight loss or, in children, failure to achieve expected growth and/or weight gain, marked nutritional deficiency, reliance on enteral feeding or oral nutritional supplements, significant interference with psychosocial functioning</p> <p>The disturbance cannot be better explained by lack of available food or by an associated culturally sanctioned practice</p> <p>The eating disturbance cannot be attributed to a coexisting medical condition nor better explained by another mental disorder. If the eating disturbance occurs in the context of another condition or disorder, the severity of the eating disturbance exceeds that routinely associated with the condition or disorder</p>
Other specified feeding or eating disorders, examples	<p>Atypical AN: all of the criteria for AN are met yet the individual's weight is within or above the normal range despite significant weight loss</p> <p>BN (of low frequency and/or limited duration): All of the criteria for BN are met, but, on average, the binge eating and compensatory behaviors occur less than once a week and/or for <3 mo</p> <p>BED (of low frequency and/or limited duration): All of the criteria for BED are met, but, on average, the binge eating occurs less than once a week and/or for <3 mo</p> <p>Purging disorder: recurrent purging behavior (eg, self-induced vomiting; misuse of laxatives, diuretics, or other medications) in the absence of binge eating with the intent to influence weight or body shape</p>

Adapted from the *DSM-5*, American Psychiatric Association, 2013.²

eliminated, and several diagnoses have been added, including binge-eating disorder (BED) and avoidant/

restrictive food intake disorder (ARFID).^{3–5} The diagnosis of ARFID encompasses feeding behaviors

previously categorized in the fourth edition (*DSM-IV*) as “feeding disorder of infancy and early childhood” and

expands these into adolescence and adulthood. Individuals with ARFID intentionally limit intake for reasons other than for concern for body weight, such as the sensory properties of food, a lack of interest in eating, or a fear of adverse consequences with eating (eg, choking or vomiting). As a result, they may experience weight loss or failure to achieve expected weight gain, malnutrition, dependence on nutritional supplementation, and/or interference with psychosocial functioning.⁶⁻⁹ The category “other specified feeding and/or eating disorder” is now applied to patients whose symptoms do not meet the full criteria for an eating disorder despite causing significant distress or impairment. Among these disorders is atypical AN in which diminished self-worth, nutritional restriction, and weight loss mirrors that seen with AN, although body weight at presentation is in the normal or above-normal range. Efforts are ongoing to further categorize abnormal eating behaviors and refine diagnoses.¹⁰

Epidemiology

Prevalence data for eating disorders vary according to study populations and the criteria used to define an eating disorder.¹¹ A systematic review of prevalence studies published between 1994 and 2013 found widely varied estimates in the lifetime prevalence of eating disorders, with a range from 1.0% to 22.7% for female individuals and 0.3% to 0.6% for male individuals.¹² A 2011 cross-sectional survey of more than 10 000 nationally representative US adolescents 13 to 18 years of age estimated prevalence rates of AN, BN, and BED at 0.3%, 0.9%, and 1.6%, respectively. Behaviors suggestive of AN and BED but not meeting diagnostic thresholds were identified in another 0.8% and 2.5%, respectively. The mean age of onset for each of these disorders was 12.5 years.¹³ Several studies have

suggested higher BED prevalence rates of 2% to 4%, with a more equal distribution between girls and boys, making it perhaps the most common eating disorder among adolescents.¹⁴ In contrast, the diagnoses seen in treatment may belie the relative prevalence of these disorders. In a review of 6 US adolescent eating disorder treatment programs, the distribution of diagnoses was 32% AN, 30% atypical AN, 9% BN, 19% ARFID, 6% purging disorder, and 4% others.¹⁵ This may reflect the underrecognition and/or undertreatment of disorders such as BED.

Although previously mischaracterized as diseases of non-Hispanic white, affluent adolescent girls, eating disorder behaviors are increasingly recognized across all racial and ethnic groups¹⁶⁻²⁰ and in lower socioeconomic classes,²¹ preadolescent children,²² males, and children and adolescents perceived as having an average or increased body size.

Preteens with eating disorders are more likely than older adolescents to have premorbid psychopathology (depression, obsessive-compulsive disorder, or other anxiety disorders) and less likely to have binge and purge behaviors. There is a more equal distribution of illness by sex among younger patients and, frequently, more rapid weight loss, leading to earlier presentation to health care providers.²³

Although diagnosis in males may increase with the more inclusive *DSM-5* criteria,^{24,25} it is often delayed because of the misperception of health care providers that eating disorders are female disorders.²⁶ In addition, disordered eating attitudes may differ in male individuals,²⁷ focusing on leanness, weight control, and muscularity. Purging, use of muscle-building supplements, substance abuse, and comorbid

depression are common in males.²⁸⁻³⁰

Eating disorders can occur in individuals with various body habitus, and their presence in those of larger body habitus is increasingly apparent.³¹⁻³⁴ Weight stigma (the undervaluation or negative stereotyping of individuals because they have overweight or obesity) seems to play a role. Adolescents with larger body habitus are exposed to weight stigma through the media, their families, peers, and teachers, and health care professionals, resulting in depression, anxiety, poor body image, social isolation, unhealthy eating behaviors, and worsening obesity.³⁵ When presenting with significant weight loss but a BMI still classified in the “healthy,” overweight, or obese ranges, patients with eating disorders such as atypical AN may be overlooked by health care providers^{36,37} but may experience the same severe medical complications as those who are severely underweight.³⁸⁻⁴⁰

Increased rates of disordered eating may be found in sexual minority youth.⁴¹⁻⁴³ Analysis of Youth Risk Behavior Survey data reveals lesbian, gay, and bisexual high school students have significantly higher rates of unhealthy and disordered weight-control behaviors than their heterosexual peers.^{44,45} Transgender youth may be at particular risk.^{46,47} In a survey of nearly 300 000 college students, transgender students had the highest rates of self-reported eating disorder diagnoses and compensatory behaviors (ie, use of diet pills or laxatives or vomiting) compared with all cisgender groups. Nearly 16% of transgender respondents reported having been diagnosed with an eating disorder, as compared with 1.85% of cisgender heterosexual women.⁴⁸

Adolescents with chronic health conditions requiring dietary control

TABLE 2 Example Questions to Ask Adolescents With a Possible Eating Disorder

History/Information	Example Questions
Weight history	What was your highest weight? How tall were you? How old were you? What was your lowest weight? How tall were you? How old were you?
Body image	What do you think your weight should be? What feels too high? What feels too low? Are there body areas that cause you stress? Which areas? Do you do any body checking (ie, weighing, body pinching or checking, mirror checking)? How much of your day is spent thinking about food or your body?
Diet history	24-h diet history Do you count calories, fat, carbohydrates? How much do you allow? What foods do you avoid? Do you ever feel guilty about eating? How do you deal with that guilt (ie, exercising, purging, eating less)? Do you feel out of control when eating?
Exercise history	Do you exercise? What activities? How often? How intense is your workout? How stressed do you feel when you are unable to exercise?
Binge eating and purging	Do you ever binge? On what foods? How much? How often? Any triggers? Do you vomit? How often? How soon after eating? Do you use laxatives, diuretics, diet pills, caffeine? What types? How many? How often?
Family history	Does anyone in your family have a history of dieting or an eating disorder? Anyone on special diets (eg, vegetarian, gluten-free)? Anyone with obesity? Does anyone in your family have a history of depression, anxiety, bipolar disorder, obsessive-compulsive disorder, substance abuse, or other psychiatric illness? Does anyone in your family take psychiatric medication?
Review of systems	Dizziness, syncope, weakness or fatigue? Pallor, easy bruising or bleeding, cold intolerance? Hair loss, lanugo, dry skin? Constipation, diarrhea, early fullness, bloating, abdominal pain, heartburn? Palpitations, chest pain? Muscle cramps, joint pains? Excessive thirst and voiding? For girls: Age at menarche? Frequency of menses? LMP? Weight at time of LMP?
Psychosocial history (HEADSS)	
Home	Who lives in the home? How well do the family members get along with each other? Is the family experiencing any stressors?
Education	Where do you attend school? What grade? Regular classroom? Is school challenging for you? What grades do you receive? Has there been a change in your grades?
Activities	What activities are you involved in outside of the classroom? Do you have friends you can trust? Have you experienced any bullying? What Web sites do you most often visit when you go online? How much time is spent each day online?
Drug use	Have you ever used tobacco, e-cigarettes, alcohol, or drugs? Which ones? How much? How often? Have you ever used anabolic steroids or stimulants? Caffeine consumption? Other substances?
Depression/suicide	How is your mood? Increased irritability? Feelings of depression or hopelessness? Any anxiety or obsessive-compulsive thoughts or behaviors? Any history of cutting or self-injury? Have you ever wished you were dead? How often do you have these thoughts? When was the last time? Any thoughts of suicide? What methods have you imagined? Any attempts? History of physical, sexual or emotional abuse? Any previous mental health care?

TABLE 2 Continued

History/Information	Example Questions
Sexual history	Do you feel that the gender you feel inside matches your body on the outside? Are you romantically or sexually attracted to guys, girls, or both? Not sure? Have you had any sexual contact with another person? If yes, was it with guys, girls or both? Use of condoms? Use of contraceptives? History of pregnancy or sexually transmitted infection? Has anyone touched you sexually when you didn't want to be touched?

Adapted from Rome and Strandjord.⁸⁹ LMP, last menstrual period.

(eg, diabetes, cystic fibrosis, inflammatory bowel disease, and celiac disease) may also be at increased risk of disordered eating.^{49–51} Among teenagers with type 1 diabetes mellitus, at least one-third may engage in binge eating, self-induced vomiting, insulin omission for weight loss, and excessive exercise,^{52,53} resulting in poorer glycemic control.⁵⁴

Many adolescents engage in dietary practices that may overlap with or disguise eating disorders. The lay term "orthorexia" describes the behavior of individuals who become increasingly restrictive in their food consumption, not based on concerns for quantity of food but the quality of food (eg, specific nutritional content or organically produced). The desire to improve one's health through optimal nutrition and food quality is the initial focus of the patient, and weight loss and/or malnutrition may ensue as various foods are eliminated from the diet. Individuals with orthorexia may spend excessive amounts of time in meal planning and experience extreme guilt or frustration when their food-related practices are interrupted.^{55,56} Psychologically, this behavior appears to be related to AN and obsessive-compulsive disorder⁵⁷ and is considered by some to be a subset within the restrictive eating disorders. Vegetarianism is a lifestyle choice adopted by many adolescents and young adults that may sometimes signal underlying eating pathology.^{58,59} In a comparison of adolescent and young adult females with and without a history of eating

disorders, those with eating disorders were more likely to report ever having been vegetarian. Many of these young women acknowledged that their decision to become vegetarian was primarily motivated by their desire for weight loss, and most reported that they had done so at least a year after first developing eating disorder symptoms.⁶⁰

In an attempt to improve performance or achieve a desired physique, adolescent athletes may engage in unhealthy weight-control behaviors.⁶¹ The term "female athlete triad" has historically referred to (1) low energy availability that may or may not be related to disordered eating; (2) menstrual dysfunction; and (3) low bone mineral density (BMD) in physically active females.^{62–65} Inadequate caloric intake in comparison to energy expenditure is the catalyst for endocrine changes and leads to decreased bone density and menstrual irregularities. Body weight may be stable. This energy imbalance may result from a lack of knowledge regarding nutritional needs in the athlete or from intentional intake restriction associated with disordered eating.

Hormonal disruption and low BMD can occur in undernourished male athletes as well.⁶⁶ Increased recognition of the role of energy deficiency in disrupting overall physiologic function in both male and female individuals led a 2014 International Olympic Committee consensus group to recommend replacing the term female athlete triad to the more inclusive term,

"relative energy deficiency in sport."^{67,68} Athletes participating in sports involving endurance, weight requirements, or idealized body shapes may be at particular risk of relative energy deficiency in sport. Signs and symptoms of relative energy deficiency, such as amenorrhea, bradycardia, or stress fractures, may alert pediatricians to this condition.

SCREENING FOR EATING DISORDERS

Pediatricians are in a unique position to detect eating disorders early and interrupt their progression. Annual health supervision visits and preparticipation sports examinations offer opportunities to screen for eating disorders. *Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents*, fourth edition, offers sample screening questions about eating patterns and body image.⁶⁹ Reported dieting, body image dissatisfaction, experiences of weight-based stigma, or changes in eating or exercise patterns invite further exploration. Positive responses on a standard review of symptoms may need further probing. For example, oligomenorrhea or amenorrhea (either primary or secondary) may indicate energy deficiency.⁷⁰ Serial weight and height measurements plotted on growth charts are invaluable. Weight loss or the failure to make expected weight gain may be more obvious when documented on a graph. Similarly, weight fluctuations or rapid weight gain may cue a health care provider to question binge eating or BN symptoms. Recognizing that

TABLE 3 Notable Physical Examination Features in Children and Adolescents With Eating Disorders

Features related to inadequate energy intake or malnutrition:
Deviation from previous growth trajectory when plotted on height, weight, and BMI graphs
Abnormal vital signs:
Low resting HR or BP
Orthostatic increase in HR (>20 beats per min) or decrease in BP (>10 mm Hg)
Hypothermia
Flat or anxious affect
Pallor, dry sallow skin; carotenemia (particularly palms and soles)
Cachexia: facial wasting, decreased subcutaneous fat, decreased muscle mass
Dull, thin scalp hair or lanugo
Cardiac murmur (one-third with mitral valve prolapse), cool extremities; acrocyanosis; poor perfusion
Stool mass left lower quadrant
Delayed or interrupted pubertal development
Small breasts; vaginal dryness
Small testes
Features related to purging:
Abnormal vital signs:
Orthostatic increase in HR (>20 beats per min) or decrease in BP (>10 mm Hg)
Angular stomatitis; palatal scratches; dental enamel erosions
Russell's sign (abrasion or callous on knuckles from self-induced emesis)
Salivary gland enlargement (parotid and submandibular)
Epigastric tenderness
Bruising or abrasions over the spine (related to excessive exercise or sit ups)
Features related to excess energy intake:
Deviation from previous growth trajectory when plotted on height, weight, and BMI curves
Obesity
Elevated BP or hypertension
Acanthosis nigricans, acne, hirsutism
Hepatomegaly
Premature puberty
Musculoskeletal pain

Adapted from Rosen; American Academy of Pediatrics.²⁰⁸

many patients who present to eating disorder treatment programs have or previously had elevated weight according to criteria from the Centers for Disease Control and Prevention,⁷¹ it is worthwhile to carefully inquire about eating and exercise patterns when weight loss is noted in any child or adolescent. Screening for unhealthy and extreme weight-control measures before praising desirable weight loss can avoid inadvertently reinforcing these practices.

ASSESSMENT OF CHILDREN AND ADOLESCENTS WITH SUSPECTED EATING DISORDERS

A comprehensive assessment of a child or adolescent suspected of having an eating disorder includes a thorough medical, nutritional, and psychiatric history, followed by

a detailed physical examination. A useful web resource for assessment is published in multiple languages by the Academy for Eating Disorders.⁷² Relevant interview questions are listed in Table 2. A collateral history from a parent may reveal abnormal eating-related behaviors that were denied or minimized by the child or adolescent.

A full psychosocial assessment, including a home, education, activities, drugs/diet, sexuality, suicidality/depression (HEADSS) assessment is vital. This evaluation includes screening for physical or sexual abuse by using the principles of trauma-informed care and responding according to American Academy of Pediatrics guidance on suspected physical or sexual abuse or sexual assault^{73–75} as well as state laws. Vital to the HEADSS assessment

is an evaluation for symptoms of other potential psychiatric diagnoses, including suicidal thinking, which may have been unrecognized previously.

A comprehensive physical examination, including close attention to growth parameters and vital signs, allows the pediatrician to assess for signs of medical compromise and for signs and symptoms of eating disorder behaviors; findings may be subtle and, thus, overlooked without careful notice. For accuracy, weights are best obtained after the patient has voided and in an examination gown without shoes. Weight, height, and BMI can be evaluated by using appropriate growth charts. Low body temperature, resting blood pressure (BP), or resting heart rate (HR) for age may suggest energy restriction. Because a HR of 50 beats per minute or less is unusual even in college-aged athletes,⁷⁶ the finding of a low HR may be a sign of restrictive eating. Orthostatic vital signs (HR and BP, obtained after 5 minutes of supine rest and repeated after 3 minutes of standing)^{77,78} revealing a systolic BP drop greater than 20 mm Hg, a diastolic BP drop greater than 10 mm Hg, or tachycardia may suggest volume depletion from restricted fluid intake or purging or a compromised cardiovascular system.

Pertinent physical findings in children and adolescents with eating disorders are summarized in Table 3. A differential diagnosis for the signs and symptoms of an eating disorder is found in Table 4, and selected medical complications of eating disorders are provided in Table 5.

LABORATORY EVALUATION

Initial laboratory evaluation is performed to screen for medical complications of eating disorders or to rule out alternate diagnoses (Tables 4 and 5). Typical initial laboratory testing includes

TABLE 4 Selected Differential Diagnosis for Eating Disorders According to Presentation

Clinical Presentations	Differential Diagnosis
Weight loss	
Gastrointestinal	Inflammatory bowel disease; celiac disease
Endocrine	Hyperthyroidism; diabetes mellitus; adrenal insufficiency
Infectious	Chronic infections, such as tuberculosis or HIV; intestinal parasite
Psychiatric	Depression; psychosis; anxiety or obsessive-compulsive disorder; substance use
Other	Neoplasm; superior mesenteric artery syndrome
Vomiting	Gastroesophageal reflux disease
Gastrointestinal disease	Gastroesophageal reflux disease
	Eosinophilic esophagitis
	Pancreatitis
	Cyclic vomiting
Neurologic	Increased intracranial pressure
	Migraine
Other	Food allergy
Binge eating or unexplained weight gain	
Endocrine	Hypothyroidism; hypercortisolism
Psychiatric	Depression
Iatrogenic	Medication side effect
Genetic	Prader Willi syndrome; Kleine-Levin syndrome

Adapted from Rome and Strandjord⁸⁹ and Rosen; American Academy of Pediatrics.²⁰⁸

a complete blood cell count; serum electrolytes, calcium, magnesium, phosphorus, and glucose; liver transaminases; urinalysis; and thyroid-stimulating hormone concentration.⁷² Screening for specific vitamin and mineral deficiencies (eg, vitamin B₁₂, vitamin D, iron, and zinc) may be indicated on

the basis of the nutritional history of the patient. Laboratory investigations are often normal in patients with eating disorders; normal results do not exclude the presence of serious illness with an eating disorder or the need for hospitalization for medical stabilization. An electrocardiogram is important for those with significant

weight loss, abnormal cardiovascular signs (such as orthostasis or bradycardia), or an electrolyte abnormality. A urine pregnancy test and serum gonadotropin and prolactin levels may be indicated for girls with amenorrhea; a serum estradiol concentration may serve as a baseline for reassessment during

TABLE 5 Selected Medical Complications Resulting From Eating Disorders

Eating Disorder Behaviors	Medical Complications
Related to dietary restriction or weight loss	
Fluids and electrolytes	Dehydration; electrolyte abnormalities: hypokalemia, hyponatremia
Psychiatric	Depressed mood or mood dysregulation; obsessive-compulsive symptoms; anxiety
Neurologic	Cerebral cortical atrophy; cognitive deficits; seizures
Cardiac	Decreased cardiac muscle mass, right axis deviation, low cardiac voltage; cardiac dysrhythmias, cardiac conduction delays; mitral valve prolapse; pericardial effusion; congestive heart failure; edema
Gastrointestinal	Delayed gastric emptying, slowed gastrointestinal motility, constipation; superior mesenteric artery syndrome; pancreatitis; elevated transaminases; hypercholesterolemia
Endocrinologic	Growth retardation; hypogonadotropic hypogonadism: amenorrhea, testicular atrophy, decreased libido; sick euthyroid syndrome; hypoglycemia/hyperglycemia, impaired glucose tolerance; hypercholesterolemia; decreased BMD
Hematologic	Leukopenia, anemia, thrombocytopenia, elevated ferritin; depressed erythrocyte sedimentation rate
Related to vomiting	
Fluid and electrolytes	Electrolyte disturbance: hypokalemia, hypochloremia, metabolic alkalosis
Dental	Dental erosions
Gastrointestinal	Gastroesophageal reflux, esophagitis; Mallory-Weiss tears; esophageal or gastric rupture
Related to laxative use	
Fluids and electrolytes	Hyperchloremic metabolic acidosis; hypocalcemia
Gastrointestinal	Laxative dependence
Related to binge eating	Obesity with accompanying complications
Related to refeeding	Night sweats; polyuria, nocturia; refeeding syndrome: electrolyte abnormalities, edema, seizures, congestive heart failure (rare)
Seen among all eating disorder behaviors	Suicide

Adapted from Rosen; American Academy of Pediatrics.²⁰⁸

recovery.⁷⁹ Similarly, serum gonadotropin and testosterone levels can be useful to assess and monitor for central hypogonadism in boys with restrictive eating. Bone densitometry, by using dual radiograph absorptiometry analyzed with age-appropriate software, may be considered for those with amenorrhea for more than 6 to 12 months.^{80,81} If there is uncertainty about the diagnosis, other studies including inflammatory markers, serological testing for celiac disease, serum cortisol concentrations, testing stool for parasites, or radiographic imaging of the brain or gastrointestinal tract may be considered. In the occasional patient, both an eating disorder and an organic illness, such as celiac disease, may be discovered.⁸²

MEDICAL COMPLICATIONS IN PATIENTS WITH EATING DISORDERS

Eating disorders can affect every organ system^{83,84} with potentially serious medical complications that develop as a consequence of malnutrition, weight changes, or purging. Details of complications are described in reviews^{85–89} and are summarized in Table 5. Most medical complications resolve with weight normalization and/or resolution of purging. Complications of BED can include those of obesity; these are summarized in other reports and not reiterated here.^{84,90}

Psychological and Neurologic Effects

Psychological symptoms can be primary to the eating disorder, a feature of a comorbid psychiatric disorder, or secondary to starvation. Initial symptoms of depression and anxiety may abate with refeeding.⁹¹ Rumination about body weight and size is a core feature of AN, whereas rumination about food decreases as starvation reverses.⁹² Difficulty in emotion regulation occurs across the spectrum of eating disorders but is more severe in those who binge eat

or purge.⁹³ Cognitive function studies in a large population-based sample of adolescents revealed eating disorder participants had deficits in executive functioning, including global processing and cognitive flexibility but performed better than control participants on measures of visual attention and vigilance.⁹⁴

Structural brain imaging studies to date have yielded inconsistent results, likely explained, at least in part, by methodologic differences and the need to control for many variables, including nutritional state, hydration, medication use, and comorbid illness.⁹⁵ A longitudinal study revealed that global cortical thinning in acutely ill adolescents and young adults with AN normalized with weight restoration over a period of approximately 3 months.⁹⁶

Dermatologic Effects

Common skin changes in underweight patients include lanugo, hair thinning, dry scaly skin, and yellow discoloration related to carotenemia. Brittle nails and angular cheilitis may also be observed. Acrocyanosis can be observed in underweight patients and may be a protective mechanism against heat loss. Abrasions and calluses over the knuckles can occur from cutting the skin on incisors while self-inducing emesis.⁹⁷

Dental and/or Oral Effects

Patients with eating disorders experience higher rates of dental erosion and caries. This occurs more frequently in those who self-induce emesis but can also be observed in those who do not.⁹⁸ Normal dental findings do not preclude the possibility that purging is occurring.⁹⁹ Hypertrophy of the parotid and other salivary glands, accompanied by elevations in serum amylase concentrations with normal lipase concentrations, may be a clue to vomiting.⁹⁹ Xerostomia, from either salivary gland dysfunction or

psychiatric medication side effect, can reduce the oral pH, which can lead to increased growth of cariogenic oral bacteria.^{98,100}

Cardiovascular Effects

Reports of cardiac complications in eating disorders are focused predominantly on restrictive eating disorders. Common cardiovascular signs include low HR, orthostasis, and poor peripheral perfusion. Orthostatic intolerance symptoms (eg, lightheadedness) and vital sign findings may resemble those of postural orthostatic tachycardia syndrome^{101,102} and may contribute to a delay in referral to appropriate care if eating disorder behaviors are not disclosed or appreciated.

Cardiac structural changes include decreased left ventricular (LV) mass, LV end diastolic and LV end systolic volumes, functional mitral valve prolapse, pericardial effusion, and myocardial fibrosis (noted in adults).^{103–105} Electrocardiographic abnormalities, including sinus bradycardia, and lower amplitude LV forces are more common in AN than in nonrestrictive eating disorders.¹⁰⁶ One study reported a nearly 10% prevalence of prolonged (>440 milliseconds) QTc interval in hospitalized adolescents and young adults with a restrictive eating disorder.¹⁰⁷ Repolarization abnormalities, a potential precipitant to lethal arrhythmia,¹⁰⁸ may prompt clinicians to also consider other factors, such as medication use or electrolyte abnormalities, that may affect cardiac conduction.^{107,109}

Gastrointestinal Tract Effects

Gastrointestinal complaints are common and sometimes precede the diagnosis of the eating disorder. Delayed gastric emptying and slow intestinal transit time often contribute to reported sensations of nausea, bloating, and postprandial fullness¹¹⁰ and may be a presenting feature of restrictive eating.

Constipation is a frequent experience for patients and multifactorial in etiology.¹¹¹ Esophageal mucosal damage from self-induced vomiting, including scratches, and bleeding secondary to Mallory-Weiss tears can occur.⁹⁹ Superior mesenteric artery syndrome may develop in the setting of severe weight loss.¹¹¹ Hepatic transaminase concentrations and coagulation times can be elevated as a consequence of malnutrition and, typically, normalize with appropriate nutrition.¹¹⁰

Renal and Electrolyte Effects

Fluid and electrolyte abnormalities may occur as a result of purging or cachexia.^{99,112} Dehydration can be present in any patient with an eating disorder. Disordered osmotic regulation can present in many patterns (central and renal diabetes insipidus, syndrome of inappropriate antidiuretic hormone).¹¹² Patients who vomit may have a hypokalemic, hypochloremic metabolic alkalosis resulting from loss of gastric hydrochloric acid, chronic dehydration, and the subsequent increase in aldosterone that promotes sodium reabsorption in exchange for potassium and acid at the distal tubule level.¹¹³ Patients who abuse laxatives may experience a variety of electrolyte and acid-base derangements.¹¹³ Dilutional hyponatremia can be observed in patients who intentionally water load to induce satiety or to misrepresent their weight at clinic visits. Abrupt cessation of laxative use may be associated with peripheral edema and, therefore, motivate further laxative¹¹⁴ or diuretic misuse.

Endocrine Effects

Restrictive eating disorders commonly cause endocrine dysfunction.^{80,115} Euthyroid sick syndrome (low triiodothyronine, elevated reverse triiodothyronine, or normal or low thyroxine and thyroid-stimulating hormone) is the most common thyroid abnormality.¹¹⁶

Functioning as an adaptive mechanism to starvation, supplemental thyroid hormone is not indicated when this pattern is noted.¹¹⁶ Hypercortisolemia may be seen in AN.^{81,116} Hypothalamic-pituitary-gonadal axis suppression may be attributable to weight loss, physical overactivity, or stress. Female individuals with AN may have amenorrhea, and male individuals can have small testicular volumes¹¹⁷ and low testosterone concentrations.¹¹⁸

Growth retardation, short stature, and pubertal delay may all be observed in prepubertal and peripubertal children and adolescents with eating disorders.¹¹⁵ AN is associated with low levels of insulin-like growth factor-1 and growth hormone resistance.¹¹⁹ Catch-up growth has been inconsistently reported in the literature; younger patients may have greater and more permanent effects on growth.^{120,121} Adolescent boys may be at an even greater risk for height deficits than girls; because boys typically enter puberty later than girls and experience their peak growth at a later sexual maturity stage, they are less likely to have completed their growth if an eating disorder develops in the middle teenage years.¹¹⁹

Low BMD is a frequent complication of eating disorders in both male and female patients¹¹⁷ and is a risk in both AN and BN.¹²² Low BMD is worrisome not only because of the increased risk of fractures in the short-term¹²³ but, also, because of the potential to irreversibly compromise skeletal health in adulthood.¹²⁴

TREATMENT PRINCIPLES ACROSS THE EATING DISORDER SPECTRUM

The ultimate goals of care in eating disorders are that children and adolescents are nourished back to their full healthy weight and growth trajectory, that their eating patterns and behaviors are normalized, and that they establish a healthy

relationship with food and their body weight, shape, and size as well as a healthy sense of self. Independent of a specific *DSM* diagnosis, treatment is focused on nutritional repletion and psychological therapy. Psychotropic medication can be a useful adjunct in select circumstances.

The Pediatrician's Role in Care

After diagnosing an eating disorder, the pediatrician arranges appropriate care. Patients who are medically unstable may require urgent referral to a hospital (Table 6). Patients with mild nutritional, medical, and psychological dysfunction may be managed in the pediatrician's office in collaboration with outpatient nutrition and mental health professionals with specific expertise in eating disorders. Because an early response to treatment may be associated with better outcomes,^{125,126} timely referral to a specialized multidisciplinary team is preferred, when available. If resources do not exist locally, pediatricians may need to partner with health experts who are farther away for care. For patients who do not improve promptly with outpatient care, more intensive programming (eg, day-treatment programs or residential settings) may be indicated.

Often, an early task of the pediatrician is to identify a treatment goal weight. This goal weight may be determined in collaboration with a registered dietitian. Pediatricians who are planning to refer the patient to a specialized treatment team may opt to defer the task to the team. Acknowledging that body weights naturally fluctuate, the treatment goal weight is often expressed as a goal range. Individualized treatment goal weights are formulated on the basis of age, height, premorbid growth trajectory, pubertal stage, and menstrual history.^{87,127} In a study of adolescent girls with AN, of those who resumed menses during

TABLE 6 Indications Supporting Hospitalization in an Adolescent With an Eating Disorder

One or More of the Following Justify Hospitalization
1. $\leq 75\%$ median BMI for age and sex (percent median BMI calculated as patient BMI/50th percentile BMI for age and sex in reference population $\times 100$)
2. Dehydration
3. Electrolyte disturbance (hypokalemia, hyponatremia, hypophosphatemia)
4. ECG abnormalities (eg, prolonged QTc or severe bradycardia)
5. Physiologic instability: <ul style="list-style-type: none">a. Severe bradycardia (HR < 50 beats per min daytime; < 45 beats per min at night);b. Hypotension (90/45 mm Hg);c. Hypothermia (body temperature $< 96^{\circ}\text{F}$, 35.6°C);d. Orthostatic increase in pulse (> 20 beats per min) or decrease in BP (> 20 mm Hg systolic or > 10 mm Hg diastolic)
6. Arrested growth and development
7. Failure of outpatient treatment
8. Acute food refusal
9. Uncontrollable binge eating and purging
10. Acute medical complications of malnutrition (eg, syncope, seizures, cardiac failure, pancreatitis and so forth)
11. Comorbid psychiatric or medical condition that prohibits or limits appropriate outpatient treatment (eg, severe depression, suicidal ideation, obsessive-compulsive disorder, type 1 diabetes mellitus)

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treatment, this occurred, on average, at 95% of the treatment goal weight.¹²⁸ Health care providers may be pressured by patients, their patients' parents, or other health care providers to target a treatment goal weight that is lower than the previous growth trajectory or other clinical indicators would suggest is appropriate. If a treatment goal weight is inappropriately low, there is an inherent risk of offering only partial weight restoration and insufficient treatment.¹²⁹ The treatment goal weight is reassessed at regular intervals (eg, every 3–6 months) to account for changes in physical growth and development (in particular, age, height, and sexual maturity).^{87,127}

An important role for the pediatrician is to offer guidance regarding eating and to manage the physical aspects of the illnesses. For all classifications of eating disorders, reestablishing regular eating patterns is a fundamental early step. Meals and snacks are reintroduced or improved in a stepwise manner, with 3 meals and frequent snacks per day. Giving the message that “food is the medicine that is required for recovery” and promoting adherence to taking that medicine at scheduled intervals often helps

patients and families get on track.¹³⁰ A multivitamin with minerals can help ensure that deficits in micronutrients are addressed. To optimize bone health, calcium and vitamin D supplements can be dosed to target recommended daily amounts (elemental calcium: 1000 mg for patients 4–8 years of age, or 1300 mg for patients 9–18 years of age; vitamin D: 600 IU for patients 4–18 years of age).^{87,131} Patients can be reassured that the bloating discomfort caused by slow gastric emptying improves with regular eating. When constipation is troubling, nutritional strategies, including weight restoration, are the treatments of choice.¹¹¹ When these interventions are inadequate to alleviate constipation, osmotic (eg, polyethylene glycol 3350) or bulk-forming laxatives are preferred over stimulant laxatives. The use of nonstimulant laxatives decreases the risks of electrolyte derangement and avoids the potential hazard of “cathartic colon syndrome” that may be associated with abuse of stimulant cathartics (senna, cascara, bisacodyl, phenolphthalein, anthraquinones).^{99,114}

To optimize dental outcomes, patients can be encouraged to

disclose their illness to their dentist. Current dental hygiene recommendations for patients who vomit include the use of topical fluoride, applied in the dental office or home, or use of a prescription fluoride (5000 ppm) toothpaste. Because brushing teeth immediately after vomiting may accelerate enamel erosion, patients can be advised to instead rinse with water, followed by using a sodium fluoride rinse whenever possible.¹³²

AN

Collaborative Outpatient Care

Most patients with AN are treated in outpatient settings.^{85,133} Pediatricians play an important role in the medical management and coordination of the treatment of these patients. The pediatrician plays a primary role in assessing for and managing acute and long-term medical complications, monitoring treatment progress, and coordinating care with nutritional and mental health colleagues.^{85,130,134} Although some primary care pediatricians feel comfortable coordinating care, others choose to refer patients to providers with expertise in pediatric eating disorders. Ideally, all members of the treatment team are sensitive to the unique

developmental needs of children and adolescents.¹³³

Educating young people and their parents about the physiologic and psychological effects of food restriction is an early component of care. Parents are empowered to feed their children regularly (typically 3 meals and 2–3 snacks per day) and adjust portion size and energy richness based on weight progress. Many parents are amazed to discover the amount of energy (3500 kcal or more) that may be required to restore weight for their children. Detailed tracking of caloric intake is not necessary. Serving foods with high caloric density and ensuring that beverages are energy rich (eg, choosing fruit juice or milk instead of water) are effective strategies to maximize energy intake without requiring large increases in volume. Parents can relieve adolescents of having to decide on appropriate serving sizes by plating meals for them. Accommodating special diets, such as vegetarian or vegan, can make meeting nutritional goals especially challenging. Reintroducing foods that have been avoided or that induce fear of weight gain are essential steps on the path to recovery.

Family-Based Treatment and Parent-Focused Therapy

Over the past 2 decades, a specialized eating disorder–focused, family-based intervention, commonly referred to as family-based treatment (FBT), has emerged as the leading first-line treatment approach for pediatric eating disorders.¹³⁵ Effectiveness is well established for AN.^{133,136} Rather than dwelling on possible causes of the eating disorder, FBT is focused on recovery from the disease. FBT consists of 3 phases and contends that parents are not to blame for their child's illness, eating disorders are not caused by dysfunctional families, and parents play an essential role in

recovery.¹³⁶ During appointments, the entire family unit meets with the therapist. In phase 1, weight restoration is the primary goal. Parents, supported by the therapist, take responsibility to ensure that their child eats sufficiently and limit pathologic weight-control behaviors. Parents are encouraged to take responsibility for meal planning and preparation. Pediatricians can be helpful by reminding parents of the importance of fighting the disease effectively in the early stages, with the goals of reaching a truly healthy weight, resuming pubertal development, reversing medical complications, and restoring normal cognitions. Early weight gain (4–5 pounds by session 4, typically correlating with 4 weeks of treatment) is predictive of better outcomes in adolescents.^{126,137,138} By phase 2, substantial weight recovery has occurred, and the adolescent gradually resumes responsibility for his or her own eating. By phase 3, weight has been restored, and the therapy shifts to address general issues of adolescent psychosocial development.¹³⁶ This therapy is detailed in manuals for providers¹³⁷ and families.¹³⁹ FBT with experienced providers is not available in all communities. Nevertheless, community providers may integrate the essential principles of FBT in their work with patients and families.¹³⁰

Parent-focused therapy is an adaptation of FBT wherein the therapist supports the parents to renourish the patient and limit weight-control behaviors but, after the initial appointment, meets only with the parents.¹⁴⁰ The patient has brief visits with a nurse or physician for the assessment of weight and acute mental health issues but is not directly involved with a therapist.

The role pediatricians serve in the care of an adolescent in FBT differs from the customary role of a physician with patients.¹³⁴ In the

FBT setting, the pediatrician does not weigh the patient because that task is performed by the therapist. The pediatrician directs the care only when there are immediate medical safety concerns. If the pediatrician identifies an urgent medical issue that requires intervention or hospitalization, he or she is obligated to provide recommendations to the patient, the parents, and the primary therapist. For the medically stable patient, the pediatrician acts as a consultant to the parents and primary therapist. When a parent asks a question related to treatment, instead of directly advising the parents what to do, the pediatrician, ideally, redirects that treatment decision back to the parent: “You know your child the best. What do you think will best help in your child's recovery?” In this way, the physician empowers parents to make their own decisions, enhancing their confidence to care for their ill child.

Day-Treatment Programs

Day-treatment programs (day hospitalization and partial hospitalization) provide an intermediate level of care for patients with eating disorders who are medically stable and do not require 24-hour supervision but need more than outpatient care.^{133,141} These programs may prevent the need for higher levels of care or may be a “step-down” from inpatient or residential to outpatient care. Day treatment typically involves 8 to 10 hours per day of care (including meals, therapy, groups, and other activities) by a multidisciplinary staff 5 days per week. Reported evaluations of child and adolescent day-treatment programs are few and observational in design.^{142–145} Despite the absence of systematic data supporting their usefulness, these programs are generally believed to have an important role in the continuum of care.

Residential Treatment

Residential treatment may be necessary for a minority of medically stable patients with eating disorders. Indications for residential treatment include a poor motivation for recovery, need for structure and supervision to prevent unhealthy behaviors (eg, food restriction, compulsive exercise), lack of a supportive family environment, absence of outpatient treatment in the patient's locale,¹⁴⁶ or outpatient interventions having been unsuccessful.¹³³ Residential treatment typically includes 24 hour per day supervision, medical oversight, group-based psychoeducational therapy, nutritional counseling, individual therapy, and family therapy. The length of stay can be weeks to months, depending on the severity of illness and financial resources. Outcome studies reported by residential programs, generally, reveal improved symptomatology at discharge,¹⁴⁷ but the results at long-term follow-up are mixed.^{148,149} However, few outcome studies are focused on adolescents, compare the efficacy of residential to outpatient treatment, or make comparisons across programs or treatment modalities.

Although some adolescents require this higher level of care, health care providers and families are encouraged to exercise caution when selecting a residential treatment program. The number of residential programs has more than tripled in the last decade, with many operated by for-profit companies. Marketing practices by some are questionable.¹⁵⁰ Outcome studies demonstrating program efficacy may be misleading because of a lack of rigorous design or peer review.¹⁵¹ Until recently, there was no certification process to ensure program quality and safety. In 2016, The Joint Commission implemented new accreditation standards for

behavioral health care organizations that provide outpatient or residential eating disorder treatment.¹⁵² It remains to be seen how many programs will pursue this accreditation.

The National Eating Disorders Association Web site offers useful suggestions for evaluating treatment programs (www.nationaleatingdisorders.org).

Hospital-Based Stabilization

Suggested indications for the hospitalization of children and adolescents with eating disorders published by the Society for Adolescent Health and Medicine are listed in Table 6.

The most common goal for hospital-based stabilization is nutritional restoration. Variation occurs with regard to how quickly hospitalized patients with AN are refed.^{153,154} It is important to balance 2 competing goals: achieve weight gain swiftly and avoid refeeding syndrome.¹⁵⁵ Refeeding syndrome refers to the metabolic and clinical changes that occasionally occur when a malnourished patient is aggressively nutritionally rehabilitated; the hallmarks are hypophosphatemia and multiorgan dysfunction.^{155–157} A systematic review of hospitalized adolescents with AN reported an average incidence of refeeding hypophosphatemia (without necessarily organ dysfunction) of 14%.¹⁵⁸ Over the past decade, a long followed maxim, "start low and go slow," has been challenged.^{87,155} Several centers have described starting calories at 1400 kcal or more per day,¹⁵⁴ including recent reports demonstrating safe treatment of mildly and moderately malnourished adolescents by using initial caloric prescriptions of 2200 to 2600 kcal per day, while achieving a weight gain of approximately 3 to 4.5 pounds per week.^{159,160} Because the risk of refeeding hypophosphatemia may

correlate with the degree of starvation, pediatricians may opt to take a more cautious approach in severely malnourished (<70% median BMI) children until further studies are reported.^{87,154}

Nasogastric tube (NGT) feeding may be necessary for some hospitalized adolescents, but opinions vary regarding when they should be initiated.¹⁶¹ Most North American programs reserve NGT feeds for when patients are not able to complete meals; however, internationally, some centers report the routine use of NGT feeding, either exclusively at first or in combination with meals.^{162,163} Potential benefits of NGT feeding include faster weight gain and medical stabilization, with a possibility for a reduced hospital length of stay.^{162,163} Although viewed by some health care providers as invasive or punitive, others view NGT feeding as empathic, by reducing both physical and psychological pain in the early treatment stages.¹⁶¹ There is insufficient evidence to recommend one approach over another.¹⁵⁴ Independent of whether NGT feeds are used routinely, physicians involved in the treatment of hospitalized medically unstable patients may be called on to provide nutrition via an NGT when nutritional needs are not being met. The use of total parenteral nutrition carries higher risks of medical complications, is costly, and is not recommended unless other forms of refeeding are not possible.¹⁵⁴

High-quality studies in which researchers examine the impact of inpatient care are limited, and the best end point for hospital treatment of children and adolescents is unclear. A US multicenter research collaborative showed that, in a national cohort of low-weight 9- to 21-year-olds with restrictive eating disorders, those who were hospitalized had a greater odds of being at 90% of the median BMI at 1-year follow-up.¹⁶⁴ However,

a randomized controlled trial (RCT) of treatment of adolescent AN in the United Kingdom revealed no benefits of inpatient over outpatient care¹⁶⁵; this study was limited by poor adherence to the allocated treatment. An RCT in Germany in 2014 revealed that inpatient adolescents discharged earlier to outpatient treatment fared as well as those discharged later.¹⁴¹ Similarly, an RCT conducted in Australia in 2015 revealed that adolescents who were discharged to FBT as soon as they were medically stable fared at least as well as adolescents who remained inpatients until achieving 90% of their treatment goal weight.¹⁶⁶ The recently reported average length of stay in the United States for patients admitted for medical stabilization by using higher caloric prescriptions was 3 to 12 days.^{159,167,168}

Pharmacotherapy for AN

A variety of medications have been studied for the treatment of AN, primarily in adults, but none have been approved for this indication by the US Food and Drug Administration (FDA).¹⁶⁹ Despite their demonstrated ineffectiveness,¹⁷⁰ more than one-half of adolescents with restrictive eating disorders are prescribed psychotropic medications, most likely in attempts to treat comorbid conditions, such as depression and anxiety.¹⁷¹ Selective serotonin-reuptake inhibitors (SSRIs) have been tried but are not effective in acutely ill, malnourished patients and have not been shown to prevent disease relapse in those who are weight restored.^{172–174} A number of atypical antipsychotic medications have also been studied, including quetiapine, risperidone, and olanzapine. Results have generally revealed little benefit in weight gain or improvement in eating-disorder thinking.^{169,175–178} Initial studies of augmentation of SSRIs with atypical antipsychotics in adult patients have been promising.¹⁷⁹

The current recommendations to optimize bone health are full weight restoration with physiologic resumption of menses and supplementation with calcium and vitamin D.^{79,81,87,115} Bisphosphonate treatment is not recommended.^{79,87,115} Estrogen supplementation in the form of combined estrogen-progesterone oral contraceptive pills is not effective in enhancing BMD in adolescents with AN.⁸¹ Small trials with transdermal estrogen¹⁸⁰ or with low-dose combined oral contraceptive pills plus dehydroepiandrosterone¹⁸¹ have shown a positive effect on BMD compared with controls, but further studies are needed before these are considered standard care. Although cyclic vaginal bleeding may be induced with the use of exogenous hormones, this may reinforce a patient's denial of the medical consequences of her disease and masks the spontaneous return of menses.

BN and BED

Collaborative Outpatient Care

Most patients with BN and BED are managed in outpatient settings with the collaboration of a medical and mental health care providers as well as a dietitian, as needed.

Psychological treatment studies are more limited in BN compared with AN and are especially lacking in BED.¹³³ Cognitive behavioral therapy (CBT) has a modest evidence-base for BN and BED.^{133,182} CBT explicitly recognizes the interrelationships among an individual's thoughts, feelings, and actions, and its principles can be used by all disciplines. Reestablishing regular eating patterns is a central goal, and educating patients about the perpetuating nature of the restriction-binge-purge cycle is an early focus. Patients with BN and BED can minimize the urge to binge that is typically experienced late in the day,

if they eat regularly throughout the day. Decreasing the binge amount and frequency may decrease guilt and shame and the ensuing negative self-assessment. During CBT, patients are taught to question their distorted thoughts and remodel their eating behaviors.¹⁸²

FBT

Although there is a manual to guide FBT for patients with BN,¹⁸³ it is based on more limited evidence than FBT for AN.¹⁸² An RCT comparing FBT with CBT revealed patients in the FBT group were more likely to abstain from binge eating and purging at the end of the 18-week treatment (39% vs 20%) with no statistical difference (49% vs 32%) at 1-year follow-up.¹⁸⁴ There are no published studies in which researchers examine FBT for BED.

Pharmacotherapy for BN

As with other pharmacotherapy research, studies of treatment of BN have primarily been in adult subjects. Several pharmacologic agents, including SSRIs, have been demonstrated to be effective for the treatment of adult BN, although only fluoxetine has FDA approval. Although not approved for pediatric BN, fluoxetine is FDA approved for child and adolescent depression and obsessive-compulsive disorder, so it is a reasonable option if pharmacologic treatment of BN is considered.¹⁶⁹ The antiepileptic topiramate has been shown to significantly decrease binge eating in adults who do not respond to or are not able to tolerate SSRIs. However, cases of topiramate triggering eating disorder symptoms in adolescents have been reported.¹⁸⁵ Other drugs, including naltrexone and ondansetron, are being used with some success in adult BN, although data are lacking to recommend their use more broadly.¹⁶⁹

Pharmacotherapy for BED

Research on the treatment of binge eating lags behind that for other eating disorders and has been focused on adult subjects. SSRIs have rarely differed from placebo in their effect on BED and show no better outcome than behavioral therapy alone. Although the use of topiramate has been shown to reduce binge eating and help with weight loss, the rates of adverse effects are relatively high.¹⁸⁶

Lisdexamfetamine, a central nervous system stimulant approved for treatment of attention-deficit/hyperactivity disorder, was approved by the FDA in 2015 for the treatment of moderate to severe BED in adults. Although it has been demonstrated to reduce the frequency of binge-eating episodes, lisdexamfetamine is not indicated for weight loss. As with the use of other central nervous system stimulants, there is a potential for abuse and dependence as well as serious cardiovascular reactions.¹⁸⁷

ARFID

ARFID is a relatively new diagnosis, and, consequently, there is limited literature describing treatment.^{188,189} Because patients with ARFID vary in terms of underlying psychological motivations for restrictive eating, individualized behavioral treatment strategies are needed.^{182,190}

Despite varying characteristics of the disorder, the dual goals of refeeding and normalization of eating align with the goals of treating other eating disorders. A study of pediatric and young adult patients admitted with ARFID at a single academic medical center reported that ARFID patients were more likely to require enteral nutrition and stayed in the hospital longer than patients with AN.⁹

No medication is specifically indicated for use in ARFID; pharmacotherapy is directed at treating underlying comorbid illness (eg, anxiety) as necessary.

FINANCIAL CONSIDERATIONS

The treatment of eating disorders is multidisciplinary, often long-term, and may require expensive, high-level care, such as inpatient stabilization or residential or partial hospitalization programs. The costs associated with treatment can create substantial financial burdens for families.¹⁹¹

Having medical insurance, public or private, is no guarantee that these costs will be covered.¹⁹² Insurance carriers are able to define their own criteria for eating disorder treatment, leading to wide variations in coverage from state to state. Some states do not identify eating disorders as life-threatening conditions, thereby limiting treatment coverage. State-sponsored public insurance plans may not cover out-of-state treatment programs, even when no comparable treatment programs exist within that state. Outpatient mental health providers who are willing to accept the lower payments from public insurance may have no expertise in treating eating disorders. Those who do and will see publicly insured patients or those in managed care plans typically limit the number of these patients in their panels. Private insurance may increase access to treatment but dictate lower levels and shorter periods of care than is indicated by a patient's clinical status and health care provider recommendation. Families of patients with eating disorders typically will need assistance navigating the financial aspects of treatment. The National Eating Disorders Association offers general information online for families regarding financial coverage for treatment (www.nationaleatingdisorders.org).

PROGNOSIS

The prognoses reported for adolescents with eating disorders vary widely, depending on research

methodology, definitions of recovery, and duration of follow-up. Generally, adolescents have greater success in recovery from eating disorders than their adult counterparts,¹⁹³ with overall recovery rates of approximately 70%.¹⁹⁴

In a review of 11 adolescent eating disorder treatment programs, 54% of patients treated for restrictive disorders had restored to at least 90% of their median body weight (MBW) for age and height at 1-year follow-up. This is essential for catch-up growth and resumption of menses in girls. Two significant predictors of weight recovery were a higher percentage of MBW at initial presentation and shorter duration of symptoms, highlighting the importance of early identification of these disorders. Outcomes did not vary meaningfully across programs, suggesting that all treatment models were helpful.¹⁹⁵

In a more-recent study, researchers examined the weight restoration of patients from 14 adolescent treatment programs with a diagnosis of a restrictive eating disorder by *DSM-5* criteria. At 1-year follow-up, those with ARFID were the least likely (43%) to have regained $\geq 90\%$ MBW and were also more likely to be younger, have had a longer duration of symptoms, and have left treatment prematurely. Eighty-two percent of those with atypical AN and 64% of those with AN had regained $\geq 90\%$ MBW. Having received a higher level of care (eg, partial hospitalization and/or residential care) did not increase the likelihood of weight recovery. Again, there were no significant differences in outcomes between programs, despite various treatment modalities.¹⁹⁶

Information on the long-term prognosis of adolescents with AN

is limited. In a study of adolescents who completed a 12-month outpatient AN treatment study (either FBT or adolescent-focused therapy), approximately one-third of patients were in full remission 1 year after completion, with better rates in the FBT group (49%) than in the adolescent-focused therapy group (23%).¹⁹⁷ Follow-up in a convenience sample of the original study 2 to 4 years after treatment revealed less than 10% of patients relapsed, with no difference between the 2 groups.¹⁹⁸ An RCT comparing parent-focused therapy with FBT demonstrated equivalent outcomes between the groups at 12-month follow-up (37% vs 29%).¹⁴⁰

Information about recovery from BN, BED, and purging disorder in adolescents is less available but suggests higher rates of relapse and the development of comorbidities. Outcome studies on BN in adults reveal variable recovery rates, ranging from approximately 50% to 70% at 4- to 6-year follow-up, with relapse rates of 30% and about 25% having chronic disease.¹⁹⁴ A longitudinal study of adolescent girls with BED and purging disorders into early adulthood revealed that one-quarter of these girls started to use drugs other than marijuana, more than one-third began to binge drink frequently, and 27% demonstrated high levels of depressive symptoms.¹⁹⁹ Not surprisingly, misuse of drugs and alcohol among patients with eating disorders is associated with a poorer outcome or death.¹⁹³

Mortality rates among individuals with eating disorders are substantially elevated in comparison with those of the general population, with death typically occurring in adulthood. Premature death is 4 to 5 times higher for patients with AN and 2 to 3 times as high for those

with BN.^{200–203} Suicide rates are increased among patients with eating disorders²⁰⁴ and, in one study, accounted for 30% deaths.²⁰³ In a national survey of adolescents, 35% of those meeting criteria for BN, 15% of those meeting criteria for BED, and 8% of those meeting criteria for AN reported having made a suicide attempt.²⁰⁵ The risk of suicide among patients with eating disorders appears to be declining and has been attributed to an increased recognition of eating disorders and effective treatment.²⁰⁶

PEDIATRICIAN'S ROLE IN PREVENTION AND ADVOCACY

Efforts to prevent eating disorders may occur in clinical practice and community settings. By using sensitive, nonstigmatizing language and demonstrating supportive attitudes toward children and adolescents of all body shapes and sizes, pediatricians create a welcoming clinical setting for discussions about weight and weight-related behaviors. The American Academy of Pediatrics clinical report “Preventing Obesity and Eating Disorders in Adolescents” highlights steps that pediatricians can take to prevent both conditions.²⁰⁷ These steps include focusing on healthy habits with patients and families rather than weight and dieting, encouraging more frequent family meals, discouraging “weight talk” and “weight teasing” in the home, closely monitoring weight loss in patients advised to lose weight, and promoting a healthy body image in all children and adolescents.²⁰⁷ Pediatricians may also advise teachers, coaches, and athletic trainers about healthy approaches to nutrition and exercise, raise awareness of the detrimental effects of weight stigmatization, and alert them to the warning signs of eating disorders.

Pediatricians can join others in advocating for improved access to quality eating disorder treatment services. The limited availability of developmentally appropriate mental health services, lack of mental health parity, and service “carve-outs” all have been barriers to patients and families who seek necessary treatment and seem to be disproportionately problematic for patients with eating disorders. Despite evidence of its effectiveness, FBT is not available in many communities. Through advocacy, pediatricians can help support health care reform efforts that will enable children and adolescents with eating disorders to access necessary care.

GUIDANCE FOR PEDIATRICIANS

1. Pediatricians should be knowledgeable about the variety of risk factors and early signs and symptoms of eating disorders in both male and female children and adolescents. Pediatricians should screen patients for disordered eating and unhealthy weight-control behaviors at annual health supervision visits. Pediatricians should evaluate weight, height, and BMI by using age- and sex-appropriate charts, assess menstrual status in girls, and recognize the changes in vital signs that may signal the presence of an eating disorder.
2. When an eating disorder is suspected, pediatricians, in conjunction with appropriate consultants, should initiate a comprehensive evaluation of the patient that includes both medical and psychological assessments as well as suicide risk appraisal. Once diagnosed, patients should be monitored for medical and nutritional

complications by their pediatrician or referred to other qualified practitioners for medical oversight.

3. To facilitate multidisciplinary care, pediatricians should refer their patients with eating disorders to treatment resources in their region when available. Ideally, these treatment program providers should have expertise in the unique developmental needs of this age group.
4. Pediatricians are encouraged to advocate for legislation and policy changes that ensure appropriate services for patients with eating disorders, including medical care, nutritional intervention, mental health treatment, and care coordination, in settings that are appropriate for the developmental level of the patient and severity of the illness.

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ABBREVIATIONS

AN: anorexia nervosa
ARFID: avoidant/restrictive food intake disorder
BED: binge-eating disorder
BMD: bone mineral density
BN: bulimia nervosa
BP: blood pressure
CBT: cognitive behavioral therapy
DSM-5: *Diagnostic and Statistical Manual of Mental Disorders Fifth Edition*
FBT: family-based treatment
FDA: Food and Drug Administration
HEADSS: home, activities, drugs/diet, sexuality, suicidality/depression
HR: heart rate
LV: left ventricular
MBW: median body weight
NGT: nasogastric tube
RCT: randomized controlled trial
SSRI: selective serotonin-reuptake inhibitor

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REFERENCES

1. Weiselberg EC, Gonzalez M, Fisher M. Eating disorders in the twenty-first century. *Minerva Ginecol.* 2011;63(6): 531–545
2. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*, 5th ed. Washington, DC: American Psychiatric Association Publishing; 2013
3. Ornstein RM, Rosen DS, Mammel KA, et al. Distribution of eating disorders in children and adolescents using the proposed DSM-5 criteria for feeding and eating disorders. *J Adolesc Health.* 2013;53(2): 303–305
4. Call C, Walsh BT, Attia E. From DSM-IV to DSM-5: changes to eating disorder diagnoses. *Curr Opin Psychiatry.* 2013; 26(6):532–536
5. Ornstein RM, Katzman DK. Child and adolescent feeding and eating disorders and the DSM-5: a brave new world. *Adolesc Med State Art Rev.* 2014;25(2): 360–376
6. Norris ML, Spettigue WJ, Katzman DK. Update on eating disorders: current perspectives on avoidant/restrictive food intake disorder in children and youth. *Neuropsychiatr Dis Treat.* 2016; 12:213–218
7. Fisher MM, Rosen DS, Ornstein RM, et al. Characteristics of avoidant/restrictive food intake disorder in children and adolescents: a “new disorder” in DSM-5. *J Adolesc Health.* 2014;55(1):49–52
8. Nicely TA, Lane-Loney S, Masciulli E, Hollenbeak CS, Ornstein RM. Prevalence and characteristics of avoidant/restrictive food intake disorder in a cohort of young patients in day treatment for eating disorders. *J Eat Disord.* 2014;2(1):21
9. Strandjord SE, Sieke EH, Richmond M, Rome ES. Avoidant/restrictive food intake disorder: illness and hospital

- course in patients hospitalized for nutritional insufficiency. *J Adolesc Health*. 2015;57(6):673–678
10. Murray SB, Anderson LK. Deconstructing “atypical” eating disorders: an overview of emerging eating disorder phenotypes. *Curr Psychiatry Rep*. 2015;17(11):86
 11. Smink FRE, van Hoeken D, Hoek HW. Epidemiology of eating disorders: incidence, prevalence and mortality rates. *Curr Psychiatry Rep*. 2012;14(4):406–414
 12. Lindvall Dahlgren C, Wisting L. Transitioning from DSM-IV to DSM-5: a systematic review of eating disorder prevalence assessment. *Int J Eat Disord*. 2016;49(11):975–997
 13. Swanson SA, Crow SJ, Le Grange D, Swendsen J, Merikangas KR. Prevalence and correlates of eating disorders in adolescents. Results from the national comorbidity survey replication adolescent supplement. *Arch Gen Psychiatry*. 2011;68(7):714–723
 14. Marzilli E, Cerniglia L, Cimino S. A narrative review of binge eating disorder in adolescence: prevalence, impact, and psychological treatment strategies. *Adolesc Health Med Ther*. 2018;9:17–30
 15. Fisher M, Gonzalez M, Malizio J. Eating disorders in adolescents: how does the DSM-5 change the diagnosis? *Int J Adolesc Med Health*. 2015;27(4):437–441
 16. Wang ML, Walls CE, Peterson KE, et al. Dietary and physical activity factors related to eating disorder symptoms among middle school youth. *J Sch Health*. 2013;83(1):14–20
 17. Gee L, Peebles R, Golden NH, Storfer-Isser A, Heinberg LJ, Horwitz SM. Language spoken at home and parental birthplace moderate the association of race/ethnicity and distorted weight perception. *Clin Pediatr (Phila)*. 2012;51(12):1155–1163
 18. Marques L, Alegria M, Becker AE, et al. Comparative prevalence, correlates of impairment, and service utilization for eating disorders across US ethnic groups: implications for reducing ethnic disparities in health care access for eating disorders. *Int J Eat Disord*. 2011;44(5):412–420
 19. Striegel-Moore RH, Rosselli F, Holtzman N, Dierker L, Becker AE, Swaney G. Behavioral symptoms of eating disorders in Native Americans: results from the ADD Health Survey Wave III. *Int J Eat Disord*. 2011;44(6):561–566
 20. Rodrigues M. Do Hispanic girls develop eating disorders? A critical review of the literature. *Hisp Health Care Int*. 2017;15(4):189–196
 21. Mitchison D, Hay P, Slewa-Younan S, Mond J. The changing demographic profile of eating disorder behaviors in the community. *BMC Public Health*. 2014;14:943
 22. Pinhas L, Morris A, Crosby RD, Katzman DK. Incidence and age-specific presentation of restrictive eating disorders in children: a Canadian Paediatric Surveillance Program study. *Arch Pediatr Adolesc Med*. 2011;165(10):895–899
 23. Peebles R, Wilson JL, Lock JD. How do children with eating disorders differ from adolescents with eating disorders at initial evaluation? *J Adolesc Health*. 2006;39(6):800–805
 24. Raevuori A, Keski-Rahkonen A, Hoek HW. A review of eating disorders in males. *Curr Opin Psychiatry*. 2014;27(6):426–430
 25. Vo M, Lau J, Rubinstein M. Eating disorders in adolescent and young adult males: presenting characteristics. *J Adolesc Health*. 2016;59(4):397–400
 26. Räisänen U, Hunt K. The role of gendered constructions of eating disorders in delayed help-seeking in men: a qualitative interview study. *BMJ Open*. 2014;4(4):e004342
 27. Darcy AM. Eating disorders in adolescent males: an critical examination of five common assumptions. *Adolesc Psychiatry (Hilversum)*. 2011;1(4):307–312
 28. Calzo JP, Horton NJ, Sonnevile KR, et al. Male eating disorder symptom patterns and health correlates from 13 to 26 years of age. *J Am Acad Child Adolesc Psychiatry*. 2016;55(8):693–700.e2
 29. Piacentino D, Kotzalidis GD, Del Casale A, et al. Anabolic-androgenic steroid use and psychopathology in athletes. A systematic review. *Curr Neuropharmacol*. 2015;13(1):101–121
 30. Valente S, Di Girolamo G, Forlani M, et al. Sex-specific issues in eating disorders: a clinical and psychopathological investigation. *Eat Weight Disord*. 2017;22(4):707–715
 31. Haines J, Neumark-Sztainer D. Prevention of obesity and eating disorders: a consideration of shared risk factors. *Health Educ Res*. 2006;21(6):770–782
 32. Corsica JA, Hood MM. Eating disorders in an obesogenic environment. *J Am Diet Assoc*. 2011;111(7):996–1000
 33. Rancourt D, McCullough MB. Overlap in eating disorders and obesity in adolescence. *Curr Diab Rep*. 2015;15(10):78
 34. Flament MF, Henderson K, Buchholz A, et al. Weight status and DSM-5 diagnoses of eating disorders in adolescents from the community. *J Am Acad Child Adolesc Psychiatry*. 2015;54(5):403–411.e2
 35. Pont SJ, Puhl R, Cook SR, Slusser W; Section on Obesity; Obesity Society. Stigma experienced by children and adolescents with obesity. *Pediatrics*. 2017;140(6):e20173034
 36. Sim LA, Lebow J, Billings M. Eating disorders in adolescents with a history of obesity. *Pediatrics*. 2013;132(4). Available at: www.pediatrics.org/cgi/content/full/132/4/e1026
 37. Kennedy GA, Forman SF, Woods ER, et al. History of overweight/obesity as predictor of care received at 1-year follow-up in adolescents with anorexia nervosa or atypical anorexia nervosa. *J Adolesc Health*. 2017;60(6):674–679
 38. Peebles R, Hardy KK, Wilson JL, Lock JD. Are diagnostic criteria for eating disorders markers of medical severity? *Pediatrics*. 2010;125(5). Available at: www.pediatrics.org/cgi/content/full/125/5/e1193
 39. Sawyer SM, Whitelaw M, Le Grange D, Yeo M, Hughes EK. Physical and psychological morbidity in adolescents with atypical anorexia nervosa. *Pediatrics*. 2016;137(4):e20154080
 40. Swenne I. Influence of premorbid BMI on clinical characteristics at presentation of adolescent girls with eating disorders. *BMC Psychiatry*. 2016;16:81

41. Nagata JM, Garber AK, Tabler JL, Murray SB, Bibbins-Domingo K. Prevalence and correlates of disordered eating behaviors among young adults with overweight or obesity. *J Gen Intern Med*. 2018;33(8):1337–1343
42. Watson RJ, Adjei J, Saewyc E, Homma Y, Goodenow C. Trends and disparities in disordered eating among heterosexual and sexual minority adolescents. *Int J Eat Disord*. 2017;50(1):22–31
43. Watson RJ, VanKim NA, Rose HA, Porta CM, Gahagan J, Eisenberg ME. Unhealthy weight control behaviors among youth: sex of sexual partner is linked to important differences. *Eat Disord*. 2018;26(5):448–463
44. Austin SB, Nelson LA, Birkett MA, Calzo JP, Everett B. Eating disorder symptoms and obesity at the intersections of gender, ethnicity, and sexual orientation in US high school students. *Am J Public Health*. 2013;103(2):e16–e22
45. Hadland SE, Austin SB, Goodenow CS, Calzo JP. Weight misperception and unhealthy weight control behaviors among sexual minorities in the general adolescent population. *J Adolesc Health*. 2014;54(3):296–303
46. Connolly MD, Zervos MJ, Barone CJ II, Johnson CC, Joseph CL. The mental health of transgender youth: advances in understanding. *J Adolesc Health*. 2016;59(5):489–495
47. McClain Z, Peebles R. Body image and eating disorders among lesbian, gay, bisexual, and transgender youth. *Pediatr Clin North Am*. 2016;63(6):1079–1090
48. Diemer EW, Grant JD, Munn-Chernoff MA, Patterson DA, Duncan AE. Gender identity, sexual orientation, and eating-related pathology in a national sample of college students. *J Adolesc Health*. 2015;57(2):144–149
49. Quick VM, Byrd-Bredbenner C, Neumark-Sztainer D. Chronic illness and disordered eating: a discussion of the literature. *Adv Nutr*. 2013;4(3):277–286
50. Toni G, Berioli MG, Cerquiglini L, et al. Eating disorders and disordered eating symptoms in adolescents with type 1 diabetes. *Nutrients*. 2017;9(8):906
51. Ilzarbe L, Fàbrega M, Quintero R, et al. Inflammatory bowel disease and eating disorders: a systematized review of comorbidity. *J Psychosom Res*. 2017;102:47–53
52. d'Emden H, Holden L, McDermott B, et al. Disturbed eating behaviours and thoughts in Australian adolescents with type 1 diabetes. *J Paediatr Child Health*. 2013;49(4):E317–E323
53. Colton PA, Olmsted MP, Daneman D, et al. Eating disorders in girls and women with type 1 diabetes: a longitudinal study of prevalence, onset, remission, and recurrence. *Diabetes Care*. 2015;38(7):1212–1217
54. Young V, Eiser C, Johnson B, et al. Eating problems in adolescents with Type 1 diabetes: a systematic review with meta-analysis. *Diabet Med*. 2013;30(2):189–198
55. Koven NS, Abry AW. The clinical basis of orthorexia nervosa: emerging perspectives. *Neuropsychiatr Dis Treat*. 2015;11:385–394
56. Dunn TM, Bratman S. On orthorexia nervosa: a review of the literature and proposed diagnostic criteria. *Eat Behav*. 2016;21:11–17
57. Costa CB, Hardan-Khalil K, Gibbs K. Orthorexia nervosa: a review of the literature. *Issues Ment Health Nurs*. 2017;38(12):980–988
58. Robinson-O'Brien R, Perry CL, Wall MM, Story M, Neumark-Sztainer D. Adolescent and young adult vegetarianism: better dietary intake and weight outcomes but increased risk of disordered eating behaviors. *J Am Diet Assoc*. 2009;109(4):648–655
59. Zurowski KL, Witte TK, Smith AR, et al. Increased prevalence of vegetarianism among women with eating pathology. *Eat Behav*. 2015;19:24–27
60. Bardone-Cone AM, Fitzsimmons-Craft EE, Harney MB, et al. The inter-relationships between vegetarianism and eating disorders among females. *J Acad Nutr Diet*. 2012;112(8):1247–1252
61. Carl RL, Johnson MD, Martin TJ; Council on Sports Medicine and Fitness. Promotion of healthy weight-control practices in young athletes. *Pediatrics*. 2017;140(3):e20171871
62. Hergenroeder AC, De Souza MJ, Anding RH. The female athlete triad: energy deficiency, physiologic consequences, and treatment. *Adolesc Med State Art Rev*. 2015;26(1):116–142
63. De Souza MJ, Nattiv A, Joy E, et al.; Expert Panel. 2014 female athlete triad coalition consensus statement on treatment and return to play of the female athlete triad: 1st International Conference held in San Francisco, California, May 2012 and 2nd International Conference held in Indianapolis, Indiana, May 2013. *Br J Sports Med*. 2014;48(4):289
64. Weiss Kelly AK, Hecht S; Council on Sports Medicine and Fitness. The female athlete triad. *Pediatrics*. 2016;138(2):e20160922
65. Committee on Adolescent Health Care. Committee opinion No.702: female athlete triad. *Obstet Gynecol*. 2017;129(6):e160–e167
66. Tenforde AS, Barrack MT, Nattiv A, Fredericson M. Parallels with the female athlete triad in male athletes. *Sports Med*. 2016;46(2):171–182
67. Mountjoy M, Sundgot-Borgen J, Burke L, et al. The IOC consensus statement: beyond the female athlete triad—relative energy deficiency in sport (RED-S). *Br J Sports Med*. 2014;48(7):491–497
68. Mountjoy M, Sundgot-Borgen J, Burke L, et al. International Olympic Committee (IOC) consensus statement on relative energy deficiency in sport (RED-S): 2018 update. *Int J Sport Nutr Exerc Metab*. 2018;28(4):316–331
69. Hagan JF, Shaw JS, Duncan PM, eds.. *Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents*, 4th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2017
70. American College of Obstetricians and Gynecologists. Committee opinion No. 651 summary: menstruation in girls and adolescents: using the menstrual cycle as a vital sign. *Obstet Gynecol*. 2015;126(6):1328
71. Lebow J, Sim LA, Kransdorf LN. Prevalence of a history of overweight and obesity in adolescents with restrictive eating disorders. *J Adolesc Health*. 2015;56(1):19–24
72. Academy for Eating Disorders Medical Care Standards Committee. *Eating Disorders: A Guide to Medical Care*. 3rd ed. Reston, VA: Academy for Eating

- Disorders; 2016. Available at: <https://www.aedweb.org/learn/publications/medical-care-standards>. Accessed September 16, 2019
73. Jenny C, Crawford-Jakubiak JE; Committee on Child Abuse and Neglect; American Academy of Pediatrics. The evaluation of children in the primary care setting when sexual abuse is suspected. *Pediatrics*. 2013;132(2). Available at: www.pediatrics.org/cgi/content/full/132/2/e558
 74. Christian CW; Committee on Child Abuse and Neglect, American Academy of Pediatrics. The evaluation of suspected child physical abuse. [published correction appears in *Pediatrics*. 2015; 136(3):583]. *Pediatrics*. 2015;135(5). Available at: www.pediatrics.org/cgi/content/full/135/5/e1337
 75. Crawford-Jakubiak JE, Alderman EM, Leventhal JM; Committee on Child Abuse and Neglect; Committee on Adolescence. Care of the adolescent after an acute sexual assault. [published correction appears in *Pediatrics*. 2017;139(6):e20170958]. *Pediatrics*. 2017;139(3):e20164243
 76. Bessem B, de Bruijn MC, Nieuwland W. Gender differences in the electrocardiogram screening of athletes. *J Sci Med Sport*. 2017;20(2): 213–217
 77. Freeman R, Wieling W, Axelrod FB, et al. Consensus statement on the definition of orthostatic hypotension, neurally mediated syncope and the postural tachycardia syndrome. *Clin Auton Res*. 2011;21(2):69–72
 78. Kaufman H. Mechanisms, causes, and evaluation of orthostatic hypotension. Available at: <https://www.uptodate.com/contents/mechanisms-causes-and-evaluation-of-orthostatic-hypotension/print>. Accessed September 16, 2019
 79. Committee on Adolescent Health Care. ACOG committee opinion No. 740: gynecologic care for adolescents and young women with eating disorders. *Obstet Gynecol*. 2018;131(6):e205–e213
 80. Misra M, Klibanski A. Anorexia nervosa and its associated endocrinopathy in young people. *Horm Res Paediatr*. 2016; 85(3):147–157
 81. Misra M, Golden NH, Katzman DK. State of the art systematic review of bone disease in anorexia nervosa. *Int J Eat Disord*. 2016;49(3):276–292
 82. Mårild K, Størdal K, Bulik CM, et al. Celiac disease and anorexia nervosa: a nationwide study. *Pediatrics*. 2017; 139(5):e20164367
 83. Palla B, Litt IF. Medical complications of eating disorders in adolescents. *Pediatrics*. 1988;81(5):613–623
 84. Barlow SE; Expert Committee. Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity. *Pediatrics*. 2007;120(suppl 4):S164–S192
 85. Golden NH, Katzman DK, Sawyer SM, et al.; Society for Adolescent Health and Medicine. Position Paper of the Society for Adolescent Health and Medicine: medical management of restrictive eating disorders in adolescents and young adults. *J Adolesc Health*. 2015; 56(1):121–125
 86. Herpertz-Dahlmann B. Adolescent eating disorders: update on definitions, symptomatology, epidemiology, and comorbidity. *Child Adolesc Psychiatr Clin N Am*. 2015;24(1):177–196
 87. Golden NH, Katzman DK, Sawyer SM, et al. Update on the medical management of eating disorders in adolescents. *J Adolesc Health*. 2015; 56(4):370–375
 88. Campbell K, Peebles R. Eating disorders in children and adolescents: state of the art review. *Pediatrics*. 2014;134(3): 582–592
 89. Rome ES, Strandjord SE. Eating disorders. *Pediatr Rev*. 2016;37(8): 323–336
 90. Kelly AS, Barlow SE, Rao G, et al.; American Heart Association Atherosclerosis, Hypertension, and Obesity in the Young Committee of the Council on Cardiovascular Disease in the Young, Council on Nutrition, Physical Activity and Metabolism, and Council on Clinical Cardiology. Severe obesity in children and adolescents: identification, associated health risks, and treatment approaches: a scientific statement from the American Heart Association. *Circulation*. 2013;128(15): 1689–1712
 91. Gauthier C, Hassler C, Mattar L, et al.; EVHAN Group. Symptoms of depression and anxiety in anorexia nervosa: links with plasma tryptophan and serotonin metabolism. *Psychoneuroendocrinology*. 2014;39: 170–178
 92. Fürtjes S, Seidel M, King JA, Biemann R, Roessner V, Ehrlich S. Rumination in anorexia nervosa: cognitive-affective and neuroendocrinological aspects. *Behav Res Ther*. 2018;111:92–98
 93. Weinbach N, Sher H, Bohon C. Differences in emotion regulation difficulties across types of eating disorders during adolescence. *J Abnorm Child Psychol*. 2018;46(6): 1351–1358
 94. Allen KL, Byrne SM, Hii H, van Eekelen A, Mattes E, Foster JK. Neurocognitive functioning in adolescents with eating disorders: a population-based study. *Cogn Neuropsychiatry*. 2013;18(5): 355–375
 95. Frank GKW. Advances from neuroimaging studies in eating disorders. *CNS Spectr*. 2015;20(4): 391–400
 96. Bernardoni F, King JA, Geisler D, et al. Weight restoration therapy rapidly reverses cortical thinning in anorexia nervosa: a longitudinal study. *Neuroimage*. 2016;130:214–222
 97. Strumia R. Eating disorders and the skin. *Clin Dermatol*. 2013;31(1):80–85
 98. Kisely S, Baghaie H, Lalloo R, Johnson NW. Association between poor oral health and eating disorders: systematic review and meta-analysis. *Br J Psychiatry*. 2015;207(4):299–305
 99. Sachs K, Mehler PS. Medical complications of bulimia nervosa and their treatments. *Eat Weight Disord*. 2016;21(1):13–18
 100. Johnson LB, Boyd LD, Rainchuso L, Rothman A, Mayer B. Eating disorder professionals' perceptions of oral health knowledge. *Int J Dent Hyg*. 2017; 15(3):164–171
 101. Stewart JM, Boris JR, Chelmsky G, et al.; Pediatric Writing Group of the American Autonomic Society. Pediatric disorders of orthostatic intolerance. *Pediatrics*. 2018;141(1):e20171673
 102. Gibson D, Drabkin A, Krantz MJ, et al. Critical gaps in the medical knowledge

- base of eating disorders. *Eat Weight Disord.* 2018;23(4):419–430
103. Spaulding-Barclay MA, Stern J, Mehler PS. Cardiac changes in anorexia nervosa. *Cardiol Young.* 2016;26(4):623–628
 104. Lelli L, Rotella F, Castellini G, et al. Echocardiographic findings in patients with eating disorders: a case-control study. *Nutr Metab Cardiovasc Dis.* 2015; 25(7):694–696
 105. Ofiaz S, Yucel B, Oz F, et al. Assessment of myocardial damage by cardiac MRI in patients with anorexia nervosa. *Int J Eat Disord.* 2013;46(8):862–866
 106. Panagiotopoulos C, McCrindle BW, Hick K, Katzman DK. Electrocardiographic findings in adolescents with eating disorders. *Pediatrics.* 2000;105(5): 1100–1105
 107. Guerrier K, Mitan L, Wang Y, Czosek RJ. Risk for prolonged QT interval and associated outcomes in children with early restrictive eating patterns. *Cardiol Young.* 2016;26(4):644–649
 108. Giovinazzo S, Sukkar SG, Rosa GM, et al. Anorexia nervosa and heart disease: a systematic review. *Eat Weight Disord.* 2019;24(2):199–207
 109. Sachs KV, Harnke B, Mehler PS, Krantz MJ. Cardiovascular complications of anorexia nervosa: a systematic review. *Int J Eat Disord.* 2016;49(3):238–248
 110. Norris ML, Harrison ME, Isserlin L, Robinson A, Feder S, Sampson M. Gastrointestinal complications associated with anorexia nervosa: a systematic review. *Int J Eat Disord.* 2016;49(3):216–237
 111. Bern EM, Woods ER, Rodriguez L. Gastrointestinal manifestations of eating disorders. *J Pediatr Gastroenterol Nutr.* 2016;63(5):e77–e85
 112. Stheneur C, Bergeron S, Lapeyroue A-L. Renal complications in anorexia nervosa. *Eat Weight Disord.* 2014;19(4): 455–460
 113. Mehler PS, Walsh K. Electrolyte and acid-base abnormalities associated with purging behaviors. *Int J Eat Disord.* 2016;49(3):311–318
 114. Roerig JL, Steffen KJ, Mitchell JE, Zunker C. Laxative abuse: epidemiology, diagnosis and management. *Drugs.* 2010;70(12):1487–1503
 115. Donaldson AA, Gordon CM. Skeletal complications of eating disorders. *Metabolism.* 2015;64(9):943–951
 116. Warren MP. Endocrine manifestations of eating disorders. *J Clin Endocrinol Metab.* 2011;96(2):333–343
 117. Misra M, Katzman DK, Cord J, et al. Bone metabolism in adolescent boys with anorexia nervosa. *J Clin Endocrinol Metab.* 2008;93(8): 3029–3036
 118. Sabel AL, Rosen E, Mehler PS. Severe anorexia nervosa in males: clinical presentations and medical treatment. *Eat Disord.* 2014;22(3):209–220
 119. Misra M. Long-term skeletal effects of eating disorders with onset in adolescence. *Ann N Y Acad Sci.* 2008; 1135:212–218
 120. Katzman DK. Medical complications in adolescents with anorexia nervosa: a review of the literature. *Int J Eat Disord.* 2005;37(suppl):S52–S59, NaN–S89
 121. Swenne I. Weight requirements for catch-up growth in girls with eating disorders and onset of weight loss before menarche. *Int J Eat Disord.* 2005; 38(4):340–345
 122. Robinson L, Aldridge V, Clark EM, Misra M, Micali N. A systematic review and meta-analysis of the association between eating disorders and bone density. *Osteoporos Int.* 2016;27(6): 1953–1966
 123. Faje AT, Fazeli PK, Miller KK, et al. Fracture risk and areal bone mineral density in adolescent females with anorexia nervosa. *Int J Eat Disord.* 2014; 47(5):458–466
 124. Solmi M, Veronese N, Correll CU, et al. Bone mineral density, osteoporosis, and fractures among people with eating disorders: a systematic review and meta-analysis. *Acta Psychiatr Scand.* 2016;133(5):341–351
 125. Le Grange D, Accurso EC, Lock J, Agras S, Bryson SW. Early weight gain predicts outcome in two treatments for adolescent anorexia nervosa. *Int J Eat Disord.* 2014;47(2):124–129
 126. Madden S, Miskovic-Wheatley J, Wallis A, Kohn M, Hay P, Touyz S. Early weight gain in family-based treatment predicts greater weight gain and remission at the end of treatment and remission at 12-month follow-up in adolescent anorexia nervosa. *Int J Eat Disord.* 2015; 48(7):919–922
 127. Norris ML, Hiebert JD, Katzman DK. Determining treatment goal weights for children and adolescents with anorexia nervosa. *Paediatr Child Health.* 2018; 23(8):551–552
 128. Faust JP, Goldschmidt AB, Anderson KE, et al. Resumption of menses in anorexia nervosa during a course of family-based treatment. *J Eat Disord.* 2013;1:12
 129. Lebow J, Sim LA, Accurso EC. Is there clinical consensus in defining weight restoration for adolescents with anorexia nervosa? *Eat Disord.* 2018; 26(3):270–277
 130. Findlay S, Pinzon J, Taddeo D, Katzman DK; Canadian Paediatric Society, Adolescent Health Committee. Family-based treatment of children and adolescents with anorexia nervosa: guidelines for the community physician. *Paediatr Child Health.* 2010;15(1):31–40
 131. Golden NH, Abrams SA; Committee on Nutrition. Optimizing bone health in children and adolescents. *Pediatrics.* 2014;134(4). Available at: www.pediatrics.org/cgi/content/full/134/4/e1229
 132. Steinberg BJ. Medical and dental implications of eating disorders. *J Dent Hyg.* 2014;88(3):156–159
 133. Madden S, Miskovic-Wheatley J; American Academy of Child and Adolescent Psychiatry, Committee on Quality Issues. Practice parameter for the assessment and treatment of children and adolescents with eating disorders. *Psychol Med.* 2015;45(2): 415–427
 134. Katzman DK, Peebles R, Sawyer SM, Lock J, Le Grange D. The role of the pediatrician in family-based treatment for adolescent eating disorders: opportunities and challenges. *J Adolesc Health.* 2013;53(4):433–440
 135. Rienecke RD. Family-based treatment of eating disorders in adolescents: current insights. *Adolesc Health Med Ther.* 2017;8:69–79
 136. Forsberg S, Lock J. Family-based treatment of child and adolescent eating disorders. *Child Adolesc Psychiatr Clin N Am.* 2015;24(3):617–629

137. Lock J, Le Grange D. *Treatment Manual for Anorexia Nervosa: A Family-Based Approach*, 2nd ed. New York, NY: Guilford Press; 2012
138. Doyle PM, Le Grange D, Loeb K, Doyle AC, Crosby RD. Early response to family-based treatment for adolescent anorexia nervosa. *Int J Eat Disord*. 2010; 43(7):659–662
139. Lock J, Le Grange D. *Help Your Teenager Beat an Eating Disorder*, 2nd ed. New York, NY: Guilford Press; 2015
140. Le Grange D, Hughes EK, Court A, Yeo M, Crosby RD, Sawyer SM. Randomized clinical trial of parent-focused treatment and family-based treatment for adolescent anorexia nervosa. *J Am Acad Child Adolesc Psychiatry*. 2016; 55(8):683–692
141. Herpertz-Dahlmann B, Schwarte R, Krei M, et al. Day-patient treatment after short inpatient care versus continued inpatient treatment in adolescents with anorexia nervosa (ANDI): a multicentre, randomised, open-label, non-inferiority trial. *Lancet*. 2014;383(9924):1222–1229
142. Dancyger I, Fornari V, Schneider M, et al. Adolescents and eating disorders: an examination of a day treatment program. *Eat Weight Disord*. 2003;8(3): 242–248
143. Goldstein M, Peters L, Baillie A, McVeagh P, Minshall G, Fitzjames D. The effectiveness of a day program for the treatment of adolescent anorexia nervosa. *Int J Eat Disord*. 2011;44(1): 29–38
144. Ornstein RM, Lane-Loney SE, Hollenbeak CS. Clinical outcomes of a novel, family-centered partial hospitalization program for young patients with eating disorders. *Eat Weight Disord*. 2012; 17(3):e170–e177
145. Henderson K, Buchholz A, Obeid N, et al. A family-based eating disorder day treatment program for youth: examining the clinical and statistical significance of short-term treatment outcomes. *Eat Disord*. 2014;22(1):1–18
146. American Psychiatric Association. Treatment of Patients with Eating Disorders, Third Edition. In: *Am J Psychiatry*, vol. 163. 2006:4–54
147. Twohig MP, Bluett EJ, Cullum JL, et al. Effectiveness and clinical response rates of a residential eating disorders facility. *Eat Disord*. 2016;24(3):224–239
148. Friedman K, Ramirez AL, Murray SB, et al. A narrative review of outcome studies for residential and partial hospital-based treatment of eating disorders. *Eur Eat Disord Rev*. 2016; 24(4):263–276
149. Weltzin T, Kay B, Cornella-Carlson T, et al. Long-term effects of a multidisciplinary residential treatment model on improvements of symptoms and weight in adolescents with eating disorders. *J Groups Addict Recovery*. 2014;9(1):71–85
150. Attia E, Blackwood KL, Guarda AS, Marcus MD, Rothman DJ. Marketing residential treatment programs for eating disorders: a call for transparency. *Psychiatr Serv*. 2016; 67(6):664–666
151. Frisch MJ, Herzog DB, Franko DL. Residential treatment for eating disorders. *Int J Eat Disord*. 2006;39(5): 434–442
152. The Joint Commission. New requirements for residential and outpatient eating disorders programs. 2016. Available at: <https://www.jointcommission.org/standards/r3-report/r3-report-issue-7-eating-disorders-standards-for-behavioral-health-care/>. Accessed September 16, 2019
153. Schwartz BI, Mansbach JM, Marion JG, Katzman DK, Forman SF. Variations in admission practices for adolescents with anorexia nervosa: a North American sample. *J Adolesc Health*. 2008;43(5):425–431
154. Garber AK, Sawyer SM, Golden NH, et al. A systematic review of approaches to refeeding in patients with anorexia nervosa. *Int J Eat Disord*. 2016;49(3): 293–310
155. Society for Adolescent Health and Medicine. Refeeding hypophosphatemia in hospitalized adolescents with anorexia nervosa: a position statement of the Society for Adolescent Health and Medicine. *J Adolesc Health*. 2014;55(3): 455–457
156. Pulcini CD, Zettle S, Srinath A. Refeeding syndrome. *Pediatr Rev*. 2016;37(12): 516–523
157. O'Connor G, Goldin J. The refeeding syndrome and glucose load. *Int J Eat Disord*. 2011;44(2):182–185
158. O'Connor G, Nicholls D. Refeeding hypophosphatemia in adolescents with anorexia nervosa: a systematic review. *Nutr Clin Pract*. 2013;28(3):358–364
159. Strandjord SE, Sieke EH, Richmond M, Khadilkar A, Rome ES. Medical stabilization of adolescents with nutritional insufficiency: a clinical care path. *Eat Weight Disord*. 2016;21(3): 403–410
160. Parker EK, Faruque SS, Anderson G, et al. Higher caloric refeeding is safe in hospitalised adolescent patients with restrictive eating disorders. *J Nutr Metab*. 2016;2016:5168978
161. Hart S, Franklin RC, Russell J, Abraham S. A review of feeding methods used in the treatment of anorexia nervosa. *J Eat Disord*. 2013;1:36
162. Agostino H, Erdstein J, Di Meglio G. Shifting paradigms: continuous nasogastric feeding with high caloric intakes in anorexia nervosa. *J Adolesc Health*. 2013;53(5):590–594
163. Madden S, Miskovic-Wheatley J, Clarke S, Touyz S, Hay P, Kohn MR. Outcomes of a rapid refeeding protocol in adolescent anorexia nervosa. *J Eat Disord*. 2015;3:8
164. Kapphahn CJ, Graham DA, Woods ER, et al. Effect of hospitalization on percent median body mass index at one year, in underweight youth with restrictive eating disorders. *J Adolesc Health*. 2017;61(3):310–316
165. Gowers SG, Clark AF, Roberts C, et al. A randomised controlled multicentre trial of treatments for adolescent anorexia nervosa including assessment of cost-effectiveness and patient acceptability - the T0uCAN trial. *Health Technol Assess*. 2010;14(15):1–98
166. Madden S, Miskovic-Wheatley J, Wallis A, et al. A randomized controlled trial of in-patient treatment for anorexia nervosa in medically unstable adolescents. *Psychol Med*. 2015;45(2): 415–427
167. Peebles R, Lesser A, Park CC, et al. Outcomes of an inpatient medical nutritional rehabilitation protocol in children and adolescents with eating disorders. *J Eat Disord*. 2017;5:7

168. Garber AK, Mauldin K, Michihata N, Buckelew SM, Shafer M-A, Moscicki A-B. Higher calorie diets increase rate of weight gain and shorten hospital stay in hospitalized adolescents with anorexia nervosa. *J Adolesc Health*. 2013;53(5):579–584
169. Powers PS, Cloak NL. Psychopharmacologic treatment of obesity and eating disorders in children and adolescents. *Child Adolesc Psychiatr Clin N Am*. 2012;21(4):831–859
170. van den Heuvel LL, Jorandaan GP. The psychopharmacological management of eating disorders in children and adolescents. *J Child Adolesc Ment Health*. 2014;26(2):125–137
171. Monge MC, Forman SF, McKenzie NM, et al. Use of psychopharmacologic medications in adolescents with restrictive eating disorders: analysis of data from the National Eating Disorder Quality Improvement Collaborative. *J Adolesc Health*. 2015;57(1):66–72
172. Kaye W, Nagata T, Weltzin TE, et al. Double-blind placebo-controlled administration of fluoxetine in restricting- and restricting-purging-type anorexia nervosa. *Biol Psychiatry*. 2001; 49(7):644–652
173. Walsh BT, Kaplan AS, Attia E, et al. Fluoxetine after weight restoration in anorexia nervosa: a randomized controlled trial. [published correction appears in *JAMA*. 2006 Aug 23;296(8): 934]. *JAMA*. 2006;295(22):2605–2612
174. Sebaaly JC, Cox S, Hughes CM, Kennedy MLH, Garri SS. Use of fluoxetine in anorexia nervosa before and after weight restoration. *Ann Pharmacother*. 2013;47(9):1201–1205
175. Hagman J, Gralla J, Sigel E, et al. A double-blind, placebo-controlled study of risperidone for the treatment of adolescents and young adults with anorexia nervosa: a pilot study. *J Am Acad Child Adolesc Psychiatry*. 2011; 50(9):915–924
176. Kafantaris V, Leigh E, Hertz S, et al. A placebo-controlled pilot study of adjunctive olanzapine for adolescents with anorexia nervosa. *J Child Adolesc Psychopharmacol*. 2011;21(3):207–212
177. Norris ML, Spettigie W, Buchholz A, et al. Olanzapine use for the adjunctive treatment of adolescents with anorexia nervosa. *J Child Adolesc Psychopharmacol*. 2011;21(3):213–220
178. Kishi T, Kafantaris V, Sunday S, Sheridan EM, Correll CU. Are antipsychotics effective for the treatment of anorexia nervosa? Results from a systematic review and meta-analysis. *J Clin Psychiatry*. 2012;73(6):e757–e766
179. Marzola E, Desedime N, Giovannone C, Amianto F, Fassino S, Abbate-Daga G. Atypical antipsychotics as augmentation therapy in anorexia nervosa. *PLoS One*. 2015;10(4):e0125569
180. Misra M, Katzman D, Miller KK, et al. Physiologic estrogen replacement increases bone density in adolescent girls with anorexia nervosa. *J Bone Miner Res*. 2011;26(10):2430–2438
181. Divasta AD, Feldman HA, Giancaterino C, Rosen CJ, Leboff MS, Gordon CM. The effect of gonadal and adrenal steroid therapy on skeletal health in adolescents and young women with anorexia nervosa. *Metabolism*. 2012; 61(7):1010–1020
182. Lock J. An update on evidence-based psychosocial treatments for eating disorders in children and adolescents. *J Clin Child Adolesc Psychol*. 2015;44(5): 707–721
183. Lock J, Le Grange D. *Treating Bulimia in Adolescents: A Family-Based Approach*. New York, NY: Guilford Press; 2007
184. Le Grange D, Lock J, Agras WS, Bryson SW, Jo B. Randomized clinical trial of family-based treatment and cognitive-behavioral therapy for adolescent bulimia nervosa. *J Am Acad Child Adolesc Psychiatry*. 2015;54(11): 886–894.e2
185. Lebow J, Chuy JA, Cedermark K, Cook K, Sim LA. The development or exacerbation of eating disorder symptoms after topiramate initiation. *Pediatrics*. 2015; 135(5). Available at: www.pediatrics.org/cgi/content/full/135/5/e1312
186. Reas DL, Grilo CM. Pharmacological treatment of binge eating disorder: update review and synthesis. *Expert Opin Pharmacother*. 2015;16(10):1463–1478
187. Heo Y-A, Duggan ST. Lisdexamfetamine: a review in binge eating disorder. *CNS Drugs*. 2017;31(11):1015–1022
188. Zimmerman J, Fisher M. Avoidant/restrictive food intake disorder (ARFID). *Curr Probl Pediatr Adolesc Health Care*. 2017;47(4):95–103
189. Mammel KA, Ornstein RM. Avoidant/restrictive food intake disorder: a new eating disorder diagnosis in the diagnostic and statistical manual 5. *Curr Opin Pediatr*. 2017;29(4):407–413
190. Mairs R, Nicholls D. Assessment and treatment of eating disorders in children and adolescents. *Arch Dis Child*. 2016;101(12):1168–1175
191. Toulany A, Wong M, Katzman DK, et al. Cost analysis of inpatient treatment of anorexia nervosa in adolescents: hospital and caregiver perspectives. *CMAJ Open*. 2015;3(2):E192–E197
192. Marcell AV, Breuner CC, Hammer L, Hudak ML; Committee on Adolescence; Committee on Child Health Financing. Targeted reforms in health care financing to improve the care of adolescents and young adults. *Pediatrics*. 2018;142(6):e20182998
193. Ackard DM, Richter S, Egan A, Cronmeyer C. Poor outcome and death among youth, young adults, and midlife adults with eating disorders: an investigation of risk factors by age at assessment. *Int J Eat Disord*. 2014; 47(7):825–835
194. Steinhausen H-C. Outcome of eating disorders. *Child Adolesc Psychiatr Clin N Am*. 2009;18(1):225–242
195. Forman SF, Grodin LF, Graham DA, et al.; National Eating Disorder QI Collaborative. An eleven site national quality improvement evaluation of adolescent medicine-based eating disorder programs: predictors of weight outcomes at one year and risk adjustment analyses. *J Adolesc Health*. 2011;49(6):594–600
196. Forman SF, McKenzie N, Hehn R, et al. Predictors of outcome at 1 year in adolescents with DSM-5 restrictive eating disorders: report of the national eating disorders quality improvement collaborative. *J Adolesc Health*. 2014; 55(6):750–756
197. Lock J, Le Grange D, Agras WS, Moye A, Bryson SW, Jo B. Randomized clinical trial comparing family-based treatment with adolescent-focused individual therapy for adolescents with anorexia nervosa. *Arch Gen Psychiatry*. 2010; 67(10):1025–1032

198. Le Grange D, Lock J, Accurso EC, et al. Relapse from remission at two- to four-year follow-up in two treatments for adolescent anorexia nervosa. *J Am Acad Child Adolesc Psychiatry*. 2014; 53(11):1162–1167
199. Field AE, Sonneville KR, Micali N, et al. Prospective association of common eating disorders and adverse outcomes. *Pediatrics*. 2012;130(2). Available at: www.pediatrics.org/cgi/content/full/130/2/e289
200. Franko DL, Keshaviah A, Eddy KT, et al. A longitudinal investigation of mortality in anorexia nervosa and bulimia nervosa. *Am J Psychiatry*. 2013;170(8): 917–925
201. Arcelus J, Mitchell AJ, Wales J, Nielsen S. Mortality rates in patients with anorexia nervosa and other eating disorders. A meta-analysis of 36 studies. *Arch Gen Psychiatry*. 2011; 68(7):724–731
202. Keshaviah A, Edkins K, Hastings ER, et al. Re-examining premature mortality in anorexia nervosa: a meta-analysis redux. *Compr Psychiatry*. 2014;55(8): 1773–1784
203. Suokas JT, Suvisaari JM, Gissler M, et al. Mortality in eating disorders: a follow-up study of adult eating disorder patients treated in tertiary care, 1995-2010. *Psychiatry Res*. 2013; 210(3):1101–1106
204. Smith AR, Zuromski KL, Dodd DR. Eating disorders and suicidality: what we know, what we don't know, and suggestions for future research. *Curr Opin Psychol*. 2018;22: 63–67
205. Crow SJ, Swanson SA, le Grange D, Feig EH, Merikangas KR. Suicidal behavior in adolescents and adults with bulimia nervosa. *Compr Psychiatry*. 2014;55(7): 1534–1539
206. Preti A, Rocchi MBL, Sisti D, Camboni MV, Miotto P. A comprehensive meta-analysis of the risk of suicide in eating disorders. *Acta Psychiatr Scand*. 2011; 124(1):6–17
207. Golden NH, Schneider M, Wood C; Committee on Nutrition; Committee on Adolescence; Section on Obesity. Preventing obesity and eating disorders in adolescents. *Pediatrics*. 2016;138(3):e20161649
208. Rosen DS; American Academy of Pediatrics Committee on Adolescence. Identification and management of eating disorders in children and adolescents. *Pediatrics*. 2010;126(6):1240–1253