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Anorexia nervosa in adolescents: An overview

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Abstract: Anorexia nervosa (AN) is an eating disorder that is difficult to treat, and relapse is common. This article addresses management strategies and nursing interventions for adolescents diagnosed with AN.

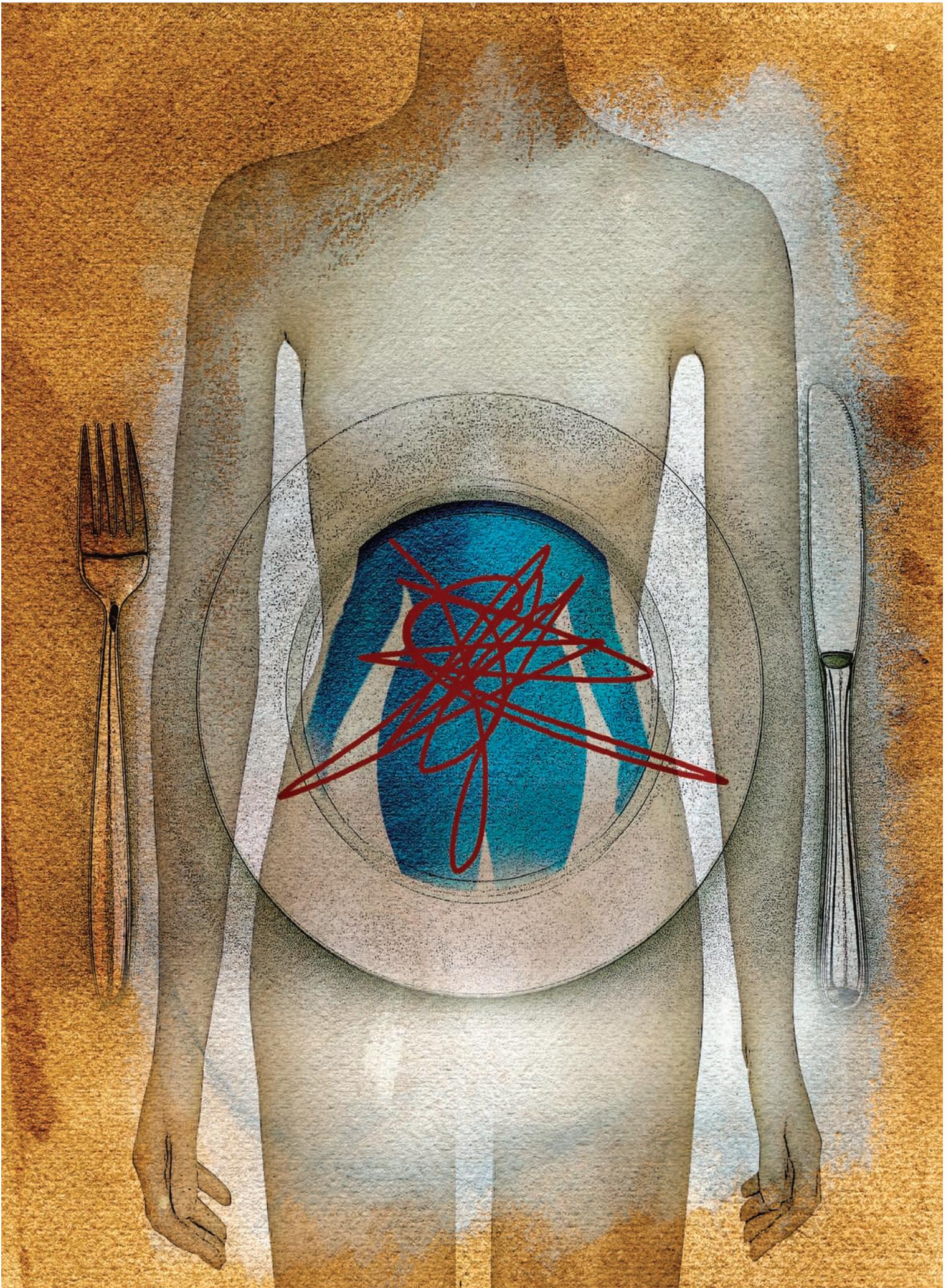
Keywords: adolescents, AN, anorexia nervosa, binge-eating, BMI, body mass index, eating disorders, purging

in France in 1874, AN describes the symptoms associated with self-starvation and a preoccupation with weight.¹ According to a national representative survey of adolescents ages 13 to 18, the incidence of AN in both males and females was 0.3% and the median age at onset was 12.3 years.³ AN has the highest mortality of all mental health disorders, typically resulting from complications of starvation or suicide.⁴

Using a case history, this article focuses on AN in adolescents and discusses current treatment approaches and appropriate nursing interventions.

DX, 16, WAS ADMITTED with anorexia nervosa (AN) after unsuccessful outpatient treatment. She had intentionally lost 30 lb over 6 months by restricting her nutritional intake and counting calories. DX met the inclusion criteria for hospital admission following evaluation of her vital signs, height, weight, body mass index (BMI), serum electrolytes, and nutritional status.

AN is a potentially life-threatening eating disorder in which patients experience extreme fears of gaining weight and altered perceptions of their body.^{1,2} First recognized



Three key features

According to *The Diagnostic and Statistical Manual of Mental Health Disorders*, 5th edition (DSM-5), an AN diagnosis requires each of the following three key features:⁵

- persistent self-restriction of energy intake, leading to significant weight loss
- an intense fear of gaining weight, or persistent behavior that interferes with weight gain
- a disturbance in self-perceived weight or shape.

Determining a BMI percentage according to patient age is important in assessing adolescents for AN. The CDC offers a BMI calculator and instructions (see *Resources*). Patients under the 5% margin for BMI with age are considered underweight.⁶ One study suggested a BMI below the 10th percentile may result in the malnourishment associated with AN.⁷

Healthcare providers must also follow trends specific to the individual patient's weight. For in-

stance, a petite adolescent who has parents with a similar frame may fall into a low percentile without an AN diagnosis. Similarly, clinicians must assess deviations from individual growth trajectories, even if the patient's weight has not fallen to dangerous levels; for example, an adolescent patient whose weight has dropped from the 75th percentile to the 25th percentile for his or her age, presenting with other essential signs and symptoms of AN.

The DSM-5 describes two subtypes of AN: the restricting type and the binge-eating or purging type.⁵ Both are characterized by a 3-month time frame.

- In restricting type, patients achieve weight loss primarily through dieting, fasting, and/or excessive exercise.⁸
- Patients diagnosed with binge-eating or purging type have engaged in recurrent episodes of self-induced vomiting or the misuse of laxatives, diuretics, or enemas.⁸

Risk factors

Why do some adolescents develop AN and other eating disorders while others do not? Eating disorders such as AN are caused by combinations of behavioral, biological, genetic, psychological, and environmental or cultural influences.¹ The following factors may put individuals at increased risk for developing an eating disorder.^{1,5,9,10}

Biological factors include:

- female gender
- a family member diagnosed with an eating disorder and/or mental health disorder
- a history of dieting.

Psychological factors include:

- obsessive-compulsive disorder (OCD) and behavioral inflexibility
- perfectionism
- body image dissatisfaction
- anxiety and/or depression.

Environmental or cultural factors include:

- immersion in a culture that values thinness
- participation in modeling, ballet, wrestling, gymnastics, or other activities that encourage thinness
- teasing and bullying
- a limited social network.

Studies of twins have demonstrated an estimated AN heritability between 33% and 84%.¹¹ Research is ongoing regarding whether specific chromosomes have a role in the development of AN.¹¹

Pathophysiology

Adolescents with AN often present with significant weight loss and a preoccupation with food and weight. They may restrict certain foods or calories and develop food rituals. These individuals may refuse foods they once enjoyed, refuse to eat socially with family and friends, and overexercise to extremes.

The excessive restriction of calories may impede growth and stop menstruation in female adolescents. Combined with an emphasis on exercise, these restrictions lead to

Resources

Academy for Eating Disorders: Resources

www.aedweb.org/resources/resources/fast-facts

Centers for Disease Control and Prevention: BMI percentile calculator for child and teen

www.cdc.gov/healthyweight/bmi/calculator.html

Children's Hospital of Orange County: Eating disorders (medical stabilization) care guideline

www.choc.org/wp/wp-content/uploads/careguidelines/EatingDisordersCareGuideline.pdf

Toledo Center for Eating Disorders: Eating Disorder Inventory-3 (EDI-3) scale descriptions. Psychological Assessment Resources (PAR)1

<http://toledocenter.com/wp-content/uploads/2015/10/EDI-3-Scale.pdf>

Mayo Clinic: Teen eating disorders: tips to protect your teen

www.mayoclinic.org/healthy-lifestyle/tween-and-teen-health/in-depth/teen-eating-disorders/art-20044635

National Association of Anorexia Nervosa and Associated Disorders

<https://anad.org>

National Eating Disorders Association

www.nationaleatingdisorders.org

The Center for Eating Disorders at Sheppard Pratt: A collection of supportive and informative books, websites, blogs and helpful organizations

www.eatingdisorder.org/eating-disorder-information/resources

malnourishment, causing protein deficiencies and disrupting the cardiovascular, renal, gastrointestinal, endocrine, integumentary, hematologic, and reproductive systems.¹¹ Studies have demonstrated that malnutrition associated with AN also affects neuropsychological functioning by reducing brain tissue.¹¹

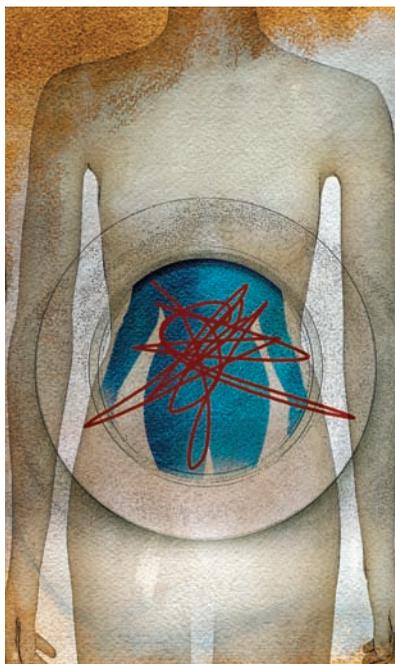
Signs and symptoms

Nurses can identify physical signs and symptoms, such as amenorrhea, headaches, irritability, constipation, syncope, dizziness, loss of muscle mass, dry skin, and hair loss. Health-care providers conducting a physical exam of patients with suspected AN should monitor vital signs for hypotension, bradycardia, hypothermia, and orthostatic changes greater than a 20 mm Hg decrease in systolic BP or a 10 mm Hg decrease in diastolic BP within 3 minutes of standing from a supine position.¹²

Other notable findings include hypercarotenemia, acrocyanosis, lanugo, dependent edema, breast atrophy, scaphoid abdomen, and parotid swelling.¹¹ Additionally, patients with bingeing or purging type AN may have a calloused dorsum on their dominant hand and eroded tooth enamel.^{11,13} Individuals with AN may dress in baggy clothing or layers and complain of feeling cold.¹

Psychiatric comorbidities

Patients with AN often present with mental health issues, including depression, obsessive tendencies, social anxiety, separation anxiety, and phobias such as the fear of swallowing or gaining weight.¹ Other common psychiatric disorders associated with AN include personality disorders and self-injurious behaviors.¹¹ Some patients with restricting type AN may present with OCD as well. Additionally, patients with binge-eating or purging type AN may have alcohol use disorder and other substance use disorders.⁵



Psychological recovery for patients with AN includes improving self-esteem, developing better interpersonal relationships, and returning to a healthy lifestyle.

Complications

Some complications of the weight loss and malnutrition associated with AN will resolve with improved weight, but others may be chronic. These issues can affect every organ system and occur at any weight.¹¹ *Endocrine* abnormalities may include the delayed onset of puberty, amenorrhea, and permanent adversely affected fertility, often leading to greater reductions and delays in reproduction across the patient's lifespan.¹⁴⁻¹⁶ The most common endocrine change related to AN is reversion to a prepubertal state.¹⁵ Levels of cortisol and other hormones may be elevated, and hypoglycemia may occur.¹⁵

After just 1 year, patients may experience decreased *bone density*, leading to osteoporosis and fragility

fractures.¹⁵ Malnourishment may permanently change *neurocognitive* functioning due to atrophy of the gray and white matter.¹⁴ *Cardiac* complications include left ventricular atrophy and subsequent annular changes, leading to mitral valve prolapse. Prolonged QT intervals may increase the risk for cardiac dysrhythmias and sudden death.^{14,15}

The *gastrointestinal* system is affected as well, including possible dysphagia from weakened and uncoordinated pharyngeal muscles, slowed gastric emptying, and chronic constipation.¹⁵ Additionally, AN affects the *respiratory* system, including abnormalities in pulmonary function and potentially spontaneous pneumothorax.¹⁵ Similarly, the *renal* system may be affected, with patients possibly developing dehydration and renal insufficiency related to self-imposed fluid restriction. Other renal abnormalities may include pyuria, proteinuria, and hematuria.¹¹

Hematologic complications, such as anemia, leukopenia, and thrombocytopenia, may occur as a result of changes in the bone marrow.¹¹ AN may also cause abnormalities in a patient's *sense of taste*, or dysgeusia, as well as a reduced ability to determine sweetness and an overperception of fat in foods.⁸

Additionally, patients with AN may experience complications related to the *dermatologic* system, including:^{8,15}

- xerosis, or skin that is dry and scaly
- lanugo-like body hair, which is described as dark hair that is fine and downy
- telogen effluvium, or hair loss
- carotenoderma, or yellowing skin
- acne
- hyperpigmentation
- seborrheic dermatitis, which is characterized by erythema and greasy scales
- acrocyanosis, in which a patient's hands and feet are cold, blue, and sometimes sweaty
- perniosis, or painful or pruritic erythema

- petechiae
- livedo reticularis, which is characterized by circular patches that are reddish or cyanotic in color
- paronychia, or inflammation or infection of the skin around the nail
- pruritus
- striae distensae, which is characterized by erythematous or hypopigmented patches
- delayed wound healing.

Many of these complications can be appropriately addressed with inpatient hospitalization to safely manage weight restoration. Conducted too rapidly, weight restoration may lead to refeeding syndrome, a metabolic derangement characterized by severe fluid and electrolyte imbalances that can lead to cardiac dysrhythmias and sudden death.² A large-scale study demonstrated that a 2 kg per week weight gain with appropriate medical monitoring was safe for many patients.²

Management

One 2015 practice parameter provides an evidence-based approach to evaluate and treat eating disorders in adolescents.¹

Many short, validated, and reliable tools are available to screen younger patients for eating disorders, such as the eating disorder examination questionnaire, the eating disorder inventory, and the eating attitudes test.¹

Though preferred, outpatient therapy is not always possible. Criteria established by the Society for Adolescent Health and Medicine will assist clinicians to decide whether hospitalization is necessary (see *Indications for hospitalization*).¹⁷

The *Practice Guideline for the Treatment of Patients with Eating Disorders* provides empirical evidence for inpatient treatment of eating disorders in adolescents.¹⁸ Critical aspects of care include restoring fluid and electrolyte balance, improving nutritional status, monitoring and enforcing any prescribed physical activity, monitoring vital signs and weight, and monitoring intake of food and fluid and output of urine and bowel movements. The guideline lists additional goals for treating AN, including:¹⁸

- restoring patients to a healthy weight
- treating any physical complications

- enhancing patient motivation to cooperate and participate in treatment to restore healthy eating patterns
- providing education regarding nutrition and healthy eating habits
- helping patients reassess and change core dysfunctional cognitions, attitudes, motives, conflicts, and feelings
- treating any associated psychiatric comorbidities, including deficits in mood, impulse regulation, self-esteem, and behavioral issues
- enlisting family support and providing appropriate counseling and therapy
- preventing relapse.

Many healthcare facilities that treat adolescents with eating disorders have institutional guidelines for consistency in patient care. For example, the goals for in-patient hospitalization at Boston Children's Hospital include weight gain and nutritional stabilization, vital signs and electrolyte stabilization, psychiatric consultation, and parental education. Nursing flowsheets and protocols provide clear guidelines and ensure consistency of nursing care.¹⁴

Nursing considerations

Nurses play a key role in evaluating and treating adolescents with eating disorders such as AN and should take a nonjudgmental approach to patient care. In school health settings or in primary care, nurses should determine the appropriate height and weight as estimated in the growth chart and refer patients given evidence of growth failure or extreme weight loss.¹

Part of a comprehensive evaluation is a physical and psychiatric evaluation. Nurses assess patient eating patterns and body satisfaction, evaluating food intake, weight fluctuations, body image, and exercise. The SCOFF questionnaire uses a series of five questions to gauge patient risk for eating disorders such as AN:^{11,19}

- Do you make yourself sick because you feel uncomfortably full?
- Do you worry you have lost control over how much you eat?

Indications for hospitalization¹⁷

One or more of the following justify hospitalization for adolescents with eating disorders, including AN:

- 75% median BMI for age and gender
- dehydration
- electrolyte disturbances, such as hypokalemia, hyponatremia, and hypophosphatemia
- ECG abnormalities, such as a prolonged QT interval or severe bradycardia
- physiologic instability, such as significant hypotension, severe bradycardia, or hypothermia
- arrested growth and development
- unsuccessful outpatient treatment
- acute food refusal
- uncontrollable binge-eating and purging
- acute medical complications of malnutrition, including syncope, seizures, heart failure, and pancreatitis
- psychiatric or physical comorbidities that prohibit or limit appropriate outpatient treatment, such as severe depression, suicidal ideation, OCD, and type 1 diabetes mellitus

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- Have you lost more than 13 to 14 lb (*one stone*) in a 3-month period?
- Do you believe yourself to be *fat* when others say you are too thin?
- Would you say that *food* dominates your life?

Lab testing requirements include a complete blood cell count; a comprehensive metabolic panel; and kidney, liver, and thyroid function studies. If applicable, nurses should also assess menstrual history, and hormonal studies can help identify amenorrhea. Additionally, dual-energy X-ray absorptiometry for bone density may be beneficial for female patients with amenorrhea lasting longer than 6 months and all male patients with significant weight loss.¹

Severe malnourishment leads to a variety of complications as already described. Nurses are vital in the emergency management of clinically unstable dysrhythmias, as well as cardiac arrest, hypothermia, and fluid and electrolyte disturbances.¹

Psychiatric evaluation

Adolescents with AN are often resistant to treatment and think that their weight is normal. Psychological recovery for patients with AN includes improving self-esteem, developing better interpersonal relationships, and returning to a healthy lifestyle.¹¹

Outpatient psychosocial interventions may be effective for this patient population, including family-based treatment. This consists of 10 to 20 family therapy sessions over a 6- to 12-month period and empowers parents to take charge of their adolescent's weight restoration. Cognitive behavioral therapy may also be helpful.¹

Psychiatric hospitalization programs, partial hospitalization, and residential programs may be considered if outpatient interventions are unsuccessful or unavailable. Developmental awareness and sensitivity are essential in providing skilled care for adolescents with eating disorders. Healthcare facilities should utilize a

multidisciplinary approach, including a team of nurses, along with a psychotherapist, a pediatrician, and a dietitian. Medications should be reserved for comorbidities and patients who do not improve with psychosocial interventions.¹

Case study continued

DX, the patient introduced at the beginning of this article, expressed anxiety over nutrition and had limited her intake to 800 calories a day. Specifically, she voiced concerns about “getting fat” and “not being able to finish meals.” Her psychosocial assessment and unsuccessful outpatient treatment plan were also considered. Further assessment revealed that she excelled academically and ran cross-country at a suburban high school.

DX entered a 17-day eating disorder treatment program according to facility protocols, which outlined nursing interventions, utilized a multidisciplinary approach to stabilization, and coordinated follow-up outpatient care. The day of admission was counted as day 0.

Upon admission, DX weighed 40.9 kg (89.98 lb) and measured 164.5 cm (5 ft 4 in), with a BMI of 15.4. Adolescent females of her age and height should be eating about 2,200 calories daily with a BMI between 18.5 and 24.5.²⁰

Before she was weighed, DX completed a measured void, removed all clothing, and donned a hospital gown. Her weight and orthostatic BP were monitored daily until discharge. A neurologic evaluation revealed that DX was alert and oriented with coherent thought processes. Although she was experiencing anxiety and depression, she had no suicidal ideation. The nursing staff obtained results of her ECG and serum electrolytes upon admission, as well as an abdominal X-ray that revealed constipation requiring laxatives. Her ECG and electrolyte values were within

normal limits, but her systolic BP decreased 40 mm Hg from a supine to a standing position. Her resting heart rate was 50 bpm.

She received consultations from child life, music therapy, social work, nutrition, and psychology. Per protocol, DX's bathroom door remained locked and no garbage receptacles were kept in the room to prevent purging. Liquid nutrition was initially prescribed at 1,000 calories and increased by 500 calories daily until a caloric intake of 3,500 was reached.

DX consumed oral liquid nutrition without requiring enteral nutrition. All meals were eaten in a dining room designed to build rapport and support therapeutic communication for those with eating disorders. This therapeutic milieu encourages patients to express feelings while consuming nourishment. Per facility protocol, meals were ingested in a 30-minute time frame, during which the patient was monitored by the nursing staff. Hydroxyzine was prescribed before each meal due to visible patient anxiety.

During her first 3 days, DX's weight increased to 41.2 kg (90.64 lb) and her orthostatic hypotension and lab results remained stable. On day 3, DX began eating solid nutrition equivalent to 2,000 calories/day. She was able to meet small goals with assistance from the nursing staff.

DX followed the eating disorder treatment plan as prescribed over the course of the next 10 days. Her weight increased to 43.1 kg (94.82 lb), and her orthostatic BP changes decreased to less than 10 mm Hg. She developed relationships with the nursing staff and participated in music therapy and other therapeutic groups conducted by child life specialists. DX worked with a dietitian to develop healthy eating habits and received passes to leave the hospital for short periods with her family, which allowed them to encourage

her prescribed nutrition outside of the hospital setting.

During the remainder of her hospitalization, DX achieved a healthy weight of 48.7 kg (107.14 lb). Her insight and motivation toward recovery improved, and she worked to restore healthy eating patterns and family relationships. Her discharge involved planning and coordinating outpatient care, including referral to a psychologist and enrollment in family therapy and an eating disorders partial hospitalization program. These outpatient services are essential in preventing relapse and achieving a full recovery.

Summary

AN may result in a variety of complications due to malnutrition associated with weight loss that affects almost every organ system.¹⁵ Nutrition rehabilitation, cognitive-behavioral psychotherapy, and family therapy are necessary in the treatment of AN, but studies have demonstrated that these may be more beneficial in the weight maintenance phase.¹⁵ Nurses play a critical role in identifying at-risk adolescents and encouraging early treatment. ■

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