Adolescent Medicine

PART XI

Chapter 150

Adolescent Physical and Social Development

Cynthia M. Holland-Hall and Maria D. Brown

See also Part XXIV and Chapters 599 and 600.

During the preteen, teenage, and young adult years, young people undergo not only dramatic changes in physical appearance but also rapid changes in physiologic, psychologic, and social functioning. Hormonally driven physiologic changes and ongoing neurologic development occur in the setting of social structures that foster the transition from childhood to adulthood. This period of development comprises **adolescence**, which is divided into three phases—early, middle, and late adolescence—each marked by a characteristic set of biologic, cognitive, and psychosocial milestones (Table 150.1). Although individual variations in the timing and pace of development undoubtedly exist, these changes follow a predictable pattern of occurrence. Gender and culture profoundly affect the developmental course, as do physical, social, and environmental influences (Fig. 150.1). Given the interaction of these domains, a biopsychosocial perspective is best suited to approach the healthcare of the adolescent.

PHYSICAL DEVELOPMENT

Puberty is the biologic transition from childhood to adulthood. Pubertal changes include the appearance of the secondary sexual characteristics, increase in height, change in body composition, and development

Table 150.1 Milestones in Early, Middle, and Late Adolescent Development

VARIABLE	EARLY ADOLESCENCE	MIDDLE ADOLESCENCE	LATE ADOLESCENCE
Approximate age range	10-13 yr	14-17 yr	18-21 yr
Sexual maturity rating*	1-2	3-5	5
Physical	• *Females:* secondary sex characteristics (breast, pubic, axillary hair), start of growth spurt • *Males:* testicular enlargement, start of genital growth	• *Females:* peak growth velocity, menarche (if not already attained) • *Males:* growth spurt, secondary sex characteristics, nocturnal emissions, facial and body hair, voice changes • Change in body composition • Acne	• Physical maturation slows • Increased lean muscle mass in males
Cognitive and moral	• Concrete operations • Egocentricity • Unable to perceive long-term outcome of current decisions • Follow rules to avoid punishment	• Emergence of abstract thought (formal operations) • May perceive future implications, but may not apply in decision-making • Strong emotions may drive decision-making • Sense of invulnerability • Growing ability to see others' perspectives	• Future-oriented with sense of perspective • Idealism • Able to think things through independently • Improved impulse control • Improved assessment of risk vs reward • Able to distinguish law from morality
Self-concept/identity formation	• Preoccupied with changing body • Self-consciousness about appearance and attractiveness	• Concern with attractiveness • Increasing introspection	• More stable body image • Attractiveness may still be of concern • Consolidation of identity
Family	• Increased need for privacy • Exploration of boundaries of dependence vs independence	• Conflicts over control and independence • Struggle for greater autonomy • Increased separation from parents	• Emotional and physical separation from family • Increased autonomy • Reestablishment of "adult" relationship with parents
Peers	• Same-gender peer affiliations	• Intense peer group involvement • Preoccupation with peer culture • Conformity	• Peer group and values recede in importance
Sexual	• Increased interest in sexual anatomy • Anxieties and questions about pubertal changes • Limited capacity for intimacy	• Testing ability to attract partner • Initiation of relationships and sexual activity • Exploration of sexual identity	• Consolidation of sexual identity • Focus on intimacy and formation of stable relationships • Planning for future and commitment

*See text and Figures 150.2 and 150.3.

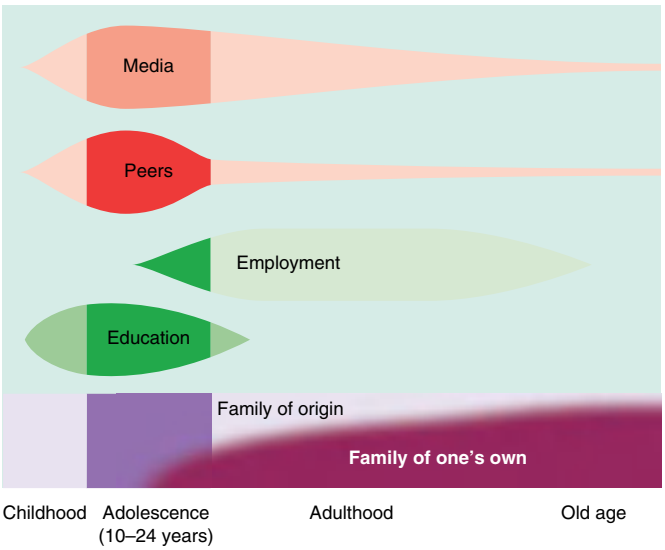

Fig. 150.1 Changing proximal social determinants of health across the life course. During adolescence, social determinants from outside the family become greater, with major influences of peers, media, education, and the beginning of workplace influences. Community and structural determinants remain consistently influential, as shown by the background shading. *(From Patton GC, Sawyer SM, Santelli JS, et al. Our future: a Lancet commission on adolescent health and wellbeing. Lancet. 2016;387:2423–2478, Fig. 2.)*

of reproductive capacity. Two principal physiologic events occur during puberty: adrenarche and gonadarche. Adrenal androgen production, chiefly dehydroepiandrosterone sulfate (DHEAS), rises in response to adrenocorticotropic hormone (ACTH). Increases in serum concentrations of DHEAS result in the development of adult-like body odor and faint genital hair **(adrenarche)**, occurring as early as 6-8 years of age. Gonadal sex steroid production occurs with activation of the hypothalamic-pituitary-gonadal (HPG) axis **(gonadarche)**. Maturation of the gonadotropin-releasing hormone (GnRH) pulse generator is among the earliest neuroendocrine changes associated with the onset of puberty. Under the influence of GnRH, the pituitary gland secretes luteinizing hormone (LH) and follicle-stimulating hormone (FSH); initially this occurs in a pulsatile fashion primarily during sleep, but this diurnal variation diminishes throughout puberty. LH and FSH stimulate corresponding increases in gonadal androgens and estrogens. The triggers for these changes are incompletely understood. The activation of the HPG axis may be mediated by increasing adiposity and associated insulin resistance, hyperinsulinemia, elevated androgens, and leptin. Both genetic and environmental (epigenetic) factors contribute to the regulation of pubertal timing.

Sexual Development

The progression of the development of the secondary sex characteristics may be described using the **sexual maturity rating (SMR)** scale (ranging from 1, prepubertal, to 5, fully mature adolescent) or **Tanner stages**. Figures 150.2 and 150.3 depict the physical findings of breast and pubic hair maturation at each SMR (Tables 150.2 and 150.3). Although the ages at which individual pubertal changes occur may vary, the timing and sequence of these changes relative to one another is predictable (Figs. 150.4 and 150.5). The wide range of normal progress through sexual maturation is affected by genetics, the psychosocial environment, nutrition, and overall health status. Environmental exposures may also play a role.

In **males** the first visible sign of puberty and the hallmark of SMR 2 is testicular enlargement, beginning as early as 9.5 years, followed by the development of pubic hair. This is followed by penile growth during SMR 3. Peak growth occurs when testis volumes reach approximately 9-10 cm^3 during SMR 4. Under the influence of LH and testosterone, the seminiferous tubules, epididymis, seminal vesicles, and prostate

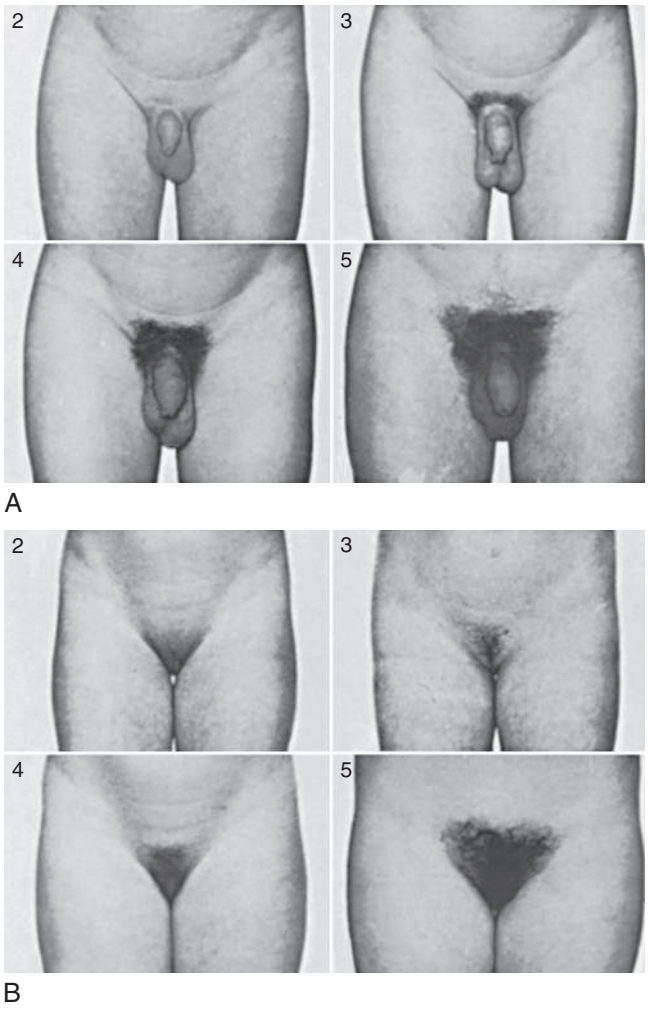

Fig. 150.2 Sexual maturity ratings (2-5) of pubic hair changes in adolescent males (A) and females (B) (see Tables 150.2 and 150.3). *(Courtesy J.M. Tanner, MD, Institute of Child Health, Department for Growth and Development, University of London.)*

enlarge. Sperm may be found in the urine by SMR 3; nocturnal emissions may be noted at this time as well. Some degree of breast tissue growth, typically bilateral, occurs in 40–65% of males during SMR 2-4 as a presumed consequence of a relative excess of estrogenic stimulation. This usually resolves with ongoing maturation.

In **females**, typically the first visible sign of puberty and the hallmark of SMR 2 is the appearance of breast buds **(thelarche)**, between 7 and 12 years of age. A significant minority of females develops pubic hair **(pubarche)** prior to thelarche. Less visible changes include enlargement of the ovaries, uterus, labia, and clitoris and thickening of the endometrium and vaginal mucosa. A clear vaginal discharge may be present before menarche (physiologic leukorrhea). Menses typically begins within 3 years of thelarche, during SMR 3-4 (average age 12.5 years; normal range 9-15 years) (see Fig. 150.5). The timing of **menarche** is determined largely by genetics; contributing factors likely include adiposity, chronic illness, nutritional status, and the physical and psychosocial environment. Early menstrual cycles often are anovulatory and thus somewhat irregular, but typically occur every 21-45 days and include 3-7 days of bleeding, even during the first year after menarche.

The **onset of puberty** and menarche appear to be occurring at earlier ages than previously reported in the United States (see Chapter 599). Several studies from 1948 to 1981 identified the average age for the onset of breast development as ranging from 10.6 to 11.2 years of age. A subsequent prospective study suggests an earlier average age of onset of 8.8 years in Black females and 9.6 years in White females. Almost 25% of Black females and 10% of White females initiate breast development

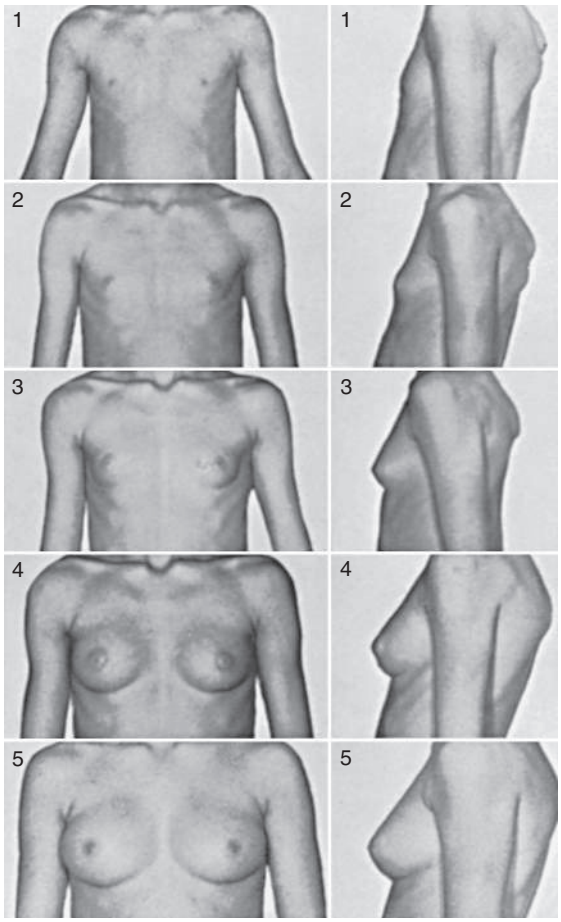

Fig. 150.3 Sexual maturity ratings (1-5) of breast changes in adolescent females. *(Courtesy J.M. Tanner, MD, Institute of Child Health, Department for Growth and Development, University of London.)*

by 7 years of age. A 2020 systematic review and meta-analysis demonstrated an almost 3 months per decade decrease in age of thelarche between 1977 and 2013 worldwide. Early breast development may be associated with a slower tempo of puberty (i.e., longer time to menarche). There also appears to be a trend toward decreasing ages for the onset of pubic hair development and menarche. Data from the National Health and Nutrition Examination Survey (NHANES), a nationally representative, longitudinal survey in the United States, show a decline in the average age of menarche of 4.9 months between the 1960s and 2002. This may be partially explained by changes in the ethnic makeup of the sample. Changes in the timing of menarche *within* ethnic groups were significantly smaller. The reasons for the larger decrease in age for breast development have been postulated to include the epidemic of childhood obesity and exposure to estrogen-like environmental agents (endocrine disruptors), but further research in this area is needed.

Although fewer data are available on changes in the timing of puberty in males, they appear to be experiencing a similar trend. Although the method of assessing the onset of puberty (i.e., inspection vs palpation of the testes) varies between studies, it appears that the average age for the onset of genital and pubic hair development may have decreased by 1-2 years over the past several decades in many industrialized countries. Evidence for an association of obesity with the timing of puberty in males has been inconsistent.

Somatic Growth

Linear growth acceleration begins in early adolescence for all genders, with 15–20% of adult height accrued during puberty. Females attain a **peak height velocity (PHV)** of 8-9 cm/year at SMR 2-3, approximately 6 months before menarche. Males typically begin their growth acceleration at a later SMR stage and achieve a PHV of 9-10 cm/year later in the course of puberty (SMR 3-4). Males continue their linear growth for approximately 2-3 years after females have stopped growing, accounting for an average difference of 11-13 cm in height between adult males and females (Fig. 150.6). The growth spurt begins distally, with enlargement of the hands and feet, followed by the arms and legs, and finally the trunk and chest. This growth pattern imparts a characteristic "awkward" appearance to some early adolescents. Body

Table 150.2 Sexual Maturity Rating (SMR) Stages in Females

SMR STAGE	PUBIC HAIR	BREASTS
1	Preadolescent	Preadolescent
2	Sparse, lightly pigmented, straight, medial border of labia	Breast and papilla elevated as small mound; diameter of areola increased
3	Darker, beginning to curl, increased amount	Breast and areola enlarged, no contour separation
4	Coarse, curly, abundant, but less than in adult	Areola and papilla form secondary mound
5	Adult feminine triangle, spread to medial surface of thighs	Mature, nipple projects, areola part of general breast contour

From Tanner JM. *Growth at Adolescence,* 2nd ed. Oxford, England: Blackwell Scientific; 1962.

Table 150.3 Sexual Maturity Rating (SMR) Stages in Males

SMR STAGE	PUBIC HAIR	PENIS	TESTES
1	None	Preadolescent	Preadolescent
2	Scant, long, slightly pigmented	Minimal change/enlargement	Enlarged scrotum, pink, texture altered
3	Darker, starting to curl, small amount	Lengthens	Larger
4	Resembles adult type, but less quantity; coarse, curly	Larger; glans and breadth increase in size	Larger, scrotum dark
5	Adult distribution, spread to medial surface of thighs	Adult size	Adult size

From Tanner JM. *Growth at Adolescence,* 2nd ed. Oxford, England: Blackwell Scientific; 1962.

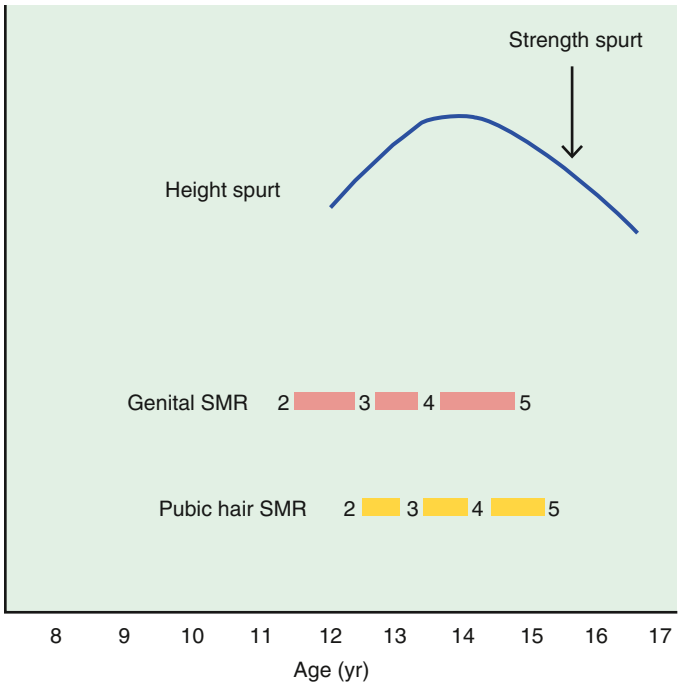

Fig. 150.4 Sequence of pubertal events in males. Although the age of onset of puberty is variable, the sequence of events relative to one another is predictable. SMR, Sexual maturity rating.

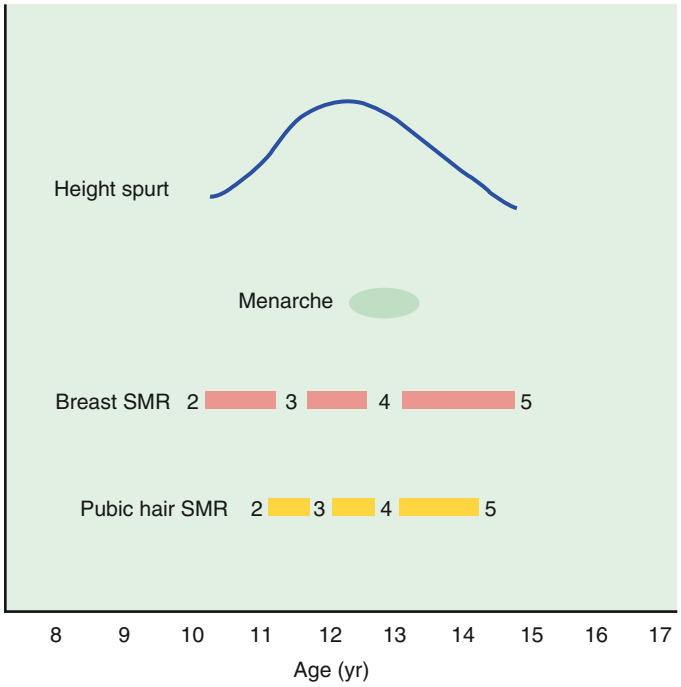

Fig. 150.5 Sequence of pubertal events in females. Although the age of onset of puberty is variable, the sequence of events relative to one another is predictable. SMR, Sexual maturity rating.

composition changes as well after attainment of PHV. Males undergo an increase in lean body mass ("strength spurt"), whereas females develop a higher proportion of body fat. Scoliosis, if present, may progress with rapid axial skeleton growth (see Chapter 720.1). From 50% to 65% of total body calcium is laid down during puberty. Bone growth precedes increases in bone mineralization and bone density, which may increase the adolescent's risk of fracture during times of rapid growth.

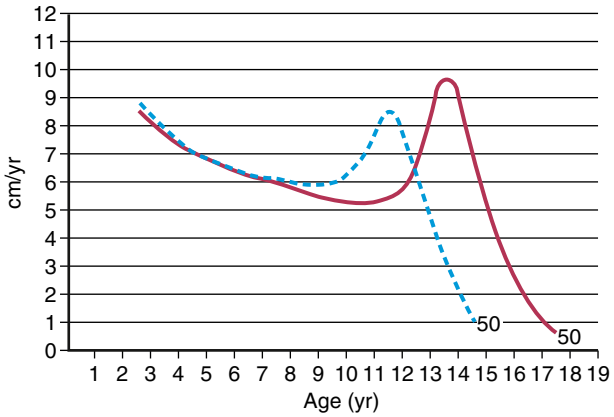

Fig. 150.6 Height velocity curves for American males *(solid line)* and females *(dashed line)* who have their peak height velocity at the average age (i.e., average growth tempo). *(From Tanner JM, Davies PSW. Clinical longitudinal standards for height and height velocity for North American children. J Pediatr. 1985;107:317.)*

Because skeletal growth precedes muscle and tendon growth, sprains and strains may be more common during this time as well.

Cardiovascular changes in middle adolescence include increased heart size, higher blood pressure, and increases in blood volume and hematocrit, particularly in males. Coupled with an increase in lung vital capacity, these changes lead to greater aerobic capacity. Androgenic stimulation of sebaceous and apocrine glands may result in acne and body odor. Rapid enlargement of the larynx, pharynx, and lungs leads to changes in vocal quality in males, typically preceded by vocal instability (voice cracking). Elongation of the optic globe may result in the development of myopia (see Chapter 660). Dental changes include jaw growth, loss of the final deciduous teeth, and eruption of the permanent cuspids, premolars, and finally, molars (see Chapter 353). Orthodontic appliances may be needed, secondary to growth exacerbations of bite disturbances. Physiologic changes in sleep patterns and increased sleep requirements occur, causing many adolescents to delay sleep onset at night, with subsequent difficulty awakening for early school start times in the morning (see Chapter 31). The mechanism of delayed circadian rhythm has not been elucidated but likely involves changes in both circadian and homeostatic sleep regulatory processes.

NEUROLOGIC, COGNITIVE, AND MORAL DEVELOPMENT

As children progress through adolescence, they develop and refine their ability to use formal operational thought processes. Abstract, symbolic, and hypothetical thinking replaces the need to manipulate concrete objects. Middle and late adolescents develop the ability to consider multiple options and to assess the long-term consequences of their actions. The capacity for verbal expression is enhanced. Because adolescents' decision-making and subsequent behaviors are the primary determinants of their mortality and morbidity, understanding these cognitive processes is of critical importance.

Both structural and functional brain development continue throughout adolescence. Cortical gray matter volume peaks in preadolescence, then decreases because of selective "pruning" of rarely used synaptic connections, slowly declining as the third decade of life is approached. Cerebral white matter volume increases until mid-to-late adolescence, reflecting increasing myelination and subsequent facilitation of integrated brain activity and more efficient transmission of information between different regions of the brain, enhancing the "signal-to-noise" ratio. Although the frontal lobes and prefrontal cortex, regions of the brain associated with executive function, have been considered to be among the last regions to mature, other cortical regions show similarly prolonged trajectories of maturation. Without question, adolescents are capable of the complex cognitive processes attributed to frontal lobe function. *Cognitive control,* however, continues to improve into adulthood, with progressive maturation and *integration* of component

processes such as working memory, inhibition and impulse control, performance monitoring, and motivational circuitry.

The behavioral correlates of adolescent neurodevelopment remain speculative but are increasingly supported by a rapidly expanding body of research. Adolescents appear to demonstrate a unique sensitivity to the effects of dopamine on reward-relevant subcortical structures such as the ventral striatum and the ventral tegmental area, with some studies demonstrating increased activation in this region when receiving rewards relative to children or adults. Other studies show reduced responsiveness to aversive stimuli in adolescents. This altered responsiveness to risk vs reward, paired with incomplete frontal lobe myelination and thus immature impulse control, may underlie the increased risk taking and novelty seeking seen in adolescents. Early maturation and distinct patterns of neural reactivity in the amygdala and other limbic structures may explain the strong role that social and emotional stimuli play in adolescents, sometimes overwhelming the frontal executive function systems that facilitate the interpretation and regulation of those social and emotional experiences. This may explain why adolescents are more likely to make poor decisions in highly emotionally charged situations relative to mature adults. These "hot cognition" processes may result in the adolescent making a different decision in the context of a strong affective experience than he or she would in a less emotional state ("cool cognition"). These two types of cognitive processes may not develop at the same rate; the adolescent may be able to use higher brain structures and functions more effectively when in states of lower emotional arousal.

Early adolescents often continue to employ the concrete operational cognitive processes of childhood. Although formal operational cognition is developing, it may be applied inconsistently across different domains. A young adolescent may be able to use abstract thought when completing schoolwork, but not when working through a personal dilemma. Early adolescence also is characterized by egocentricity—the belief of some adolescents that they are the center of everyone's attention. Despite being largely imagined, this perception of always being "on stage" can be stressful for adolescents, who may feel that others are constantly judging or evaluating them. Early adolescents express a greater need for privacy than they did in childhood and begin to appreciate the privacy of their own thoughts. With ongoing cognitive development, **middle adolescents** are more able to consider the needs and feelings of other people. Their creativity and intellectual abilities are enhanced. Because of their increased capacity for abstract thought in combination with a persistent perception of uniqueness, middle adolescents may feel a sense of immortality and immunity to the consequences of risky behaviors. **Late adolescents** are more future oriented and able to delay gratification. They can think more independently, consider others' views, and compromise. They have a stronger sense of self and more stable interests. Under times of stress, adolescents may temporarily revert to the cognitive processes and coping strategies used at younger ages.

Moral development generally accompanies cognitive development. Preadolescents, concrete and individualistic, follow rules to please authority figures and avoid punishment. As they move into early adolescence, they develop a stronger sense of right and wrong but are likely to perceive these as absolute and unquestionable. Middle and late adolescents may establish a sense of morality driven by their desire to be seen as a good person, to behave in a manner according to their perceived place in society, or by their sense of obligation to care for others. Moral decision-making, however, still may be highly subject to emotional context. Late adolescents may develop a rational conscience and an independent system of values, although these often are largely consistent with parental values. While going through this complex developmental process, religious or political organizations that promote simple answers to complex social or moral questions may hold great appeal to the adolescent.

PSYCHOSOCIAL DEVELOPMENT

In contrast to cognitive development, psychosocial development correlates more strongly with pubertal status and physical maturation than with chronological age. Whereas cognitive development is more biologically determined, psychosocial development is subject to greater environmental and cultural influences. Indeed, cultural variation can be dramatic. Some late adolescents move immediately from high school into marriage, childbearing, working, and financial independence; others remain dependent on the parents while pursuing their own education for several more years, in a period sometimes referred to as *emerging adulthood*. Psychosocial development also may be nonlinear, with different domains of growth progressing along different timelines. An overriding theme of psychosocial development is the concept of identity formation and consolidation as the adolescent moves away from the nurturing protection of the family, develops an increased affiliation with the peer group(s), and ultimately defines himself or herself as an individual.

Separation from the parents is a hallmark of adolescent development. Early adolescents start to seek out more privacy at home, spending less time with the parents. They begin to reject parental advice and involvement in their decision-making as they explore the boundaries of their dependence on, and independence from, their parents. With evolving cognitive skills, an adolescent can conceive of an ideal parent and contrast this ideal with his or her own parents. Adolescents may seek out alternative adult role models, such as teachers, coaches, or parents of friends. Parent–child conflict often peaks during middle adolescence, with disagreements over privileges, independence, and other limits set by the parents. Adolescents may appear intermittently to seek and reject parental acceptance. It is theorized that perhaps the adolescent *needs* to conceive of the parents as "wrong" in order to ameliorate the pain of separating from them. Throughout this time, however, the parents remain a critical source of nurturing and support for the adolescent and continue to exert significant influence over the adolescent's decision-making. Paradoxically, frequent arguments and conflict may coexist with strong emotional bonds and closeness. The late adolescent may reestablish a more "adult–adult" type of relationship with the parents, once again seeking out and considering parental advice and guidance as they enter adulthood.

Increasing importance of the **peer group** also may buffer the emotional trauma of separating from the parents (see Fig. 150.1). Early adolescents tend to socialize largely with same-gender peers, both in their individual friendships and larger groups. Females' peer groups tend to be more relationship oriented, whereas males' peer groups are more likely to be centered around a particular interest or activity. In both cases, group cohesion and a sense of belonging become important. Peers become increasingly important in middle adolescence, during which time the adolescent may experiment with being a part of different groups and "try on" different identities. These groups may include all genders. Peer groups may arise from organized activities, such as sports or clubs, or may simply be friendship based. Gang membership is another form of peer acceptance. **Conformity** with the peers in manners of dress, speech, and behavior is a normal part of this process and should not necessarily be viewed negatively. Similarly, **peer pressure** may exist, but its influence over the adolescent's decision-making may be positive, negative, or negligible. Acceptance and successful navigation of peer groups during adolescence may give the individual more confidence to move into and out of various social, academic, and professional groups in the future. Late adolescents are less vulnerable to peer group influence, having moved closer to establishing their own stable identity. Their cognitive skills allow them to choose selectively among different peer groups, endorsing and adopting individual values and behaviors that best reflect who they are becoming.

Early adolescents have increased **sexual awareness and interest**, which may manifest as sexual talk and gossip, and often is focused on sexual anatomy. Masturbation and other sexual exploration, sometimes with same-sex peers, are common. The prevalence of other forms of sexual behavior varies by culture; in general, these behaviors are less common in early adolescents. Romantic relationships, if they exist at all, lack emotional depth. Sexual curiosity, experimentation, and activity become more common among

middle adolescents. Same-sex attraction is common; sexual orientation may become clear to some adolescents, but still may be evolving in others during this time. Dating behaviors may be seen, but this is culture dependent and may not be a popular construct for all adolescents. Individual relationships often continue to emphasize sexual attraction over emotional intimacy. Relationships that occur during middle adolescence may be short and intense. Emotional intimacy and more permanent relationships may not be seen until late adolescence. At that time, relationships increasingly involve love and commitment and demonstrate greater stability.

Body image may affect (and be affected by) adolescents' psychosocial development as well. Early and middle adolescence are usually the ages during which poor or distorted body image and eating disorders develop. Early adolescents undergo rapid physical changes and may experience uncertainty about whether all these anatomic and physiologic changes are progressing normally. Reassurance from adults, including their healthcare providers, may be comforting. As puberty comes to an end and these changes slow, the middle adolescent's preoccupation may shift to whether they are attractive to others. A strong emphasis on physical appearance during this time is common. Although this focus on physical appearance may continue into adulthood, late adolescence generally is characterized by a shifting balance toward introspection, with somewhat less emphasis placed on external characteristics.

The **timing of pubertal changes** also can affect psychosocial development and well-being. The progression of pubertal changes in males is generally associated with a positive self-image. Early-maturing males tend to have greater self-confidence, social, and academic success, whereas later-maturing males are at risk for more internalizing behaviors and diminished self-esteem. Females may initially perceive changes in their physical appearance more negatively. This appears to be especially true for early-maturing females, some of whom experience greater decreases in self-esteem, engage in more disruptive behaviors, and have more conflict with their parents than do on-time or late-maturing females. Early-maturing females may be more comfortable associating with older peers and may subsequently be exposed to peer pressure around things like sexual activity and substance use at younger ages. Still lacking the cognitive skills to effectively navigate these situations, they may be vulnerable to making poor decisions that place their health and safety at risk. Many other factors influence how adolescents experience puberty, and supportive peers and adults can have a positive impact on psychosocial development at any maturational stage. With successful navigation of these domains, emerging adults move into the world with a strong sense of personal identity and their place in society. They are able to work toward a vocation and financial independence and to manage the responsibilities of adulthood.

IMPLICATIONS FOR PROVIDERS, PARENTS, AND POLICYMAKERS

Providers can help parents approach their child's adolescent years by reframing some of the "challenges" of adolescence as normal developmental milestones that should be anticipated and accepted. Puberty and emerging sexuality should be approached as positive and health-affirming life changes, rather than focusing discussions only on the negative reproductive risks and outcomes. Even good-natured teasing about bodily changes can be detrimental to the adolescent's self-image. Early-maturing females and late-maturing males should be supported, recognizing their potential increased exposure to psychosocial challenges. Identification of strengths and emerging positive coping strategies should be promoted in all youth, particularly those with chronic illness or other challenges. Providers need to determine the young adolescent's cognitive development and capacity for abstract thought and tailor their communication and counseling style accordingly. Physical examinations should be performed in private with the parent outside the exam room (provided the adolescent is comfortable with this), which also affords the adolescent and provider an opportunity to discuss confidential issues. Reassurance of normal development should be provided.

As adolescents develop more independence and parent–child conflict peaks, providers should remind parents that this is typical and that arguing does not mean the adolescent does not value the parents' input and perspectives. Although some may rebel initially, most adolescents ultimately adopt a value system very similar to that of their parents. Even if discussions feel ineffective to parents, they should continue to demonstrate and model these values to their child. Similarly, rather than categorically dismissing their child's "negative" interests, such as playing a violent video game, parents should be encouraged to use these opportunities to model critical thinking about the impact of such an activity. Potentially negative peer groups may be approached the same way, while fostering the development of positive peer networks. **Authoritative parenting**, in which clear and appropriate negotiated limits are set in the context of a caring and mutually respectful parent–child relationship, is most strongly associated with positive psychosocial development. Parental connectedness and close supervision or monitoring of the youth's activities and peer group can be protective against early onset of sexual activity and involvement in behaviors that may threaten their safety and can foster positive youth development. Parents should also assume an active role in their adolescent's transition to adulthood to ensure that their child receives appropriate preventive health services.

Parents and providers may each work with adolescents to foster good decision-making. In addition to providing adolescents with accurate and complete health information, the adolescent's cognitive ability to use this information in various contexts must be considered. Visits with providers can be used to promote independence among adolescents by spending time separately with both caregivers and the adolescent, allowing the adolescent space to voice concerns and receive appropriate information about making healthy decisions and recognizing behaviors that may be placing their health at risk.

Adolescents may find themselves needing to make important decisions in highly charged situations where they may be unable to manage their emotions and use their higher cognitive functions to examine the consequences of their decision. For example, a couple in a sexual situation with high emotional arousal may make the decision to proceed with unprotected intercourse. By anticipating this situation ahead of time, under conditions of lower emotional arousal, and making a plan to deal with this, they may make a different decision (e.g., stick with their prior decision never to have sex without protection) when the time comes. Parents and healthcare providers are in a position to encourage and foster this anticipation and planning under conditions of "cool cognition."

Providers may need to help parents distinguish normal adolescent development and risk-taking behaviors from possible signs of a more serious mental health or conduct problem. Bids for **autonomy**, such as avoiding family activities, demanding privacy, and increasing argumentativeness, are normal; extreme **withdrawal** or **antagonism** may be dysfunctional, signaling a mental health or substance use concern. Bewilderment and dysphoria at the start of middle school are normal; continued failure to adapt several months later suggests a more serious problem. Although some degree of risk taking is normal, progressive escalation of risk-taking behaviors is problematic. In general, when the adolescent's behaviors cause significant dysfunction in the domains of home life, academics, or peer relationships, they should be addressed by the parents and healthcare provider, and referral to a mental health provider may be considered. In most cases, parents can be reassured that although adolescence can pose unique challenges, their adolescent, like most adolescents, will come through it to become a successful and happy adult.

At national and international levels, adolescents are at risk for environmental, health, behavioral, and societal challenges. Table 150.4 provides suggestions to address these issues.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

Table 150.4 Recommended Action Bundles* for Adolescent and Young Adult Health Problems and Risks

PROBLEM/ RISK AREA	STRUCTURAL	SOCIAL MARKETING	COMMUNITY INTERVENTIONS, INCLUDING FAMILY	ELECTRONIC HEALTH, MOBILE HEALTH	SCHOOLS	HEALTH SERVICE SECTOR
Sexual and reproductive health, including HIV	***Legislation*** *18 yr as the minimum age of marriage* *Allow provision of contraception to legal minors* *Legalize abortion*	*Promote community support for sexual and reproductive health and HIV health access for adolescents*	**Cash transfer programs, with payments linked to staying in school** *Positive youth development* *Peer education*	*Target knowledge, attitudes, and risk behaviors*	**Quality secondary education** **Comprehensive sexuality education** **Safe schools with clean toilets and facilities for menstrual care** **School-based health services with condoms and modern contraceptives**	**Condoms and affordable modern contraception, including long-acting reversible contraception** **Early HIV and STI diagnosis and treatment** **Male circumcision** **Antenatal, delivery, and postnatal care** *Transition to adult care for HIV*
Undernutrition	**Fortification of foods (e.g., iron, folate)**		**Micronutrient supplements (particularly in pregnancy)** **Protein-energy supplementation** **Deworming** *Cash transfer program* *Nutrition education*		**Micronutrient supplements** **Healthy school meals**	**Screening and micronutrient supplementation**
Infectious diseases			*Deworming* *Bed net distribution*		**HPV vaccination** *Deworming*	**Early identification and treatment** **Adolescent vaccinations (HPV, childhood catch-up)** *Deworming* *Bed net distribution* *Seasonal malaria chemoprevention*
Violence	**Gun control** *Legalize homosexuality and protect women from violence and sexual coercion* *Youth justice reforms to promote second chances and diversion from custody* *16 yr as the minimum age for criminal responsibility*	*Promote knowledge of the effects of violence and available services*	*Promote parent skills and parent–child communication* *Positive youth development* *Promote gender equality* *Economic empowerment* *Group training for awareness, knowledge, and skills*		**Multicomponent interventions that target violent behavior and substance use**	**Trauma care**
Unintentional injury	**Graduated licensing** **Mandatory helmet wearing** **Multicomponent traffic injury control**	*Promote knowledge of risks*	*Police enforcement of traffic injury control*			**Trauma care, including first responders (e.g., ambulances)**
Alcohol and illicit drugs	**Limit alcohol sales to underage adolescents** **Taxation on alcohol** **Drunk-driving legislation** **Restrict illicit alcohol** **Interventions in licensed premises** **Diversion from youth justice and custody** *Graduated drinking*	**Advertising restrictions** *Campaigns to build community awareness*	*Promote parent–child communication and parenting skills* *Needle-syringe exchange access* *Mentoring*	*Target knowledge, attitudes, and risk behaviors*	*Alcohol-free policies*	*Risk screening and motivational interviewing*

Continued

Table 150.4 Recommended Action Bundles for Adolescent and Young Adult Health Problems and Risks—cont'd

PROBLEM/ RISK AREA	STRUCTURAL	SOCIAL MARKETING	COMMUNITY INTERVENTIONS, INCLUDING FAMILY	ELECTRONIC HEALTH, MOBILE HEALTH	SCHOOLS	HEALTH SERVICE SECTOR
Tobacco	**Tobacco control, including taxation, pricing, and advertising control** **Youth access restrictions** **Legislation for smoke-free air**	**Anti-tobacco campaigns**	*Interventions to promote parent skills and parent–child communication*	*Text messaging adjunct to quitting*	*Smoke-free policies* *Multicomponent*	*Routine screening and motivation interviewing to promote cessation*
Mental disorders and suicide	**Restriction of access to means**	*Promote adolescent mental health literacy*	*Gatekeeper training*	*Electronic mental health interventions*	*Educational interventions* *Gatekeeper training* *School-based mental health services*	**Practitioner training in depression recognition and treatment** *Routine assessment of mental health, including self-harm and suicide risk*
Chronic physical disorders			*Peer support initiatives*		*School-based health services*	*Promote self-management* *Promote transition to adult healthcare*
Overweight and obesity	**Taxation of high-sugar, high-salt, and high-fat foods** *Front-of-pack nutrition labels* *Restriction of fast-food advertising*	*Promote physical activity*	*Create opportunities for maintenance of physical activity in daily life*	*Interactive or personalized feedback interventions*	*Multicomponent interventions involving education about healthy diet and increasing opportunities for physical education*	**Manage comorbidities of obesity**

*Actions in **bold** have an evidence base in adolescents and young adults; actions in *italics* are promising but without yet a strong evidence base in adolescents and young adults.
HIV, Human immunodeficiency virus; HPV, human papillomavirus; STI, sexually transmitted infection.
From Patton GC, Sawyer SM, Santelli JS, et al. Our future: a Lancet commission on adolescent health and wellbeing. *Lancet*. 2016;387:2423–2478, p. 2458.

Chapter 151

Delivery of Healthcare to Adolescents

Samantha V. Hill and Tamera Coyne-Beasley

Healthcare providers play an important role in nurturing healthy behaviors among adolescents, because the leading causes of death and disability among adolescents are preventable. Adolescence provides a unique opportunity to prevent or modify health conditions arising from behaviors that develop in the second decade of life and that can lead to substantial morbidity and mortality, such as trauma, suicide, cardiovascular and pulmonary disease, type 2 diabetes, reproductive health issues, and cancer (see Chapter 150, Table 150.4).

Health systems in each community should be in place to ensure comprehensive and high-quality care to adolescents. **Health insurance coverage** that is affordable, continuous, confidential, and not subject to exclusion for preexisting conditions should be available for all adolescents and young adults. **Comprehensive, coordinated benefits** should meet the developmental needs of adolescents, particularly for reproductive, mental health, dental, and substance use services. **Safety net providers and programs** that provide confidential services, such as school-based health centers, federally qualified health centers, family planning services, and clinics that treat sexually transmitted infections **(STIs)** in adolescents and young adults, need to have assured funding for viability and sustainability. **Quality-of-care** data should be collected and analyzed by age so that the performance measures for age-appropriate healthcare needs of adolescents are monitored. **Affordability** is important for access to preventive services. Family involvement should be encouraged, but **confidentiality** and adolescent consent are critically important and should be addressed with intentionality at each visit.

Healthcare providers, trained and experienced in adolescent care, should be available in all communities. Healthcare providers should be adequately compensated to support the range and intensity of services required to address the developmental and health service needs of adolescents. The development and dissemination of provider education about **adolescent preventive health guidelines** have been demonstrated to improve the content of recommended care (Table 151.1). The ease of recognition or expectation that an adolescent's needs can be addressed in a setting relates to the visibility and flexibility of sites and services. Staff at sites should be approachable, linguistically capable, culturally humble, and able to balance trauma-informed care with healing-centered engagement approaches with attention to equity and social determinants of health. Health services should be coordinated to respond to goals for adolescent health at the local, state, and national levels. The coordination should address service financing and delivery in a manner that reduces disparities in care.

Although most adolescents in the United States have seen a healthcare provider in the past year and report a usual source of healthcare, adolescents are less likely to receive preventive care services. According to the 2019 National Health Interview Survey, an estimated 92% of 12- to 17-year-old U.S. adolescents had a well child visit within the past year. Uninsured adolescents are the least likely to receive care. The National Health Interview Survey found that 8% of 15- to 18-year-olds were uninsured, whereas 61% and 31% had private and public insurance in 2016, respectively.

Table 151.1 Bright Futures/American Academy of Pediatrics Recommendations for Preventive Healthcare for 11- to 21-Year-Olds

	PERIODICITY AND INDICATIONS
HISTORY	Annual
MEASUREMENTS	
Body mass index	Annual
Blood pressure	Annual
SENSORY SCREENING	
Vision	At 12 yr and 15 yr visits or if risk assessment positive
Hearing	Screen with audiometry, including 6,000- and 8,000-Hz high frequencies once at 11-14 yr, once at 15-17 yr, and once at 18-21 yr.
DEVELOPMENTAL/BEHAVIORAL ASSESSMENT	
Developmental surveillance	Annual
Psychosocial/behavioral assessment	Annual
Depression screening	Annual for 12 yr and older
Tobacco, alcohol, and drug use assessment	If risk assessment positive
PHYSICAL EXAMINATION	Annual
PROCEDURES	
Immunization*	Annual
Hematocrit or hemoglobin	If risk assessment positive
Tuberculin test	If risk assessment positive
Dyslipidemia screening	Once at 9-11 yr, and once at 17-21 yr
STI screening	If sexually active
HIV screening†	Once between ages 15 and 18 yr Discuss and offer at earlier age and annually if risk assessment positive.
Cervical dysplasia screening‡	Beginning at age 21 yr
ORAL HEALTH	Annual; refer to dental home
ANTICIPATORY GUIDANCE	Annual§

*Schedules per the Advisory Committee on Immunization Practices, published annually at http://www.cdc.gov/vaccines/schedules/hcp/index.html and http://redbook.solutions.aap.org/SS/Immunization_Schedules.aspx.

†The CDC recommends universal, voluntary HIV screening of all sexually active people beginning at age 13 yr. The American Academy of Pediatrics recommends offering routine HIV screening to all adolescents at least once by 16-18 yr of age and to those younger if at risk. The U.S. Preventive Services Task Force recommends offering routine HIV screening to all adolescents age 15 yr and older at least once and to those younger if at risk. Patients who test positive for HIV should receive prevention counseling and referral to care before leaving the testing site.

‡Screening for cervical cancer, April 2012, U.S. Preventive Services Task Force. http://www.uspreventiveservicestaskforce.org/uspstf/uspscerv.htm.

§Refer to specific guidance by age as listed in *Bright Futures* guidelines.

HIV, Human immunodeficiency virus; STI, sexually transmitted infection.

Adapted from 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.

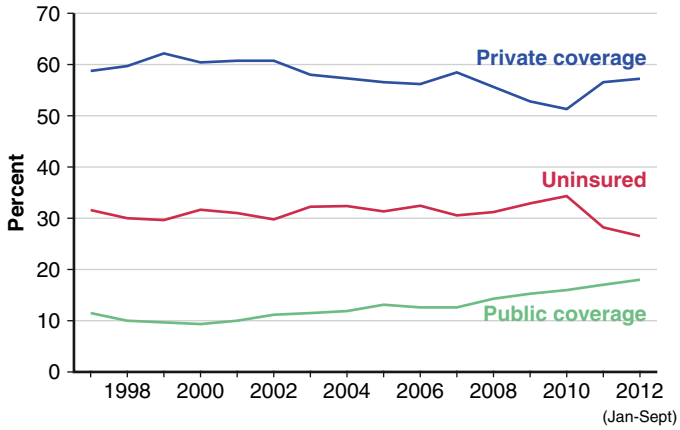

Fig. 151.1 Percentage of adults 19-25 years of age with health insurance by coverage type and percentage uninsured at the time of the interview: United States, 1997 to September 2012. *Note:* Estimates for 2012 are based on data collected in January through September. Data are based on household interviews of a sample of the civilian noninstitutionalized population. (*Data from CDC/NCHS, National Health Interview Survey, 1997–2012, Family Core Component.*)

The **Patient Protection and Affordable Care Act (ACA)** has expanded access to both commercial health plans and Medicaid for young adults age 19-26 years (Fig. 151.1); the proportion of young adults with insurance increased from 65.7% to 73.8%. ACA provisions require that commercial health plans continue dependent coverage to 26 years, regardless of the young adult's financial or dependent status, marriage, or educational enrollment; mandate university and college student health plans enhance consumer protections for students; provide financial assistance for young adults to enroll into health insurance exchanges with incomes ranging from 133% to 399% of the federal poverty level in Medicaid expansion states; and offer preventive healthcare services (to include contraceptive care) free of any cost sharing, deductibles, or copayments. In states that have expanded Medicaid coverage, all adults with incomes <133% of the federal poverty level are eligible to enroll. After passage of the ACA, 14% of 18- to 24-year-olds still remained uninsured.

The complexity and interaction of physical, cognitive, and psychosocial developmental processes during adolescence require sensitivity and skill on the part of the health professional (see Chapter 150). Health education and promotion, as well as disease prevention, should be the focus of every visit (Table 151.2).

The Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices (ACIP) currently recommends routine adolescent vaccines for universal administration beginning at the 11- to 12-year-old visit or as soon as possible: (1) tetanus-diphtheria-acellular pertussis vaccine (Tdap), (2) the meningococcal conjugate vaccine (MCV4) with a booster at age 16 years, (3) the human papillomavirus vaccine (HPV) series, and (4) the COVID-19 vaccine (see Chapter 215). ACIP recommends annual influenza vaccination and hepatitis A virus (HAV) vaccination to adolescents and young adults who have not previously received the HAV vaccine series if immunity against HAV is desired or for those at increased risk for infection, such as men who have sex with men (MSM), injection drug users (IDUs), and those with chronic liver disease or clotting factor disorders, or those who live in endemic areas. Although another meningococcal vaccine (MenB) is not routinely recommended for all adolescents, the ACIP recommends a MenB vaccine series for people ages 16-23 based on shared clinical decision-making with the patient (or parent/guardian) to provide short-term protection against serogroup B meningococcal disease.

The time spent on various elements of the screening will vary with the issues that surface during the assessment. However, time for screening and assessment is important for all adolescents, and the ideal model of adolescent care requires a minimum of 20 minutes per visit. For lesbian, gay, bisexual, trans, intersex, and asexual youth (see Chapters 153 and 154), emotional and psychologic concerns related to their experiences, from fear of disclosure to the trauma of discrimination or bullying or violence, may direct the clinician to spend more time assessing emotional and psychologic supports in the young person's environment. For youth with chronic illnesses or special needs, the assessment of at-risk behaviors should not be omitted or deemphasized by assuming they do not experience the "normal" adolescent vulnerabilities.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

Table 151.2 Adolescent Screening Recommendations

UNIVERSAL SCREENING	11- TO 14-YR-OLD VISIT ACTION	15- TO 17-YR-OLD VISIT ACTION	18- TO 21-YR-OLD VISIT ACTION
Cervical dysplasia*	N/A	N/A	Pap smear all young women at 21 yr visit
Depression	Annual adolescent depression screen beginning at 12 yr visit	Annual adolescent depression screen	Annual adolescent depression screen
Dyslipidemia	Lipid screen once at 9-11 yr	Lipid screen once at 17-21 yr	Lipid screen once at 17-21 yr
Hearing	Once at 11-14 yr Audiometry, including 6,000- and 8,000-Hz high frequencies	Once at 15-17 yr Audiometry, including 6,000- and 8,000-Hz high frequencies	Once at 18-21 yr Audiometry, including 6,000- and 8,000-Hz high frequencies
HIV†	Selective screening (see later)	HIV test once at 15-18 yr	HIV test once at 15-18 yr
Tobacco, alcohol, or drug use	Annual tobacco, alcohol, or drug use screen	Annual tobacco, alcohol, or drug use screen	Annual tobacco, alcohol, or drug use screen
Vision	At 12 yr visit Objective measure with age-appropriate visual acuity measurement using HOTV or Lea symbols, Sloan letters, or Snellen letters	At 15 yr visit Objective measure with age-appropriate visual acuity measurement using HOTV or Lea symbols, Sloan letters, or Snellen letters	N/A

SELECTIVE SCREENING	RISK ASSESSMENT (RA)	11-14 YR OLD VISIT ACTION IF RA+	15-17 YR OLD VISIT ACTION IF RA+	18-21 YR OLD VISIT ACTION IF RA+
Anemia	Positive on risk screening questions	Hemoglobin or hematocrit	Hemoglobin or hematocrit	Hemoglobin or hematocrit
Dyslipidemia (if not universally screened at this visit)	Positive on risk screening questions and not previously screened with normal results	Lipid profile	Lipid profile	Lipid profile
HIV†	Positive on risk screening questions	HIV test	HIV test (if not universally screened at this visit)	HIV test (if not universally screened at this visit)
Oral health (through 16 yr visit)	Primary water source fluoride deficient	Oral fluoridation supplementation	Oral fluoridation supplementation	N/A
STIs				
Chlamydia	Sexually active females	Chlamydia and gonorrhea NAAT (test at all sites where patient engages in sex)	Chlamydia and gonorrhea NAAT (test at all sites where patient engages in sex)	Chlamydia and gonorrhea NAAT (test at all sites where patient engages in sex)
Gonorrhea	Sexually active females			
Syphilis	Sexually active and positive on risk screening questions	Syphilis test	Syphilis test	Syphilis test
Tuberculosis	Positive on risk screening questions	Tuberculin skin test	Tuberculin skin test	Tuberculin skin test
Vision at other ages	Positive on risk screening questions at 11, 13, and 14 yr visits	Objective measure with age-appropriate visual acuity measurement using HOTV or Lea symbols, Sloan letters, or Snellen letters	Objective measure with age-appropriate visual acuity measurement using HOTV or Lea symbols, Sloan letters, or Snellen letters	Objective measure with age-appropriate visual acuity measurement using HOTV or Lea symbols, Sloan letters, or Snellen letters

*Screening for Cervical Cancer. April 2012. U.S. Preventive Services Task Force.

†The Centers for Disease Control and Prevention recommends universal, voluntary HIV screening of all sexually active people beginning at age 13 yr. The American Academy of Pediatrics recommends routine HIV screening offered to all adolescents at least once by 16-18 yr of age and to those younger if at risk. The U.S. Preventive Services Task Force recommends routine HIV screening offered to all adolescents age 15 yr and older at least once and to those younger if at risk. Patients who test positive for HIV should receive prevention counseling and referral to care before leaving the testing site.

NA, Not applicable; NAAT, nucleic acid amplification test; STIs, sexually transmitted infections.

Adapted from 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 and Bright Futures/American Academy of Pediatrics: Recommendations for Preventive Pediatric Health Care (Periodicity Schedule), 2017. https://www.aap.org/en-us/Documents/periodicity_schedule.pdf.

151.1 Legal Issues

Samantha V. Hill and Tamera Coyne-Beasley

The rights of an individual, including those of adolescents, vary widely between nations. In the United States, the right of a minor to consent to treatment without parental knowledge differs between states and is governed by **state-specific minor consent laws**. Some consent laws are based on a minor's status, such as minors who are emancipated, parents, married, pregnant, in the armed services, or mature. In some states, minors can be considered *emancipated* if they are or have served in the armed services or are living apart from parents and are economically independent through gainful employment. A *mature minor* is a minor who is emotionally and intellectually mature enough to give informed consent and who lives under the supervision of a parent or guardian. Courts have held that if a minor is mature, a physician is not liable for providing beneficial treatment. There is no formal process for recognition of a mature minor. The determination is made by the healthcare provider.

Some minor consent laws are based on services a minor is seeking, such as emergency care, sexual healthcare, substance abuse, or mental healthcare (Table 151.3). All 50 states and the District of Columbia explicitly allow minors to consent for their own health services for **STIs**. Approximately 25% of states require that minors be a certain age (generally 12-14 years) before they can consent for their own care for STIs. No state requires parental consent for STI care or requires that providers notify parents that an adolescent minor child has received STI services, except in limited or unusual circumstances.

Minors' right to consent for **contraceptive services** varies from state to state. Almost 50% of states and the District of Columbia explicitly authorize all minors to consent for their own contraceptive services, and 50% of states permit minors to consent for their own contraceptive services under specific circumstances, such as being married, a parent, currently or previously pregnant, over a certain age, or a high school graduate, or per physician's discretion. The FDA has approved a nonprescription daily oral contraceptive (norgestrel) intended to reduce barriers to access to an effective birth control measure.

A minor's right to consent for **mental healthcare** and **substance use** treatment services varies by state and age of the minor, whether care is medical vs nonmedical (e.g., counseling), and whether care is delivered as an inpatient vs outpatient basis. Minor consent laws often contain provisions regarding confidentiality and disclosure, even when general state consent laws do not have such provisions.

The **confidentiality** of medical information and records of a minor who has consented for his or her own *reproductive healthcare* is governed by numerous federal and state laws. Laws in some states explicitly protect the confidentiality of STI or contraceptive services for which minors have given their own consent and do not allow disclosure of the information without the minor's consent. In other states, laws grant physicians discretion to disclose information to parents.

The confidentiality of medical information and records of a minor who has consented for their own healthcare is also governed by numerous federal and state laws. Laws in some states explicitly protect the confidentiality of STI, contraceptive, or mental health services for which minors have given their own consent and do not allow disclosure of the information without the minor's consent. In other states, laws grant physicians discretion to disclose information to parents. Title X and Medicaid both provide confidentiality protection for family planning services provided to minors with funding from these programs.

Federal regulations issued under the Federal Health Insurance Portability and Accountability Act, known as the **HIPAA Privacy Rule**, defer to state and "other applicable laws" with respect to the question of whether parents have access to information about care for which a minor has given consent. Thus both the state laws that either prohibit or permit disclosure of confidential information and the federal Title X and Medicaid laws that protect the confidentiality of care for adolescents are important under the HIPAA Privacy Rule in determining when confidential information about health services for minors can be disclosed to parents.

Billing for confidential services is complex. Commercial health plans send home an *explanation of benefit (EOB)* to the primary insured or the primary beneficiary, listing services rendered by the provider and reimbursed by the health plan. An EOB documenting that confidential health services were rendered to their adolescent dependent that is received by a parent may disclose those services. In addition, copayments automatically generated with certain billing codes for office visits and medications can be a barrier for adolescents receiving care, including treatment. One way to circumvent a breach of confidentiality from EOBs is to have the adolescent call the insurance company; however, this can be a time-consuming process.

Table 151.3 Types of Minor Consent Statutes or Rules of Common Law That Allow for Medical Treatment of a Minor Patient Without Parental Consent

LEGAL EXCEPTIONS TO INFORMED CONSENT REQUIREMENT	MEDICAL CARE SETTING
The "emergency" exception	• The child is suffering from an emergent condition that places his or her life or health in danger • The child's legal guardian is unavailable or unable to provide consent for treatment or transport • Treatment or transport cannot be safely delayed until consent can be obtained • The professional administers only treatment for emergent conditions that pose an immediate threat to the child
The "emancipated minor" exception	• Married • Economically self-supporting and not living at home • Active-duty status in the military • In some states, a minor who is a parent or pregnant • Some states might require a court to declare the emancipation of a minor
The "mature minor" exception	Most states recognize a mature minor, in which a minor, usually ≥14 yr, displays sufficient maturity and intelligence to understand and appreciate the benefits, risks, and alternatives of the proposed treatment and to make a voluntary and reasonable choice on the basis of that information; states vary or whether a judicial determination is required
Exceptions based on specific medical condition (state laws vary)	Minor seeks: • Mental health services • Pregnancy and contraceptive services • Testing or treatment for HIV infection or AIDS • Sexually transmitted infection testing and treatment • Drug and alcohol addiction treatment

Data from American Academy of Pediatrics: consent for emergency medical services for children and adolescents. *Pediatrics* 2011;128:427–433.

In March 2020, in response to the COVID-19 pandemic, the Coronavirus Aid, Relief, and Economic Security Act (CARES Act) was passed. Part of this act requires rapid release of all patient documentation (e.g., notes, laboratory results, problem and medication lists) and poses a new challenge to the provision of confidential health services to adolescents.

Providers may elect to establish a policy of discussing with their adolescent patients when medical records and other information will be disclosed and developing a mechanism to alert office staff as to what information in the chart is confidential. For legal and other reasons, a chaperone should be present whenever an adolescent patient's genitalia is examined.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

151.2 Screening Procedures

Samantha V. Hill and Tamera Coyne-Beasley

INTERVIEWING THE ADOLESCENT

The preparation for a successful interview with an adolescent patient varies based on the history of the relationship with the patient. Patients (and their parents) who are going from preadolescence to adolescence while seeing the same provider should be guided through the transition. Although the rules for confidentiality are the same for new and continuing patients, the change in the **physician–patient relationship**, allowing more privacy during the visit and more autonomy in the health process, may be threatening for the parent and the adolescent. For new patients, the initial phases of the interview are more challenging given the need to establish rapport rapidly with the patient in order to meet the goals of the encounter. Issues of **confidentiality and privacy** should be explicitly stated along with the conditions under which that confidentiality may need to be altered, that is, in life- or safety-threatening situations. For new patients, the parents should be interviewed with the adolescent or before the adolescent to ensure that the adolescent does not perceive a breach of confidentiality. The clinician who takes time to listen, avoids judgmental statements and the use of street jargon, and shows respect for the adolescent's emerging maturity will have an easier time communicating with the adolescent. The use of *open-ended questions,* rather than closed-ended questions, will further facilitate history taking. (The closed-ended question, "Do you get along with your father?" leads to the answer "yes" or "no," in contrast to the question, "What might you like to be different in your relationship with your mother?" which may lead to an answer such as, "I would like her to stop always worrying about me.")

The goals of the interview or clinical encounter are to establish an information base, identify problems and issues from the patient's perspective, and identify problems and issues from the perspective of the clinician, based on knowledge of the health and other issues relevant to the adolescent age-group. The adolescent should be given an opportunity to express concerns and the reasons for seeking medical attention. The adolescent and the parent should be allowed to express the strengths and successes of the adolescent, in addition to communicating problems.

The effectiveness of an interview can be compromised when the interviewer is distracted by other events or individuals in the office, when extreme time limitations are obvious to either party, or when there is expressible discomfort with either the patient or the interviewer. The need for an **interpreter** when a patient is hearing impaired or **a translator** if the patient and interviewer are not language compatible provides a challenge, but not necessarily a barrier, under most circumstances (see Chapter 12). Observations during the interview can be useful to the overall assessment of the patient's maturity, presence or absence of depression, and the parent–adolescent relationship. Given the key role of a successful interview in the screening process, excellent training and experience should be sought by clinicians providing comprehensive care to adolescent patients.

PSYCHOSOCIAL ASSESSMENT

A few questions should be asked to identify the adolescent who is having difficulty with **peer relationships** (Do you have a best friend with whom you can share even the most personal secret?), **self-image** (Is there anything you would like to change about yourself?), **depression** (In the past year have you felt depressed or sad most days, even if you felt okay sometimes?), **school** (How are your grades this year compared with last year?), **personal decisions** (Are you feeling pressured to engage in any behavior for which you do not feel you are ready?), **substance use** (Have you ever tried smoking, vaping, alcohol, weed, or prescription drugs that were not prescribed for you?), and an **eating disorder** (Do you ever feel that food controls you, rather than vice versa?). Standardized screening for depression with validated tools such as the PH-Q9 modified for teens is also helpful. The **HEADS/SF/FIRST** mnemonic, basic or expanded, can be useful in guiding the interview if encounter forms are not available (Table 151.4). Based on the assessments,

Table 151.4 Adolescent Psychosocial Assessment: HEADS/SF/FIRST Mnemonic

***H*ome.** Space, privacy, frequent geographic moves, neighborhood
***E*ducation/School.** Frequent school changes, repetition of a grade/in each subject, teachers' reports, vocational goals, after-school educational clubs (e.g., language, speech, math), learning disabilities
***A*buse.** Physical, sexual, emotional, verbal abuse; parental discipline
***D*rugs.** Tobacco, electronic cigarettes or vaping devices, alcohol, marijuana, inhalants, "club drugs," "rave" parties, others; drug of choice, age at initiation, frequency, mode of intake, rituals, alone or with peers, quit methods, number of attempts
***S*afety.** Seat belts, helmets, sports safety measures, hazardous activities, driving while intoxicated
***S*exuality/*S*exual Identity.** Reproductive health (use of contraceptives, presence of sexually transmitted infections, feelings, pregnancy)
***F*amily and *F*riends**
Family: Family constellation; genogram; single/married/separated/divorced/blended family; family occupations and shifts; history of addiction in first- and second-degree relatives; parental attitude toward alcohol and drugs; parental rules; chronically ill, physically or mentally challenged parent
Friends: Peer cliques and configuration ("preppies," "jocks," "nerds," "computer geeks," cheerleaders), gang or cult affiliation
***I*mage.** Height and weight perceptions, body musculature and physique, appearance (including dress, jewelry, tattoos, body piercing as fashion trends or other statement)
***R*ecreation.** Sleep, exercise, organized or unstructured sports, recreational activities (television, video games, computer games, internet and chat rooms, church or community youth group activities [e.g., Boy (BSA)/Girl Scouts; Big Brother/Sister groups, campus groups]). How many hours per day, days per week involved?
***S*pirituality and Connectedness.** Use HOPE* or FICA† acronym; adherence, rituals, occult practices, community service or involvement
***T*hreats and Violence.** Self-harm or harm to others, running away, cruelty to animals, guns, fights, arrests, stealing, fire setting, fights in school

*HOPE, *H*ope or security for the future; *o*rganized religion; *p*ersonal spirituality and *p*ractices; *e*ffects on medical care and end-of-life issues.
†FICA, *F*aith beliefs; *i*mportance and influence of faith; *c*ommunity support.
From Dias PJ: Adolescent substance abuse: assessment in the office. *Pediatr Clin North Am* 2002;49:269–300.

appropriate counseling or referrals are recommended for more thorough probing or for in-depth interviewing.

PHYSICAL EXAMINATION

Vision Testing

The pubertal growth spurt may involve the optic globe, resulting in its elongation and myopia in genetically predisposed individuals (see Chapter 658). Vision testing should therefore be performed to detect this problem before it affects school performance.

Audiometry

Highly amplified music of the kind enjoyed by many adolescents may result in hearing loss or tinnitus (see Chapter 676). A hearing screening is recommended by the *Bright Futures* guidelines for adolescents who are exposed to loud noises regularly, have had recurring ear infections, or report problems.

Blood Pressure Determination

Criteria for a diagnosis of hypertension are based on age-specific norms that increase with pubertal maturation (see Chapter 471). Individuals younger than 13 years old whose blood pressure (BP) exceeds the 95th percentile for their age are suspect for having hypertension, regardless of the absolute reading, and a BP between the 90th and 95th percentiles should receive appropriate counseling relative to weight and have a follow-up examination in 6 months. Individuals 13-18 years old with a BP of 130-139/80-89 are suspect for having hypertension, and those with a BP of 120-129/80 should receive appropriate counseling relative to weight and have a follow-up examination in 6 months. Those with elevated BPs should have their BP measured on three separate occasions to determine the stability of the elevation before moving forward with an intervention strategy. The technique is important; false-positive results may be obtained if the cuff covers less than two thirds of the upper arm. The patient should be seated, and an average should be taken of the second and third consecutive readings, using the change rather than the disappearance as the diastolic pressure. Most adolescents with BP elevation have labile hypertension. If BP is below 2 standard deviations (SD) for age, anorexia nervosa and Addison disease should be considered.

Scoliosis

See Chapter 720.

Approximately 5% of male and 10–14% of female adolescents have a mild curvature of the spine. This is 2-4 times the rate in younger children. Scoliosis is typically manifested during the peak of the height velocity curve, at approximately 12 years in females and 14 years in males. Females should be screened twice, once between 11 and 12 and again between 13 and 14, and males should be screened between 12 and 13. Curves measuring >10 degrees should be monitored by an orthopedist until growth is complete.

Breast Examination

See Chapters 158 and 588.

Visual inspection of the young and middle adolescent female's breasts is performed to evaluate progression of sexual maturation and provide reassurance about development. The American Cancer Society no longer recommends a clinical breast exam as a screening method for women in the United States. Breast self-exam is also no longer recommended as an option for women of any age.

Scrotum Examination

Visual inspection of the young and middle adolescent male testicles is performed to evaluate progression of sexual maturation and provide reassurance about development. The peak incidence of germ cell tumors of the testes is in late adolescence and early adulthood. Because varicoceles often appear during puberty, the examination also provides an opportunity to explain and reassure the patient about this entity (see Chapter 582). Self-examination is no longer recommended because of the low incidence and high recovery rates of testicular cancer in this age-group. Palpation of the scrotum along with visual inspection should be performed to document bilaterally descended testicles.

Pelvic Examination

See Chapter 585.

Laboratory Testing

The increased incidence of iron-deficiency anemia after menarche directs the performance of a hematocrit annually in females with moderate to heavy menses. The reference standard for this test changes with progression of puberty, as estrogen suppresses erythropoietin (see Chapter 496). Populations with nutritional risk should also have the hematocrit monitored. Androgens have the opposite effect, causing the hematocrit to rise during male puberty; sexual maturity rating (SMR) 1 males have an average hematocrit of 39%, whereas those who have completed puberty (SMR 5) have an average value of 43%. **Tuberculosis (TB)** testing is important in adolescents with risk factors, such as an adolescent with HIV, living in a household with someone with HIV, incarcerated, homeless, from a country where TB is common, or those with other risk factors, because puberty has been shown to activate this disease in those not previously treated. **Hepatitis C virus (HCV)** screening should be offered to all adolescents 18 years and older regardless of their risks. It should also be offered to adolescents who report risk factors, such as IDU, received blood products or organ donation before 1992, or long-term hemodialysis. The rate of acute hepatitis C has remained the highest among persons age 20-39 years, similar to age-groups at highest risk for fatal overdose in the United States and age at initiation of IDU among certain U.S. populations. Compared with 2018, the greatest increase in the rates of acute hepatitis C were observed among those age 40-49 years (31% increase), followed by those age 30-39 years (23% increase). For the first time in more than a decade, the rate of acute hepatitis C decreased slightly among those age 20-29 years. Rates have consistently been lowest among those age <20 years or ≥60 years. Sexually active adolescents should undergo screening for **STIs** per CDC guidelines, regardless of symptoms (see Chapter 163). There are clear indications for chlamydia and gonorrhea screening of females ≤24 years old, but less sufficient evidence to support routine screening in young men. Based on feasibility, efficacy, and cost-effectiveness, evidence is insufficient to recommend routine chlamydia screening in all sexually active young men. However, screening of sexually active young males should be considered in clinical settings associated with a high prevalence of chlamydia (e.g., adolescent clinics, correctional facilities, sexually transmitted disease clinics) and should be offered to all young MSM. **HIV** screening should be discussed and offered at least once to all adolescents age 15-18 years and to younger and older adolescents who are at increased risk. Routine screening of adolescents who are asymptomatic for certain STIs (e.g., syphilis, trichomoniasis, herpes simplex virus, HPV) is not recommended. However, young MSM and pregnant adolescent females might require more thorough evaluation for all sexually transmitted diseases. Because cervical cancer incidence is low and complications from procedures may outweigh benefits of screening adolescent females, cervical cancer screening should not begin until age 21 years.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

Chapter 152

Transitioning to Adult Care

Joseph M. Truglio and Nikita Barai

The importance of thoughtfully and intentionally transitioning care of adolescents from pediatric to adult services, particularly for adolescents with **special healthcare needs (SHCN)**, has been recognized for more than 2 decades. The Society of Adolescent Health and Medicine defines health care transitions as "the purposeful, planned movement of adolescents and young adults (AYA) with chronic physical and medical conditions from child-centered to the adult-oriented health care system." For adolescents with SHCN, successful transition is associated with improved health outcomes and quality of life, whereas poorly managed transitions may lead to loss of a medical home and worsening of chronic disease control. All adolescents, regardless of SHCN, are likely to benefit from the autonomy, continuity of care, and self-management skills that are facilitated by a successful transition.

Guidelines emphasize that **transition** is a process, not an event, and encompasses much more than simply the transfer of care from one clinician to another. The guidelines make recommendations and provide practice-based resources for implementing elements of transition support in pediatric, family medicine, internal medicine, and combined internal medicine–pediatric practices. This includes providing assistance for the patient in adapting to an adult model of healthcare delivery as they transition from one practice/clinician to another or as they transition between models of care within the same practice. It also emphasizes the importance of the many members of the patient's care team (primary and specialty care, physical and occupational therapy, school and/or vocational support, mental health clinicians, and so on) that support the patient before, during, and after the transition process. Table 152.1 represents the key elements of healthcare transition. Tools to assist providers with these steps are available online from the National Center for Health Care Transition Improvement (www.gottransition.org).

The process begins with the development of a transition policy and its dissemination to all families of young adolescents, ensuring families understand that transition planning will be an element of health maintenance and chronic care management visits throughout the adolescent years. By middle adolescence, a transition plan should be developed with the youth and family caregivers and updated at subsequent visits until the patient is ready for implementation of the adult care model in early adulthood. Periodic **readiness assessments** are key to planning and anticipating challenges. Critical to the transition process is **skills training** for the adolescent in communication, self-advocacy, and self-care. Some youth with SHCN depend on caregivers for navigating the healthcare system on their behalf, and it is not realistic to expect increased independence. For these youth, addressing guardianship, long-term care planning, and advance directives are important. **Care coordination** facilitates navigation and engagement in an adult-oriented health system, especially for adolescents with SHCN. The goal is to help all youth maximize their potential as they become young adults.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

Table 152.1 Key Elements of the Transition of Healthcare Process

- **Written transition policy** to be shared with youth, families, providers, and staff, explaining the process and the responsibilities of all team members
- **Transitioning youth registry** to track the progress of each patient through the transition process
- **Longitudinal readiness checklists** assessing the youth's ability for independence, self-management, and communicating with the adult healthcare system, as well as the family's readiness to assist the patient in achieving these goals
- **Written transition plan** documenting the steps to be conducted to meet the needs identified in the readiness assessment and identifying appropriate adult care resources
- For youth with SHCN, expanded transition services, including attention to insurance, entitlements, guardianship, and vocational needs, in addition to adult subspecialty care
- Appropriate communication between the pediatric and adult medical home and subspecialists, including a **portable medical summary** and care plan delivered to the patient and caregivers
- Transfer of care, within the 18- to 21-yr-old range, to adult providers, to whom pediatric providers continue to serve as a resource until transition is complete

Chapter 153

Gender Identity and Transgender Care

Abby Walch and Stephen M. Rosenthal

TERMINOLOGY

Sex refers to the physical or genetic characteristics that differentiate between biologic maleness or femaleness (e.g., sex chromosomes, gonads, internal and external genital structures). **Sex designated (assigned) at birth** is typically based on the appearance of the external genitalia. In the absence of atypical genitalia, which may indicate a difference of sexual development requiring further evaluation, sex is designated at birth as either male or female.

Gender identity refers to one's internal core sense of gender. Gender is not binary, and although most people identify their gender as being male (boy or man) or female (girl or woman), others may identify as both, neither, or another gender completely. The gender identity of an individual cannot be known until they reach a certain level of psychosocial development and self-awareness to identify it themself. Development of gender identity likely results from a complex interplay of biologic, environmental, and cultural factors. This concept is supported by compelling studies in several biomedical disciplines including genetics, endocrinology, and neurology. **Gender expression** refers to one's external manifestations of gender (e.g., choice of name, pronouns, clothing, hairstyle), whereas **gender role** describes the behaviors, attitudes, and personality traits considered to be masculine or feminine by a society or culture during a particular period.

Many cultures recognize and accept as normal more than two genders. In the Philippines, *Bakla* is considered a third gender; many are community leaders. In India, the third gender is *Hijras,* and Aboriginal (Australian) terms such as *brotherboy* and *sistergirl* are used to refer to transgender and gender-diverse people.

Indigenous Nations (America) peoples may have three to five genders: male, female, Two Spirits female, Two Spirits male, and transgender. Navajo refer to Two Spirits as *Nádleehí* (transformed), and the Cheyenne term for Two Spirits is *Hemaneh* (half man, half woman). In all these societies, Two Spirits people are honored and often leaders in their tribe.

Cisgender refers to people who have a gender identity that aligns with their sex designated at birth. **Gender incongruence** is the term used when gender identity does not align with the sex designated at birth. **Transgender and gender diverse (TGD)** is an umbrella term used to describe a diverse group of people with gender incongruence. *All TGD gender identities are normal, healthy variations within the spectrum of possible gender identities.* Individuals with gender identities that are not exclusively male or female may describe themselves as **gender nonbinary**, **genderqueer**, or **genderfluid**. Some of these individuals may also identify as transgender while others may not.

Gender dysphoria refers to the distress experienced by TGD individuals caused by gender incongruence. This term replaced "gender identity disorder" in the most recent *Diagnostic and Statistical Manual of Mental Disorders* (DSM)-5 published in 2013, focusing the clinical concern on the distress an individual may experience because of gender dysphoria and underscoring the *nonpathologic* nature of TGD gender identities. Not all TGD individuals experience gender dysphoria, and use of this term, although sometimes necessary to obtain gender-affirming therapies, may be considered offensive and stigmatizing by some.

It is important to distinguish gender identity as separate from **sexual orientation**, which refers to an individual's sexual attraction to another person. Gender identity does not predict sexual orientation, and a person with any gender identity may have any sexual orientation.

EPIDEMIOLOGY

Early studies likely underestimated the size of the TGD population due to reliance on reports of individuals who accessed gender-related mental health or medical care and because of the lack of questions related to gender identity on population-based surveys. With newer study methods and increased societal recognition and acceptance of the diverse spectrum of genders, it is now evident that the prevalence of TGD persons is higher than previously thought. With improved access to multidisciplinary gender clinics, TGD youth are seeking gender-affirming medical treatment at increasing rates.

In 2022, a report from the Williams Institute of the University of California Los Angeles School of Law, informed by the Center for Disease Control and Prevention's (CDC's) Behavior Risk Factor Surveillance System and the Youth Risk Behavior Survey carried out from 2017 to 2020 and 2017 to 2019, respectively, revealed that 0.5% of U.S. adults (18 years and older) and 1.4% of adolescents and young adults (13-17 years) identify as transgender. A population-based study of self-reported gender identity in high school students carried out in Minnesota in 2016 reported a 2.7% prevalence of TGD individuals. An international review in 2016 estimated the TGD population worldwide to be 25 million with 0.5–1.3% of birth-designated males and 0.4–1.2% of birth-designated females having TGD gender identities.

There has been a striking inversion in the sex ratio of TGD youth seeking services for gender dysphoria. Reports from Europe and North America prior to 2005–2006 revealed a predominance of birth-designated males. Since then, and for unclear reasons, there has been a predominance of birth-designated females. A 2017 survey of 25 gender centers in the United States, Europe, and Chile demonstrated that 63% of youth being treated were transitioning from female to male.

Clinical Presentation

TGD youth may recognize and reveal their gender identity to others at any age. Some will communicate their identity in early childhood as soon as they are able to talk. Others may not acknowledge or share their identity until adulthood, largely influenced by a cis-heteronormative society in which TGD individuals encounter significant oppression and discrimination. What is evident is the importance of accepting and valuing the gender identities as reported by TGD children at any point in time and the recognition that gender may not be binary and may change over time.

Gender incongruence that occurs in young children does not invariably persist into adolescence and adulthood. Studies based on earlier versions of the DSM demonstrate that gender dysphoria or gender incongruence in prepubertal children persists in a minority of these individuals. Future studies may reveal different persistence rates, as DSM-5 criteria for the diagnosis of gender dysphoria are narrower compared to previous versions. Although it is currently not possible to predict which children will persist in their asserted TGD identity, certain factors are associated with persistence of a TGD identity. Receipt of a gender dysphoria diagnosis in childhood, increased intensity of gender dysphoria as measured on gender dysphoria scales, social gender transition in childhood, sex designated as female at birth, and older age at clinic intake have been associated with higher persistence rates of TGD identities. Although not well studied, the assigned male at birth verbal toddler who asserts "I am a girl" (rather than "I want to be a girl") has a high likelihood of persistence.

Recognition that social gender transition in prepubertal children is associated with a higher likelihood of persistence should not prevent children from making this transition. Social transition, when completed early, may result in more favorable outcomes for some TGD children and should be done with input from a qualified mental health provider. Currently, persistence of gender incongruence and gender dysphoria can only reliably be assessed after the onset of puberty. Gender dysphoria that emerges or worsens with puberty onset is associated with a very high rate of persistence of that individual's TGD identity into adulthood, an observation that is fundamental to the rationale for the provision of medical interventions in TGD youth who meet criteria for treatment.

Diagnostic Evaluation

Optimally, the diagnostic evaluations of TGD youth are performed by a multidisciplinary team comprising medical and mental health professionals. Current clinical practice guidelines recommend that gender incongruence and gender dysphoria be diagnosed by a qualified mental health gender specialist after a thorough psychodiagnostic evaluation. Specific criteria for the mental health gender specialist in their role providing care for TGD youth are outlined elsewhere, whereas the recommendations in this chapter are intended for medical providers.

Although the involvement of a mental health gender specialist in the diagnostic evaluation of TGD youth is recommended by current clinical practice guidelines prior to initiating any medical therapies, it is recognized that this may not always be possible. Mental health gender specialists may be inaccessible in certain areas, and the insistence that a TGD child establish mental healthcare in this circumstance could delay care indefinitely. Additionally, if an early pubertal TGD child presents with significant gender dysphoria, and if requiring input from a mental health gender specialist before initiating puberty blockers would create a significant delay in care, resulting in the development of irreversible secondary sexual characteristics, this could be harmful. Therefore in limited circumstances it may be reasonable to initiate gender-affirming medical therapies without input from a mental health gender specialist, though with the increasing use of telehealth, there may be greater access to mental health gender specialists. Providers involved in the diagnostic evaluation of TGD youth should be thoughtful about their strengths and limitations and refer for further evaluation as needed to provide optimal care.

At the initial clinic visit, medical providers should obtain information from TGD youth and their families about the child's gender journey. This information should include their current understanding of their gender identity, challenges faced in addition to support received in their families and surrounding communities, any distress associated with their body and if so whether it changed with puberty, and a full medical and mental health history. After obtaining this information, in TGD youth seeking gender-affirming medical therapies, the medical provider then must decide whether the individual fulfills criteria for treatment (Table 153.1) for gender dysphoria/gender incongruence according to the DSM-5 (Table 153.2).

Table 153.1 Criteria for Gender-Affirming Hormone Therapy for Adolescents

Adolescents are eligible for GnRH agonist treatment if:

1. A QUALIFIED MHP HAS CONFIRMED THAT:
   - The adolescent has demonstrated a long-lasting and intense pattern of gender nonconformity or gender dysphoria (whether suppressed or expressed)
   - Gender dysphoria worsened with the onset of puberty
   - Any coexisting psychologic, medical, or social problems that could interfere with treatment (e.g., that may compromise treatment adherence) have been addressed, such that the adolescent's situation and functioning are stable enough to start treatment
   - The adolescent has sufficient mental capacity to give informed consent/assent to this (reversible) treatment
2. AND THE ADOLESCENT:
   - Has been informed of the effects and side effects of treatment (including potential loss of fertility if the individual subsequently continues with sex hormone treatment) and options to preserve fertility
   - Has given informed consent/assent and (particularly when the adolescent has not reached the age of legal medical consent, depending on applicable legislation) the parents or other caretakers or guardians have consented to the treatment and are involved in supporting the adolescent throughout the treatment process
3. AND A PEDIATRIC ENDOCRINOLOGIST OR OTHER CLINICIAN EXPERIENCED IN PUBERTAL ASSESSMENT:
   - Agrees with the indication for GnRH agonist treatment
   - Has confirmed that puberty has started in the adolescent (Tanner stage ≥G2/B2)
   - Has confirmed that there are no medical contraindications to GnRH agonist treatment

Adolescents are eligible for subsequent sex hormone treatment if:

1. A QUALIFIED MHP HAS CONFIRMED:
   - The persistence of gender dysphoria
   - Any coexisting psychologic, medical, or social problems that could interfere with treatment (e.g., that may compromise treatment adherence) have been addressed, such that the adolescent's situation and functioning are stable enough to start sex hormone treatment
   - The adolescent has sufficient mental capacity (which most adolescents have by age 16 years) to estimate the consequences of this (partly) irreversible treatment, weigh the benefits and risks, and give informed consent/assent to this (partly) irreversible treatment
2. AND THE ADOLESCENT:
   - Has been informed of the (irreversible) effects and side effects of treatment (including potential loss of fertility and options to preserve fertility)
   - Has given informed consent/assent and (particularly when the adolescent has not reached the age of legal medical consent, depending on applicable legislation) the parents or other caretakers or guardians have consented to the treatment and are involved in supporting the adolescent throughout the treatment process
3. AND A PEDIATRIC ENDOCRINOLOGIST OR OTHER CLINICIAN EXPERIENCED IN PUBERTAL INDUCTION:
   - Agrees with the indication for sex hormone treatment
   - Has confirmed that there are no medical contraindications to sex hormone treatment

MHP, mental health professional.
Data from Coleman E, Radix AE, Bouman WP, et al. Standards of care for the health of transgender and gender diverse people, Version 8. *Int J Transgend Health*. 2022;23(Suppl 1):S1-S259.

Table 153.2 DSM-5 Criteria for Gender Dysphoria in Adolescents and Adults

A. A marked incongruence between one's experienced/expressed gender and natal gender of at least 6 mo in duration, as manifested by at least two of the following:
   1. A marked incongruence between one's experienced/expressed gender and primary and/or secondary sex characteristics (or in young adolescents, the anticipated secondary sex characteristics)
   2. A strong desire to be rid of one's primary and/or secondary sex characteristics because of a marked incongruence with one's experienced/expressed gender (or in young adolescents, a desire to prevent the development of the anticipated secondary sex characteristics)
   3. A strong desire for the primary and/or secondary sex characteristics of the other gender
   4. A strong desire to be of the other gender (or some alternative gender different from one's designated gender)
   5. A strong desire to be treated as the other gender (or some alternative gender different from one's designated gender)
   6. A strong conviction that one has the typical feelings and reactions of the other gender (or some alternative gender different from one's designated gender)

B. The condition is associated with clinically significant distress or impairment in social, occupational, or other important areas of functioning

Specify if:

1. The condition exists with a disorder of sex development
2. The condition is posttransitional, in that the individual has transitioned to full-time living in the desired gender (with or without legalization of gender change) and has undergone (or is preparing to have) at least one sex-related medical procedure or treatment regimen—namely, regular sex hormone treatment or gender reassignment surgery confirming the desired gender (e.g., penectomy, vaginoplasty in natal males; mastectomy or phalloplasty in natal females)

From the *Diagnostic and Statistical Manual of Mental Disorders*, 5th ed. Copyright 2013. American Psychiatric Association.

Gender-Affirmative Care

TGD youth have historically faced high rates of discrimination and barriers in medical care settings. Pediatric primary care providers play a vital role in assessing the gender identities of their patients during routine well child checks, and they should be relied upon as a trusted source of validation, support, and reassurance to TGD youth and their families (Table 153.3). If a provider feels unable to address gender-related issues, then referral to another provider who can is recommended. If additional information on gender-affirming medical therapies is desired, referral to a provider with expertise in the care of TGD youth is appropriate. Available resources for youth, family, and providers are noted in Table 153.4.

Pediatric providers should follow a gender-affirmative care model (GACM) in their practices. In a GACM, providers offer a supportive, open-minded environment while facilitating discussion and exploration of their patients' gender identities. Within this care model, the following messages are relayed: (1) TGD identities and diverse gender expressions are normal, healthy variations, (2) gender identity develops through a complex interplay of biologic, environmental, and cultural factors, and (3) coexisting mental health issues are more often *caused* by stigma and discrimination than by internal psychologic disturbances within the TGD child. Key components of gender-affirming clinics are highlighted in Figure 153.1.

Pediatric providers should help TGD youth explore the various options available for gender affirmation. Some TGD youth will require medical or surgical interventions for affirmation of their gender, whereas others will not. Social transition is a nonmedical intervention that may occur gradually or all at once. It may occur in only some environments and not in others, or it may occur in all spaces in which TGD individuals find themselves. Social transition may include adaptions to name and/or pronouns, changes to hairstyle and/or clothing, use of devices to hide unwanted physical features (e.g., binders to create a smoother contour of the chest) or to create the appearance of desired physical features (e.g., packers to achieve the appearance of a genital bulge), and steps to access appropriate restroom facilities at school, work, or other public locations. Social transition may also include legal

Table 153.3 Strategies for Supporting TGD Youth

DOMAIN	STRATEGIES
Clinical settings	Use of affirmed name and pronouns in clinical spaces and inclusion of this information in the electronic medical record (EMR) Training for clinical staff Use of affirming imagery, inclusive intake forms Gender-neutral bathroom spaces Open-ended, nonjudgmental discussion about gender identity Sensitive, trauma-informed care History taking using nongendered language
Relationships with family/ caregivers	Assistance with disclosure of identity to family when desired by the youth Psychoeducation on gender development and the benefits of supporting TGD youth Promoting practices such as use of affirmed name and pronouns Education about social transitioning Providing space and support for parents to express concerns without youth present Support for disclosure to extended family or other important people Referrals to support groups or family counseling
Educational settings	Education for school staff on gender concepts and zero tolerance for transphobia Advocating for the use of affirmed name and pronouns Advocacy for inclusive sexual education curriculum Advocacy for youth to use preferred bathrooms, locker rooms, and dorms and participate with desired sports teams
Public identification	Assistance with documentation for changing legal name and/or gender marker Documentation of the patient's gender identity to ensure safe passage during travel

From Voss RV, Simons L. Supporting the health of transgender and gender-diverse youth in primary care settings. *Prim Care Clin Office Pract.* 2021;48:259–270, Table 2; with data from Guss CE, Woolverton GA, Borus J, et al. Transgender adolescents' experiences in primary care: a qualitative study. *J Adolesc Health.* 2019;65:344–349.

Table 153.4 Resources for Youth, Parents, and Providers

	ONLINE RESOURCE
Resources for youth	Gender Spectrum (genderspectrum.org) The Trevor Project (thetrevorproject.org) Transgender Law Center (transgenderlawcenter.org) TransAthlete (transathlete.com) TransLifeline (translifeline.org)
Resources for families and caregivers	PFLAG/PTI (pflag.org) Family Acceptance Project (familyproject.sfsu.edu) Gender Spectrum (genderspectrum.org) National Center for Transgender Equality (transequality.org) Trans Youth Family Allies (imatyfa.org)
Resources for providers	World Professional Association for Transgender Health Standards of Care (wpath.org) Endocrine Society Gender Dysphoria/ Gender Incongruence Practice Guidelines (www.endocrine.org) UCSF Transgender Center for Excellence (transcare.ucsf.edu/guidelines) National LGBTQIA + Health Education Center (lgbtqiahealtheducation.org)

From Voss RV, Simons L. Supporting the health of transgender and gender-diverse youth in primary care settings. *Prim Care Clin Office Pract.* 2021;48:259–270, Table 3.

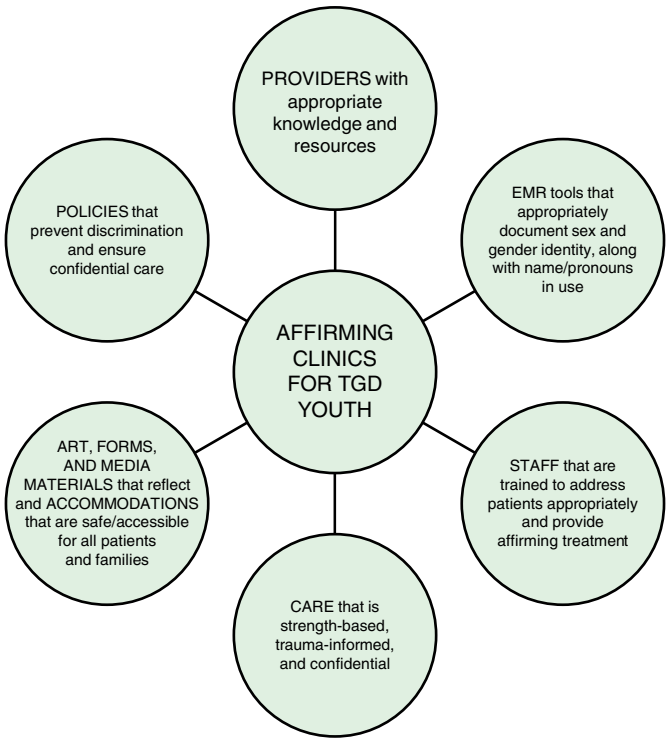

Fig. 153.1 Key components of an affirming clinic for TGD youth. *(Adapted from Allen BJ, Rosenthal SM. Care of transgender, nonbinary, and gender diverse youth. In Allen DB, Nadeau K, Kappy MS, Geffner ME, eds. Pediatric Endocrinology: Principles and Practice, 3rd ed. New York: McGraw Hill; 2020: Fig. 7-2.)*

affirmation in which an individual updates their name and/or gender marker on legal documents.

MENTAL HEALTH CONSIDERATIONS

Although the vast majority of TGD youth do not have any underlying severe psychiatric illnesses, they are at increased risk of internalizing disorders and life-threatening behaviors. Studies have demonstrated an increased prevalence of anxiety, depression, obsessive-compulsive disorder, posttraumatic stress disorder, eating disorder, self-harm behavior, suicidal ideation, and suicide attempts in TGD youth compared to cisgender controls. These conditions and behaviors are not inherent to an individual's gender identity, but rather often occur secondary to a lack of societal acceptance, stigma, discrimination, and poor

access to gender-affirming mental health and medical care. A higher co-occurrence of autism spectrum disorder among individuals with gender dysphoria and vice versa has also been demonstrated in addition to higher rates of homelessness, physical violence, substance abuse, and high-risk sexual behaviors compared to the general population.

In addition to determining the presence or absence of gender dysphoria as part of the psychodiagnostic evaluation, there are many important reasons to consider involving a mental health gender specialist in the evaluation and care of TGD youth *before* and *during* the provision of gender-affirming medical care. Mental health gender specialists may (1) evaluate for the presence of and provide treatment for coexisting mental health concerns, (2) provide family counseling and supportive psychotherapy to assist youth with the exploration of their gender identity and alleviate any distress secondary to gender dysphoria, (3) provide education, assist in decision-making, and refer as indicated for gender-affirming medical therapies, (4) educate and advocate for TGD youth and their families in their community, and (5) provide TGD youth and their families with information for support groups. An emphasis should be placed on the nonpathologic nature of TGD gender identities, and conversion or reparative therapies aimed at changing an individual's gender identity are ineffective and unethical (and illegal in certain places) practices that should not be pursued.

Despite the increased risk for mental health comorbidities in TGD youth, studies have provided evidence of protective factors resulting in positive mental health outcomes. Education regarding and access to gender-affirming medical interventions at early pubertal stages resulted in less gender dysphoria and better mental health and well-being in TGD youth. Additionally, TGD youth with supportive family environments have better mental health outcomes and quality of life. This knowledge underscores the importance of involving a qualified mental health professional to facilitate supportive home environments as needed and educating TGD youth and their families on options for gender-affirming medical therapies.

Another aspect of support is to provide access to other children/adolescents who are TGD. Many have identified like-minded friends in their own community, but others may develop a community through summer camps, group meetings associated with a treatment center, or the internet.

Gender-Affirming Medical Care

Affirming medical and surgical options in TGD individuals who require them to bring their body into alignment with their gender identity are essential, medically necessary interventions that have clear mental health benefits, some of which might even be lifesaving. Mental health benefits of gender-affirming medical therapies include the alleviation of gender dysphoria and the avoidance of worsening of any underlying psychologic distress. Options available to TGD youth vary depending on their pubertal and developmental stage, and care should be individualized based on the goals of the child rather than applied as a blanket algorithm. At each decision point, careful consideration should be given to the potential risks, benefits, and likely outcomes of each treatment, and use of signed consent forms, or informed assent forms in the case of individuals <18 years of age, attesting to an understanding of these considerations are advised before initiating any gender-affirming medical therapies. Medical care for TGD youth is based primarily on the World Professional Association for Transgender Health (WPATH) Standards of Care (SOC) published in 2022 and the Endocrine Society's clinical practice guidelines, last published in 2017. TGD seeking gender-affirming hormone therapy must satisfy certain criteria before proceeding (see Table 153.1).

Current standards of care and clinical practice guidelines for the gender-affirming medical care of TGD youth are based on compelling research from short- to medium-term studies, a 22-year follow-up case report, and expert opinion. Although large longitudinal observational outcome studies are ongoing, there remains a paucity of long-term outcome data currently available. Nevertheless, refusing to deliver timely medical interventions for TGD youth is not a neutral option. A delay or withholding of care may prolong or worsen gender dysphoria and mental health and lead to the development of irreversible physical changes that may require invasive surgical interventions in the future.

PUBERTY BLOCKERS

Treatment Criteria and Timing

Pubertal hormone suppression is recommended in TGD youth who meet criteria for treatment (see Table 153.1). No medical interventions are recommended before the onset of puberty. TGD youth are eligible for treatment *only after* the onset of puberty. Medical providers should monitor for physical exam findings consistent with Tanner stage 2, including breast buds in youth designated female at birth and testicular volume ≥4 mL in youth designated male at birth. Laboratory assays, including ultrasensitive gonadotropin and sex steroid levels obtained in the early morning, can be used to confirm the onset of puberty. However, gonadotropin-releasing hormone (GnRH) is released from the hypothalamus in a pulsatile manner, and in early puberty, gonadotropin and sex steroid hormone levels may overlap with prepubertal ranges if checked at random times.

Goals of Therapy

When initiated early in puberty, pubertal suppression allows for expansion of the diagnostic phase with additional time for gender identity exploration before deciding whether or not to proceed with gender-affirming sex hormone (GAH) therapy. Pubertal suppression also prevents the development of undesirable, irreversible secondary sex characteristics not aligned with the individual's gender identity. These irreversible characteristics include breast development, female body habitus, and possibly short stature in individuals designated female at birth and low voice, laryngeal prominence, male bone configuration, tall stature, and male hair pattern on the face and extremities in individuals designated male at birth. Some, but not all, of these features can only be addressed later with surgery, but pubertal suppression is preferred. Pubertal suppression initiated in early puberty is thought to be fully reversible; if suspended or discontinued, endogenous puberty will resume.

Pubertal suppression can also be considered in TGD youth in later stages of puberty with the goal of achieving menstrual suppression in individuals designated female at birth or the goal of blocking androgen effects in individuals designated male at birth. However, studies do not currently exist that inform whether pubertal blockers can be used as a monotherapy (and for how long) in adolescents older than 14 without posing a risk to skeletal health, given that prolonged deficiency of sex steroids could result in impaired bone mineral density (BMD) during later adolescence and adulthood.

Treatment Options

GnRH agonists are the preferred agents for pubertal suppression in TGD youth. GnRH agonists are long-acting medications that are highly effective in suppressing gonadotropin release through GnRH receptor desensitization. Once started, GnRH agonists may result in some regression of previously developed secondary sex characteristics, including atrophy of breast tissue and a reduction in testicular size. GnRH agonists are available as injectables given every 1-6 months or as subcutaneous implants that last 1-2 years.

Although GnRH agonists are the most effective and preferred option for pubertal suppression, they are costly and may be inaccessible to TGD individuals without insurance coverage. Antiandrogens and progestins with antiandrogen properties, including spironolactone, cyproterone, bicalutamide, and medroxyprogesterone, provide additional options for pubertal suppression. These medications are not as efficacious in suppressing the HPG axis as compared to GnRH agonists, and concern regarding potential side effects have limited their use. The various medications available for pubertal suppression can be found in Table 153.5.

Potential Adverse Effects

Before initiating treatment for pubertal suppression, it is important to discuss potential adverse effects with TGD youth and their guardians. The primary risks of treatment with GnRH agonists

Table 153.5 Available Formulations of Medications Used for Pubertal Blockade

	MEDICATION	ROUTE OF ADMINISTRATION	DOSING FREQUENCY	DOSE
GnRH agonists	Leuprolide acetate	Intramuscular	Every 1-3 mo	11.25-30 mg
	Triptorelin	Intramuscular	Every 24 wk	22.5 mg
	Histrelin	Subcutaneous implant	Every 1-2 yr	50 mg
Progestins	Medroxyprogesterone	Oral	Daily	Up to 40 mg
		Intramuscular	Every 3 mo	150 mg
Antiandrogens	Spironolactone	Oral	1-2 times/day	25 mg initially, up to 100-300 mg divided twice daily
	Cyproterone acetate	Oral	Daily	Up to 100 mg
	Bicalutamide	Oral	Daily	50 mg

GnRH, Gonadotropin-releasing hormone.
Adapted from Allen BJ, Rosenthal SM. Care of transgender, nonbinary, and gender diverse youth. In: Allen DB, Nadeau K, Kappy MS, Geffner ME, eds. *Pediatric Endocrinology: Principles and Practice,* 3rd ed. New York: McGraw Hill; 2020.

Table 153.6 Baseline and Follow-Up Protocol During Suppression of Puberty

EVERY 3-6 MO
Anthropometry: height, weight, sitting height, blood pressure, Tanner stages
EVERY 6-12 MO
Laboratory: LH, FSH, E2/T, 25-OH vitamin D
EVERY 1-2 YR
Bone density using DXA
Bone age on x-ray of the left hand (if clinically indicated)

DXA, Dual-energy x-ray absorptiometry; E2, estradiol; FSH, follicle-stimulating hormone; LH, luteinizing hormone; T, testosterone.
Adapted from Hembree WC, Cohen-Kettenis PT, Delemarre-van de Waal HA, Gooren LJ, et al; Endocrine Society. Endocrine treatment of transsexual persons: an Endocrine Society clinical practice guideline. *J Clin Endocrinol Metab.* 2009;94(9):3132–3154.

include impaired bone mineralization, compromised fertility (if followed by GAH therapy), and unknown effects on brain development and metabolism.

Bone Health

GnRH agonist treatment initiated early in puberty is associated with an increased risk of compromised BMD. Assessment of BMD in TGD individuals is challenging in part because it is not clear whether scores should be compared to norms for the individual's sex designated at birth or to norms for their gender identity. Previous studies have demonstrated an expected stabilization or decline in BMD Z-scores during treatment with GnRH agonists without recovery to baseline after treatment with GAH therapy in all instances. In one study, BMD Z-scores normalized in transmales but remained below zero in transfemales 3 years after the addition of GAH therapy. Potential explanations for differences include differences in lifestyle, exercise, and vitamin D levels. In early pubertal TGD youth treated with GnRH agonists, vitamin D status should be monitored and supplemented, if necessary, and adequate dietary calcium intake and weight-bearing exercise should be encouraged to optimize bone health. BMD should also be monitored every 1-2 years during GnRH agonist treatment and, if the individual undergoes phenotypic transition with gender-affirming sex hormones, should continue to be monitored as described in the Endocrine Society's clinical practice guideline (Tables 153.6 and 153.7).

Fertility

Before initiating treatment for pubertal suppression, counseling must be provided regarding options for fertility preservation. TGD adolescents and their families should be given the opportunity to meet with a specialist in reproductive endocrinology before initiating therapy or at any point during gender-affirming medical therapy as desired. When initiated early in puberty, GnRH agonists inhibit gonadal tissue maturation. If discontinued, the effects of GnRH agonists on fertility are reversible, and gamete maturation will resume. However, if followed by GAH therapy, fertility is likely to be compromised. If TGD youth desire fertility preservation, delaying or temporarily discontinuing pubertal suppression to promote spermatogenesis and oocyte maturation to allow for gamete collection is an option. The attainment of mature gametes occurs during the later stages of puberty when irreversible secondary sexual characteristics have developed, however, features that are undesirable for many TGD youth. Individuals who decide to continue pubertal suppression may elect to preserve immature gonadal tissue in the hopes that ongoing studies and future preservation techniques will allow for the maturation and preservation of viable gametes. Although in vitro maturation of human germ cells has not yet been accomplished, a report described in vivo maturation and subsequent cryopreservation of oocytes in a transgender male adolescent treated with a GnRH agonist starting in early puberty. This was achieved 2 years after the initiation of GnRH agonist therapy and without the discontinuation of pubertal suppression.

In contrast to TGD youth who initiate GnRH agonist therapy in early puberty, cryopreservation of mature sperm or eggs is an option before initiating gender-affirming medical therapy in late puberty or postpuberty (Table 153.8). If GAH therapy is initiated without fertility preservation in these individuals, it may be possible to discontinue hormone therapy in the future to allow for recovery of the hypothalamic-pituitary-gonadal (HPG) axis and subsequent gamete maturation. Stopping estrogen in individuals designated male at birth may allow for recovery of testicular function and collection of sperm. Discontinuation of testosterone in individuals designated female at birth may allow for ovarian recovery and release of eggs, and some who have desired this have had successful pregnancies. Unfortunately, even when counseling is provided, very few TGD youth pursue fertility preservation because of the high associated costs and invasiveness of some procedures and concerns regarding potential delays to medical transition.

Brain Development

Very few studies thus far have assessed the impact of GnRH agonist therapy on brain development. Attainment of executive functioning is a milestone that is typically achieved during puberty. A single cross-sectional study comparing TGD adolescents treated with GnRH agonists

Table 153.7 Baseline and Follow-Up Protocol During Induction of Puberty

Anthropometry	Height,* sitting height,* weight, blood pressure, Tanner stages*	Every 3-6 mo
Laboratory studies	Testosterone: testosterone, hemoglobin/hematocrit, lipids, 25-OH vitamin D* Estrogen: estradiol, prolactin, 25-OH vitamin D*	Every 3-12 mo
Imaging*	DXA to evaluate bone mineral density†	Every 1-2 yr
	Left hand radiograph to evaluate bone age (as clinically indicated)	

*Only indicated in individuals previously treated with pubertal blockers.
†BMD should be monitored into adulthood (until the age of 25-30 yr or until peak bone mass has been reached).
DXA, Dual-energy x-ray absorptiometry.
Adapted from Hembree WC, Cohen-Kettenis PT, Delemarre-van de Waal HA , Gooren LJ , et al; Endocrine Society. Endocrine treatment of transsexual persons: an Endocrine Society clinical practice guideline. *J Clin Endocrinol Metab.* 2009;94(9):3132–3154.

Table 153.8 Fertility Preservation Options for Transgender Patients

FERTILITY PRESERVATION METHOD	PROCEDURE	TIMING OF INTERVENTION
ASSIGNED MALE AT BIRTH		
Sperm cryopreservation	Sperm is collected from ejaculated semen ± electrical or vibratory stimulation	1. Before initiation of gender-affirming hormone therapy or surgery 2. If gender-affirming hormone therapy already initiated, consider 3-mo cessation of estrogen
Surgical sperm extraction	Sperm is obtained surgically from the testis (TESE) or epididymis (PESA)	1. Before initiation of gender-affirming hormone therapy or surgery 2. If gender-affirming hormone therapy already initiated, consider 3-mo cessation of estrogen
ASSIGNED FEMALE AT BIRTH		
Oocyte cryopreservation	Ovarian stimulation followed by surgical egg retrieval and egg freezing	1. Before initiation of gender-affirming hormone therapy or surgery 2. If gender-affirming hormone therapy already initiated, consider 3-mo cessation of testosterone
Embryo cryopreservation	Ovarian stimulation followed by surgical egg retrieval, IVF, and embryo freezing	1. Before initiation of gender-affirming hormone therapy or surgery 2. If gender-affirming hormone therapy already initiated, consider 3-mo cessation of testosterone
Ovarian tissue cryopreservation	Surgical removal and freezing of ovarian tissue	Before gender-affirming surgery involving removal of ovaries

PESA, Percutaneous epididymal sperm aspiration; TESE, testicular sperm extraction; IVF, in vitro fertilization.
From Montoya MN, Peipert BJ, Whicker D, Gray B. Reproductive considerations for the LGBTQ+ community. *Prim Care Clin Office Pract.* 2021;48:283–297, Table 2.

to untreated TGD adolescents found no significant differences in executive functioning. However, animal studies have suggested that GnRH agonists may affect cognitive function, and one transgender adolescent was reported to demonstrate a lack of expected variation in white matter fractional anisotropy (a measure of brain maturation thought to typically occur during puberty) and a 9-point drop in operational memory testing after approximately 2 years of treatment with a GnRH agonist. A subsequent systematic review and meta-analysis found no adverse impacts of hormone therapy on cognitive function in transgender young adults. Additional long-term studies are necessary to assess the impact of GnRH agonist therapy more fully on brain development in TGD youth.

Metabolism and Other Effects

A few studies have evaluated the effects of GnRH agonists on various metabolic and physiologic parameters and future surgical outcomes. A decrease in lean body mass, an increase in fat percentage, and weight gain have been reported in studies of TGD adolescents treated with GnRH agonists. TGD youth designated female at birth who start GnRH agonist therapy may also experience hot flashes, especially if this treatment is initiated in the later stages of puberty. TGD youth designated male at birth who initiate pubertal suppression in early puberty will have limited growth of their genitalia, which may require alternative techniques for penile inversion-vaginoplasty if gender-affirming genital surgery is desired in the future, and counseling should be provided in this regard before initiating treatment with a pubertal blocker.

Alternative Therapy Side Effects

GnRH agonist therapy for pubertal suppression may not be an option for all TGD youth, and alternative therapies are also associated with potential adverse effects. Spironolactone may cause electrolyte abnormalities, polyuria, and orthostasis. Concern for potential hepatotoxicity associated with cyproterone acetate and bicalutamide treatment has limited their use. Progestin treatment may cause hot flashes, headaches, acne, depression, weight gain, lipid changes, and irregular menstrual bleeding in individuals designated female at birth.

Monitoring Protocol

Efficacy and potential adverse effects of treatment should be monitored closely in TGD youth treated with pubertal suppression according to the protocol outlined in Table 153.6. For individuals treated with spironolactone, serum electrolytes should be monitored every 3 months for the first year of therapy and then annually.

A clear endpoint for pubertal suppression can be difficult to determine. It is generally recommended that GnRH agonists not be continued as monotherapy past age 14 years (nor initiated as a monotherapy past age 14 years) because of the potential adverse effects on bone health. The decision must ultimately be made to discontinue pubertal suppression all together or to initiate concurrent treatment with GAH therapy. It is recognized that this decision point can be difficult for TGD adolescents, particularly for some with nonbinary gender identities who may not desire certain physical changes that may occur with sex hormone therapy. Although current guidelines suggest that GnRH

Table 153.9 Protocol Induction of Puberty

	MEDICATION	ROUTE OF ADMINISTRATION	DOSING FREQUENCY	INITIAL DOSE	DOSE ESCALATION	ADULT DOSE
Estrogen	17β–estradiol	Oral/sublingual	Daily	PB: 5 μg/kg/day	5 μg/kg every 6 mo	2-6 mg/day
				PP: 1 mg	1 mg every 6 mo	
		Transdermal	Every 3-5 days	PB: 6.25-12.5 μg/24 hr	12.5 μg/24 hr every 6 mo	50-200 μg/24 hr
				PP: 25-50 μg/24 hr	25 μg/24 hr every 6 mo	
Testosterone	Testosterone enanthate/ cypionate	Subcutaneous	Weekly	PB: 12.5 mg/m^2	12.5 mg/m^2 every 6 mo	30-100 mg/wk
				PP: 37.5 mg	37.5 mg every 6 mo	
		Intramuscular	Every 2 wk	PB: 25 mg/m^2	25 mg/m^2 every 6 mo	60-200 mg every 2 wk
				PP: 75 mg	75 mg every 6 mo	

PB, Pubertal blocker initiated in early puberty; PP, postpuberty.
Adapted from Hembree WC, Cohen-Kettenis PT, Gooren L, et al. Endocrine treatment of gender-dysphoric/gender-incongruent persons: an Endocrine Society clinical practice guideline. *J Clin Endocrinol Metab*. 2017;102:3869–3903, Table 8; and from Allen BJ, Rosenthal SM. Care of transgender, nonbinary, and gender diverse youth. In: Allen DB, Nadeau K, Kappy MS, Geffner ME, eds. *Pediatric Endocrinology: Principles and Practice*, 3rd ed. New York: McGraw Hill; 2020, Fig. 7-2.

agonist therapy may be continued in conjunction with sex hormone therapy until gonadectomy (if pursued), it is often possible to discontinue this therapy in individuals designated female at birth who initiate treatment with testosterone once adult levels of testosterone have been reached.

GENDER-AFFIRMING SEX HORMONE THERAPY

Treatment Criteria and Timing

GAH therapy is a medically necessary intervention for many TGD adolescents. GAH therapy is partially reversible, and it is the responsibility of the medical provider to ensure the adolescent meets criteria for treatment before initiating therapy (see Table 153.1). *GAH treatment may be initiated in TGD adolescents who request this therapy after a multidisciplinary team of medical and mental health providers has confirmed the persistence of gender dysphoria/gender incongruence and if the adolescent has sufficient mental capacity to give informed consent/assent.* Most adolescents are felt to have sufficient mental capacity to provide informed consent by age 16 years; however, there may be compelling reasons to initiate therapy earlier. TGD youth treated with pubertal suppression at Tanner stage 2, which may occur as early as 8-9 years of age, may incur certain risks if this treatment is continued as monotherapy until 16 years of age. Prolonged pubertal suppression may be detrimental to bone health, and it may have detrimental effects on mental health if puberty is delayed well beyond the majority of an individual's peers. Treatment with GAH therapy therefore should be individualized with consideration given to earlier initiation as clinically indicated. Initiation of GAH should follow an evaluation by a qualified mental health gender specialist (separate from any evaluation focused on prior use of pubertal suppression), the signing of consent/assent forms, the obtainment of baseline labs, and consideration of fertility preservation.

Goals of Therapy

The goals of GAH therapy are (1) to reduce *endogenous* sex hormone levels to prevent the development of secondary sex characteristics in individuals previously treated with pubertal blockers or to reduce secondary sex characteristics in those who have already progressed through any degree of puberty and (2) to provide *exogenous* sex hormones to allow for phenotypic changes aligned with an individual's gender identity. GAH therapy must be individualized based on the adolescent's goals rather than applying a one-size-fits-all approach, though it is important to achieve a level of either testosterone or estrogen that is in the normal range for a person's developmental stage.

Treatment Options

In TGD adolescents whose puberty was blocked in early Tanner stages, puberty induction with GAH treatment should be initiated using a gradually increasing dose schedule (Table 153.9). Initial exogenous sex hormone levels are insufficient to suppress endogenous sex hormone secretion, and pubertal blockade should be continued. As sex hormone doses increase, GnRH agonist treatment may often be discontinued in individuals designated female at birth who are treated with testosterone therapy. Adult doses of exogenous testosterone therapy are often sufficient to suppress the HPG axis. In contrast, pubertal suppression must often be continued in individuals designated male at birth who are treated with estrogen therapy. Adult doses of estrogen therapy are insufficient in suppressing the HPG axis and testosterone release. Ongoing adjunctive therapy with a GnRH agonist or antiandrogen therapy (e.g., spironolactone) to block testosterone secretion and/or action is required indefinitely or until gonadectomy, if pursued. Not all TGD adolescents will pursue gonadectomy, and long-term studies are needed to determine the potential risks of prolonged treatment with GnRH agonists.

In TGD adolescents who present for gender-affirming medical therapy in late puberty or after completion of puberty, pubertal induction with sex hormones can start at higher doses and can occur more rapidly (see Table 153.9).

At this time, no evidence has demonstrated that any of the following medically approved types or methods of administering hormones is superior to others in yielding the desired phenotypic changes. Protocols for some formulations of estrogen and testosterone are not available. Protocols that do exist are outlined in Table 153.9. It is important to emphasize to patients that individual variations in outcomes will occur based on several factors including genetics, body type, and compliance.

Estrogen

Estrogen can be given via transdermal, oral, or injectable routes. The naturally occurring form, 17β–estradiol, is preferred to synthetic (e.g., ethinyl estradiol) and conjugated estrogens (e.g., Premarin), which cannot easily be monitored in the serum. Compared to synthetic estrogens, 17β–estradiol is also associated with a lower risk of venous thromboembolism (VTE). Serum estradiol levels can be monitored, with the eventual goal of achieving values in the normal range for premenopausal females (100-200 pg/mL).

TGD individuals who pursue estrogen therapy should be educated on the expected timeline of physical changes (Table 153.10).

Table 153.10 Timeline of Effects from Gender-Affirming Sex Hormone Therapy

	EFFECT	ONSET	MAXIMUM	REVERSIBILITY
Estrogen	Redistribution of body fat	3-6 mo	2-3 yr	Likely
	Decreased muscle mass/strength	3-6 mo	1-2 yr	Likely
	Softening of skin/decreased oiliness	3-6 mo	Unknown	Likely
	Decreased sexual desire	1-3 mo	3-6 mo	Likely
	Decreased spontaneous erections	1-3 mo	3-6 mo	Likely
	Breast growth	3-6 mo	2-3 yr	Not possible without surgery
	Decreased testicular volume	3-6 mo	2-3 yr	Unknown
	Decreased sperm production	Unknown	>3 yr	Unknown
	Decreased terminal hair growth	6-12 mo	>3 yr	Possible
	Scalp hair	Variable		
Testosterone	Skin oiliness/acne	1-6 mo	1-2 yr	Likely
	Facial/body hair growth	6-12 mo	4-5 yr	Unlikely without electrolysis
	Scalp hair loss	6-12 mo		Unlikely
	Increased muscle mass/strength	6-12 mo	2-5 yr	Likely
	Fat redistribution	1-6 mo	2-5 yr	Likely
	Cessation of menses	1-6 mo		Likely
	Clitoral enlargement	1-6 mo	1-2 yr	Unknown
	Vaginal atrophy	1-6 mo	1-2 yr	Unknown
	Deepening of voice	6-12 mo	1-2 yr	Not possible without surgery

Adapted from Hembree WC, Cohen-Kettenis PT, Gooren L, et al. Endocrine treatment of gender-dysphoric/gender-incongruent persons: an Endocrine Society clinical practice guideline. *J Clin Endocrinol Metab*. 2017;102:3869–3903, Table 12; and from Allen BJ, Rosenthal SM. Care of transgender, nonbinary, and gender diverse youth. In Allen DB, Nadeau K, Kappy MS, Geffner ME, eds. *Pediatric Endocrinology: Principles and Practice*, 3rd ed. New York: McGraw Hill; 2020, Tables 7-11 and 7-12.

Treatment will lead to some changes that are likely reversible and others, such as breast development, that are irreversible without surgery.

Testosterone

Naturally occurring testosterone may be given transdermally via gels or patches, through subcutaneous or intramuscular injections, or via implantation of subcutaneous pellets. Oral testosterone undecanoate is Food and Drug Administration (FDA)–approved for use in the United States but is not currently in wide use. It is important to counsel patients on the potential transfer to others via direct contact when transdermal formulations are used. Testosterone levels can be monitored in the serum, with the eventual goal of achieving values in the normal male range (typically 320-1,000 ng/dL, depending on the specific assay).

TGD individuals treated with testosterone should be educated on the expected timeline of physical changes (see Table 153.10). Treatment will lead to some changes that are likely reversible and others that are not, such as facial hair growth, which is irreversible without electrolysis. Adult levels of testosterone are typically sufficient to suppress the HPG axis and induce amenorrhea in TGD individuals designated female at birth. However, unplanned pregnancies have been reported, emphasizing the need for *ongoing contraceptive counseling* in these individuals. If undesired uterine bleeding persists, or if menstruation is causing significant dysphoria before the initiation of testosterone therapy, a progestin or other agent may be used for menstrual suppression. If estrogen is tolerable, combined continuous oral contraceptives (with limited intervals for breakthrough menses) are more effective in achieving menstrual suppression and are better for maintaining bone health than progestin-only options. For TGD adolescents who prefer nonestrogen-containing medications, progesterone-only pills, medroxyprogesterone acetate shots, and progesterone-containing intrauterine or implantable devices are available.

Potential Adverse Effects

Clinicians should inform TGD adolescents of the potential for adverse effects of GAH treatment. Risk for adverse effects is higher when supraphysiologic or inadequate doses of sex hormones are used, which should be avoided. Before initiating therapy, risk factors for adverse effects should be assessed and minimized when possible. GAH treatment has implications for fertility, which must be discussed before initiating therapy as noted previously.

Risks with Estrogen

The most serious risks associated with estrogen therapy include VTE, cardiovascular disease, and cerebrovascular accident. The risk increases with higher estrogen doses and supraphysiologic estradiol levels. Risk factors for these conditions should be assessed and addressed before initiating estrogen therapy. Tobacco cessation counseling should be provided as indicated. Oral ethinyl estradiol in particular appears to increase the risk of VTE, and it should not be used for GAH therapy in individuals at high risk. Estrogen may also cause growth of pituitary lactotroph cells and hyperprolactinemia, which resolves with a reduction or discontinuation of therapy in most individuals. Other potential adverse effects include weight gain, cholelithiasis, and hypertriglyceridemia. TGD adults treated with estrogen therapy have been shown to have an increased risk for developing breast cancer compared with a general population of men in a retrospective Dutch study, although the risk was still lower than in the general population of women. Another retrospective Dutch study spanning five decades demonstrated an increased mortality risk in TGD individuals treated with estrogen therapy compared with a general population of men and general population of women with high risks of death because of cardiovascular

disease, lung cancer, HIV-related disease, and suicide; however, the study was not designed to attribute the cause of the increased mortality risk to a specific effect of estrogen therapy. Absolute contraindications to estrogen therapy include previous VTE related to an underlying hypercoagulable condition, history of estrogen-sensitive neoplasm, and end-stage chronic liver disease.

Risks with Testosterone

Testosterone therapy is primarily associated with potential risks of developing acne, weight gain, hypertension, polycythemia, and a more atherogenic lipid profile (i.e., elevated low-density lipoprotein, elevated triglyceride, and decreased high-density lipoprotein cholesterol levels). Risk increases with sustained, supraphysiologic testosterone levels. Risk factors for these conditions should be assessed and addressed before initiating testosterone therapy. Despite being associated with a more atherogenic lipid profile, numerous studies have shown no increased risk of cardiovascular disease in individuals treated with testosterone. Additional studies are needed to determine if therapy is associated with an increased risk for cerebrovascular disease. Historically, oral testosterone formulations have been associated with increased risk for transaminitis and severe liver dysfunction, whereas injectable formulations are not. Because of the concern that aromatization of testosterone to estradiol may increase risk in patients with a history of estrogen-sensitive malignancies, consultation with an oncologist should be considered before initiating therapy in such patients. Absolute contraindications to testosterone therapy include current pregnancy, unstable coronary artery disease, and untreated polycythemia (hematocrit ≥55%).

Monitoring Protocol

Efficacy and potential adverse effects of treatment should be monitored closely in TGD youth treated with GAH therapy at baseline and follow-up according to the protocol outlined in Table 153.7. Clinical evaluation and laboratory monitoring are recommended every 3 months during the first year of GAH therapy and then 1-2 times annually thereafter. All evaluations should include a physical exam, including measurement of weight and blood pressure. Chest and genitourinary exams may be sensitive issues for TGD youth and should only be conducted as needed to guide management. Evaluations should include questions regarding occurrence of potential adverse events and satisfaction with phenotypic changes on medical therapies. Medication dosing adjustments should occur as needed with the goal of avoiding supraphysiologic and subphysiologic hormone levels that may increase the risk for adverse effects.

Surgical Therapy

Gender-affirming surgeries may be pursued by some TGD individuals to better align their bodies with their gender identities. In these individuals, surgery is medically necessary and an essential step to alleviate their gender dysphoria. Surgeries are irreversible interventions, and most, including those that directly affect fertility such as gonadectomy and/or hysterectomy, are not recommended until an individual reaches age 18 years or the age of legal majority in their country. The Endocrine Society clinical practice guideline and WPATH SOC acknowledge that mastectomy may be considered in TGD adolescents before age 18 years, taking into consideration the physical and mental health status of the individual. Hormone therapy should not be considered a prerequisite to accessing gender-affirming surgical procedures in individuals who do not desire hormone therapy nor in those in whom it is medically contraindicated. Surgeries may occur after the appropriate assessments by qualified medical and mental health professionals responsible for the care of the TGD individual have been performed and confirm that criteria for surgery are met. Individuals who undergo gonadectomy will require ongoing hormone replacement therapy to prevent adverse effects, including osteoporosis.

Table 153.11 Recommendations for Breast and Reproductive Tract Cancer Screening

ORGAN	TRANSGENDER WOMEN	TRANSGENDER MEN
Breast/chest	Discuss mammography in transwomen age >50 yr with additional risk factors for breast cancer (body mass index >35 kg/m^2, estrogen and/or progestin use >5 yr, family history) • Family history of *BRCA* mutations: prophylactic mastectomy could be recommended, with consecutive primary reconstruction	Patients who have not undergone bilateral mastectomy should follow cisgender women recommendations for breast cancer screening Patients who have undergone chest reconstructive surgery should be offered physical examination and/or chest ultrasound
Cervix	Not recommended (transwomen do not have a cervix) • Patients should be routinely examined to detect HPV-related lesions	Patients with an intact cervix should follow the recommendations for cisgender women • Consider self-collected vaginal swabs to test for high-risk HPV DNA • Pathologists should be aware if patient is taking testosterone • Patients who have undergone total hysterectomy and have no history of high-grade cervical precancerous lesion or cervical cancer can discontinue cervical cancer screening
Ovarian	N/A	Do not routinely screen • Transmen at increased risk (identified *BRCA* gene mutation and family history) should be referred for genetic counseling • Consider risk-reduction salpingo-oophorectomy
Endometrial	N/A	Do not routinely screen • Unexplained bleeding (in patients under testosterone who had reached amenorrhea) should be evaluated
Prostate	Monitor the following framework for cisgender men • PSA cutoffs may be lower in transgender men receiving antiandrogens • Consider transvaginal digital examination and ultrasound	N/A

N/A, Not applicable; *PSA*, prostate-specific antigen.
From Labanca T, Manero I, Pannunzio M. Transgender patients: considerations for routine gynecologic care and cancer screening. *J Gynecol Cancer*. 2020;30:1990–1996, Table 4.

Primary Care: Screening

Not all TGD adults have had gender-affirming chest or reproductive organ surgery. Because of this, they may be at risk for cancers not typically screened for based on their affirmed or biologic gender. Suggested breast and reproductive cancer screening recommendations are noted in Table 153.11.

THERAPY FOR NONBINARY YOUTH

Youth with nonbinary gender identities are increasingly presenting for gender-affirming medical care. Although current clinical care guidelines recognize that gender exists on a spectrum and may not always be binary, research and guidelines to date have been largely grounded in the binary gender narrative. Some individuals with nonbinary gender identities will seek treatment as outlined in current clinical practice guidelines, but not all will. The Endocrine Society clinical practice guidelines state that tailoring of current protocols to the individual may be acceptable if done within the context of accepted safety guidelines using a multidisciplinary approach including mental health support. Additionally, the WPATH SOC state they are intended to be flexible to meet the diverse healthcare needs of the individual, and health professionals may modify them in consultation with their TGD patients. However, evidence-based protocols are not yet available for nonbinary individuals, and neither the Endocrine Society nor the WPATH provide guidelines specific to the care of nonbinary youth. Nonbinary individuals have been shown to have higher rates of depression, anxiety, and self-harm compared to their binary transgender peers. In addition, they often encounter more barriers in their attempts to access gender-affirming medical care, even when care is accessed at specialized gender clinics. As a result, some feel forced to identify within the gender binary to obtain desired medical therapies or choose to not seek care.

Until future studies inform clinical practice guidelines outlining therapeutic approaches specific to nonbinary youth, gender-affirming care for nonbinary youth should be individualized. Providers should frame care using the concept of *embodiment rather than transition,* the latter implying a linear path within the gender binary. Ongoing dialogue and support are essential in helping nonbinary youth navigate a potentially nonlinear path. Providers should explore the individual's internal awareness of self, specific areas of gender dysphoria, and their embodiment goals to offer specific therapies toward affirming the individual's gender. Specific expected outcomes of the possible interventions (e.g., increased facial hair with testosterone or chest growth with estrogen) should be discussed rather than describing therapies as masculinizing or feminizing in nature. Difficult decisions may need to be made, particularly for nonbinary youth treated with pubertal suppression who do not desire any secondary sex characteristics. There is the potential for negative impacts on bone health from prolonged monotherapy with pubertal blocking agents, and this should be avoided. Providers should expect to have conversations about balancing the individual's priorities in their specific embodiment goals and to discuss the known potential risks and benefits of various treatment options in order to provide optimal care to their nonbinary patients. Patients should be counseled about the importance of maintaining a minimum threshold level of sex steroids—typically a normal adult range of either estrogen or testosterone—to preserve general health.

Like TGD youth with binary gender identities, available medical interventions for nonbinary youth may include pubertal suppression, sex hormones, and surgeries. Desired and unwanted effects should be discussed and balanced in decision-making regarding therapies. Existing treatment protocols may be modified to achieve patient embodiment goals if deemed safe with a plan for close follow-up monitoring. Potential modifications may include gradual titration or tapering of doses, low-dose or limited testosterone therapy, lower doses of estrogen therapy, intermittent hormone dosing, use of both estrogen and testosterone, and use of adjunctive medications. After initiating a new treatment, follow-up visits should include a discussion of physical changes noted and whether they are in alignment with the patient's embodiment goals, with adjustments made as needed.

Mental Health Outcomes of Treatment

Multiple studies have demonstrated the positive impact of gender-affirming medical and surgical interventions on mental health outcomes in TGD adolescents. A prospective study of 55 TGD adolescents and young adults in the Netherlands published in 2014 demonstrated resolution of gender dysphoria and improvement in general psychologic functioning after sequential treatment with GnRH agonist therapy, GAH treatment, and gender reassignment surgery. These individuals were also shown to have a sense of well-being equivalent or superior to that seen in age-matched controls from the general population, and none regretted treatment. A cross-sectional survey administered by the National Center for Transgender Equality to more than 20,000 U.S. TGD adults age 18-36 years demonstrated that those treated with GnRH agonists for pubertal suppression during adolescence had a significantly lower odds of lifetime suicidal ideation compared to those who wanted, but did not receive, such treatment. The largest observational study assessing the impact of gender-affirming medical care on the mental health of TGD adolescents and young adults in the United States (n = 315, age 12-20 years) demonstrated significant improvements in psychosocial functioning, decreases in depression and anxiety, and increases in appearance congruence, positive affect, and life satisfaction. Other studies have also reported on improvement of mental health measures, quality of life, global psychosocial functioning, and body image in response to treatment with gender-affirming medical care.

Challenges to Care

TGD youth not only face high levels of discrimination in their lived environments, but those who succeed in accessing medical care often encounter stigma and discrimination within healthcare settings. Research on the experiences of TGD persons of color, a group that faces startingly high rates of violence and homicide, is an area in need of much attention. In the United States, gender-affirming medical therapies are currently not FDA-approved for use in TGD youth, and insurance companies often deny coverage of these medically necessary, essential, and even lifesaving interventions. Some families can pay out-of-pocket for treatments when coverage is denied, whereas others cannot, furthering the socioeconomic divide between wealthy and impoverished. Efforts in multiple U.S. states to criminalize the medical care of TGD youth are ongoing and in need of significant advocacy and education. In addition, participation in same-gender sporting activities has created significant barriers among TGD athletes. Some athletic bodies have placed barriers to same-gender participation, requiring transfemales to start suppressive therapy early in puberty or to monitor testosterone levels, with a cutoff level prohibiting participation.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

Chapter 154

Gay, Lesbian, and Bisexual Adolescents

Stewart L. Adelson and Mark A. Schuster

Understanding a child's or adolescent's sexual and emotional development is an essential part of any comprehensive pediatric evaluation. For youth who are or might be gay, lesbian, or bisexual **(GLB also noted as LGB in the LGBT abbreviation)**, such understanding is particularly important. GLB youth as a group have the same health and developmental needs typical of youth in general, and their sexual orientation is part of the normal spectrum of human sexuality. However, they encounter distinct developmental challenges and can have additional physical and mental health needs related to their orientation and others' reaction to it. Their sexual orientation may be different from that expected by some families, peers, and society; they are at risk of peer rejection, bullying, violence, or family nonacceptance more frequently than most youth. Although the majority of GLB adolescents grow up physically and mentally healthy, they are at increased risk for certain health problems as a result of these stresses and the epidemiology of health threats such as HIV and other sexually transmitted infections (STIs). In addition, healthcare providers may also have biases and assumptions about the GLB community (Table 154.1).

Sexual orientation refers to an individual's attraction to others based on sex or gender. It encompasses emotional and erotic desires, physiologic arousal, sexual behavior, sexual identity, and social role. As sexuality develops, youth can be oriented entirely toward a particular sex or gender, or more than one, to various degrees on a continuum. **Homosexuality** involves orientation toward people of one's same sex or gender, and **bisexuality** involves orientation toward males and females. **Gay** is a common term for both males and females who have same-sex attractions; **lesbian** refers to gay females. Increasing numbers of youth describe themselves as having a nonbinary gender identity (see Chapter 153). Accordingly, some do not fit binary categories of sexual orientation and use other terms to describe themselves, such as **pansexual** (attracted to all genders). Those unsure of their orientation are **curious** or **questioning**. The term **young men who have sex with men (YMSM)** is sometimes used in the research literature to denote male youth who engage in sexual activity with other males, regardless of how they identify themselves.

PREVALENCE OF HOMOSEXUALITY AND BISEXUALITY IN YOUTH

Some junior high and high school students self-identify as gay, lesbian, or bisexual (Fig. 154.1). Some who do not identify as GLB report same-sex attraction, fantasies, or behavior. Some are unsure of their sexual orientation. Certainty about sexual orientation tends to increase through adolescence with sexual experience, although one can be aware of one's orientation without having had sexual partners. Those who fear nonacceptance may try to suppress or deny their orientation. Consequently, various aspects of an individual's orientation—attraction, behavior, and identity—may not always be consistent with each other throughout development. Not all youth with homosexual attraction or experience identify as *gay,* consistent in part with reluctance about having or revealing a gay identity and underscoring the differences among attraction, behavior, and identity. A report providing national estimates of the number of high school students with GLB identity in 2019 found that 2.5% said they were gay or lesbian, 8.7% said they were bisexual, and 4.5% reported being unsure of their sexual orientation (see Fig. 154.1).

Table 154.1 Common Assumptions to Avoid When Caring for Lesbian, Gay, Bisexual, and Queer Patients

ASSUMPTION TYPE	DO NOT ASSUME THAT…
Identity	• Lesbian, gay, or bisexual people are cisgender • A person has to identify as either male or female • A person's gender or sexual orientation is a major aspect of a person's identity • Being lesbian, gay, bisexual, or queer is always hard • LGBQ people cannot adjust to stressors
Sexual orientation	• All patients are heterosexual • People exploring their sexuality have a need to categorize into established sexual orientations • Bisexuality is a phase or that bisexual people are confused • Sexual orientation aligns with sexual behavior
Sexual behavior	• All LGBQ people are sexually active (some are celibate or asexual) • Gay men do not have sex with women or lesbian women do not have sex with men • All gay men have multiple partners and engage in high-risk behavior • Sexual behavior will remain stable over time • Lesbians are not at risk of HPV or other STIs • Bisexual people are promiscuous or are always unfaithful
Relationships and family	• Lesbian women do not want to be pregnant or are not at risk of pregnancy • Interpersonal violence does not occur in LGBQ couples • LGBQ patients do not have children or do not wish to have children • All adults of reproductive age have an interest in parenting • LGBQ people do not have strong family ties • LGBQ patients have ties to their families of origin
Anatomy	• Queer people all want to change their bodies with surgeries or hormones • Anything about the body of an LGBQ patient

HPV, Human papillomavirus; STI, sexually transmitted illness.
Adapted from Makadon HJ, Mayer KH, Potter J, Goldhammer H. *The Fenway Guide to Lesbian, Gay, Bisexual, and Transgender Health*, 2nd ed. Philadelphia: American College of Physicians, 2015; and Suarez Lupez E, Siegel J, Streed Jr C. The annual examination for lesbian, gay, and bisexual patients. *Prim Care Clin Office Pract*. 2021;48:191–212, Table 1.

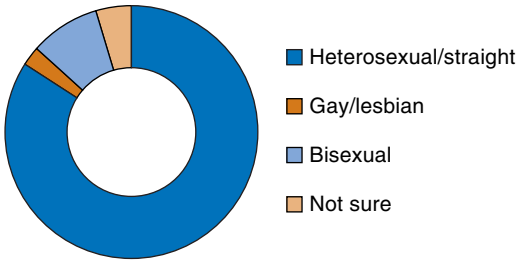

Fig. 154.1 Sexual identities among high school students. YRBS; Youth Risk Behavior Study. *(From HHS Youth Risk Behavior Survey from 2019: US Department of Health and Human Services, Centers for Disease Control and Prevention. (2020, Aug 21). Youth Risk Behavior Surveillance -- United States, 2019. MMWR Supplement, 69(1) https://www.cdc.gov/healthyyouth/data/yrbs/pdf/2019/su6901-H.pdf.)*

DEVELOPMENT OF SEXUAL ORIENTATION IN CHILDHOOD AND ADOLESCENCE

Sexual orientation development appears to begin prenatally and continue through childhood and adolescence and into adulthood. Both gender role behavior in childhood and sexual orientation in puberty and adolescence are partly influenced by prenatal genetic and neuroendocrine factors. Sociocultural and psychologic factors also influence sexual development. A gay or lesbian sexual orientation is sometimes preceded developmentally in childhood by nonconforming gender expression or variation from population averages in expression of gender-related behavior such as activities, interests, styles, and other attributes recognized as masculine or feminine, like toy preferences and preference for playmates of a particular gender. Childhood gender nonconformity is significantly associated with nonheterosexual orientation, especially in males. However, it is not experienced by all gay or lesbian people, and not all children with nonconforming gender role behavior are gay or lesbian. When present, however, nonconformity causes many gay people to feel different from peers during childhood, even before sexual desire or identity emerges. Depending on the setting, gender-nonconforming children may experience ostracism, bullying, or family nonacceptance. These reactions to gender nonconformity can lead to later difficulty with gender-related self-esteem and long-term mental health problems.

Less frequently, gay or lesbian sexual orientation in adolescence is preceded by childhood **gender variant identity**, a phenomenon in which the gender identity of an individual at any age differs from phenotypic sex and assigned sex at birth (see Chapter 153).

STIGMA, RISK, AND RESILIENCE

People experiencing same-sex attraction and behavior exist in all societies. The meaning, acceptance, and legality of non-heterosexual attraction vary greatly with cultural, historical, and social contexts. Although gay people are more visible and accepted in some societies, youth are often exposed to antigay attitudes. For many GLB youth, revealing their sexual orientation *(coming out)* to family, peers, healthcare providers, and others is a significant step. Specific racial, ethnic, religious, and other demographic groups may experience distinct developmental stressors. A comprehensive understanding of a youth's sexual development and health must consider intersecting sociodemographic factors influencing a youth's experience of a nonheterosexual orientation. For example, race, ethnicity, and religious affiliation—and the reactions of others to one's demographic characteristics—can influence comfort disclosing an GLB identity, involvement in GLB socialization, access to religious affirmation, and processes of coming out.

Some GLB youth experience difficulty coping with **stigma**. A longitudinal study that investigated **bullying** and **victimization** among youth from 5th through 10th grade found that the females and males who identified as GLB in 10th grade were more likely than their peers to report that they had been bullied and victimized across grades. GLB youth may be perceived by others as different before they themselves have any GLB attraction or experience or identify as GLB. Even when not overtly threatened, GLB youth frequently encounter negative attitudes that force them to hide at a time when family and peer acceptance holds great developmental significance. Family nonacceptance, feeling unsafe due to school harassment, and peer bullying related to sexual orientation elevate risk in GLB adolescents for depression, anxiety, substance abuse, suicidal thoughts and attempts, and social problems such as truancy, dropping out, running away, and homelessness. Mental health problems, sexual risk-taking, or substance use may increase exposure to HIV and other STIs. Stigma may also impede access to healthcare in some communities.

Nevertheless, most GLB youth are resilient, with good physical and mental health despite possible pervasive stresses. Family connectedness and school support and safety are important protective factors against depression, suicidal thoughts and attempts, and substance abuse. GLB antiharassment policies and organizations such as **genders and sexualities alliances** (also sometimes called gay-straight alliances) and antibullying programs are associated with increased school safety for GLB youth. It is therefore important to reduce stigma, support acceptance, and promote resilient coping.

HEALTH

Depression and Suicidality

Compared to their heterosexual peers, GLB youth and those who are not sure of their sexual orientation have a higher prevalence of suicidality. Family rejection, bullying, and other victimization motivated by homophobia account statistically for increased depression and suicidal thoughts and attempts in GLB adolescents. Suicidal thoughts or attempts are highest during the interval after recognition of same-sex attraction or a same-sex sexual experience but before self-acceptance as gay.

Sexually Transmitted Infections

The epidemiology of STIs, related to specific sexual practices and prevalence of certain STIs in GLB communities, informs recommended counseling, screening, and treatment strategies (Table 154.2). Anal intercourse has been shown to be the most efficient route of infection by hepatitis B (see Chapter 406), cytomegalovirus (see Chapter 302), and HIV (see Chapter 322). Oral-anal and digital-anal contact can transmit enteric pathogens, such as hepatitis A. Unprotected oral sex also can lead to oropharyngeal disease in the receptive partner and gonococcal and nongonococcal urethritis in the insertive partner. Certain STIs, particularly ulcerative diseases, such as syphilis and herpes simplex virus infection, facilitate spread of HIV. YMSM are also at risk for infections with Shigella spp. and Mpox (see Chapter 163).

Among U.S. adolescents and young adults, YMSM, and especially Black YMSM, continue to face the greatest prevalence of HIV/AIDS. Although possible, female-to-female sexual transmission of HIV is inefficient, and females who only engage in sex with females are less likely than other youth to acquire an STI. However, males and females who identify as gay or lesbian may engage in sexual activity with partners who are not of the same gender; counseling and screening for all types of STIs are still relevant.

Substance Abuse

Compared with their heterosexual peers, GLB youth appear to use alcohol and other substances at higher rates, including more binge drinking and earlier onset and more rapid trajectory of substance use.

More substantial substance use may be greatest in youth who, although they do not identify as GLB, have attraction to or engage in sexual behavior with others of their gender.

Obesity and Disordered Eating

Compared with heterosexual females, lesbian and bisexual females are generally more likely to be obese or overweight. In contrast, young gay and bisexual males are more likely to have body image concerns and to restrict eating or engage in compensatory weight loss strategies compared to heterosexual boys. Binge eating may also be more common in GLB youth.

Psychosocial Problems

Academic underachievement, truancy, and dropping out of school are frequently associated in GLB adolescents with homophobic victimization, harassment, violence, and feeling unsafe at school. Studies suggest that youth who eventually identify as GLB have higher rates than other youth of experiencing child abuse and of running away or being kicked

Table 154.2 The 6 Ps of a Complete Sexual History

P	OBJECTIVES	QUESTIONS
Partners	• Determine the number and gender/sex of partners • Determine partner risk factors (other partners, drug use)	"Are you currently sexually active?" "Have you ever been sexually active?" "When you have sex, what is the gender of your partners? What anatomy is used for sex?" "How do you describe your sexual orientation?" "How many partners have you had in the past 6 (or 12) months?" "Has anyone ever forced themselves on you sexually or touched you sexually in an unwanted way?"* Remember to ask about opposite-sex partners
Practices	• If a patient has had more than one partner in the past 12 mo (or has a partner who has other sex partners) • Explore their sexual practices and behaviors, because they will guide assessment of risk and determination of testing	"What types of sex are you having?" "When having sex, do you have vaginal, anal, and/or oral sex?" "If you have anal sex, do you have insertive sex, receptive sex, or both?" In colloquial words, "Are you a top, a bottom, or vers?" "Do you have any alternative sexual practices?" (i.e., kinks, BDSM, fisting) "Do you use alcohol or drugs during sex?" "Have you ever exchanged sex for money, drugs, food, or shelter?" "Do you use lubricants during sex? What kind?" "Do you use sex toys? How often? Do you share them? Do you clean them?" Put bluntly, questions should aim to answer who is putting what, where, when, and how
Protection from STI	• If a patient has had more than one partner in the past 12 mo (or has a partner who has other sex partners)† • Based on patient risk profile, ask these questions accordingly • Explore the patient's use of barrier methods • Explore the patient's use of PrEP	"How do you keep yourself safe during sex" "Do you use condoms/dental dams when having vaginal, anal, and/or oral sex? How often? All the time? Most of the time? About half of the time? Rarely?" If no, "Why not?" "Do you and your partners use any other protection against STI?" "Do you or your partner use PrEP? "Are you interested in starting PrEP?"
Past history of STI	• Explore patient STI history as a risk factor for future STI	"Have you ever been tested for HIV or other STIs?" "Have you ever been diagnosed with an STI?" If yes, "When were you diagnosed? How were you treated?" "Would you like to be tested? And which parts of your body should we check?" "Has your current or any former partners ever been diagnosed with an STI?" If yes, "Have you been tested for the same STI?"
Pleasure/pain	• Recognize the importance of pleasure in sexual intimacy and well-being	"Are you satisfied with your sexual life?" "Do you have any pain with sex?" "Do you have any problems with erection, lubrication, ejaculation, or orgasm?"
Prevention/planning of pregnancy	• Evaluate desire for/risk of pregnancy	"Are you concerned about getting pregnant or getting your partner pregnant?" "Are you using contraception or practicing any form of birth control?" "Do you need any information on birth control?"

*For more information, please see, "Sexual Health and the LGBTQ+ Community," by Taylor NM, King CK.. *Prim Care Clin Office Pract.* 2021;48:271-282.
†For patients who report one or fewer partners in the last 12 mo, ask whether they have any concerns about STI.
BDSM, Bondage and discipline, dominance and submission, sadism and masochism; HIV, human immunodeficiency virus; PrEP, preexposure prophylaxis.
From Suarez S, Lupez E, Siegel J, Streed Jr C. The annual examination for lesbian, gay, and bisexual patients. *Prim Care Clin Office Pract.* 2021;48:191–212, Table 2.

out of their homes. GLB young people are overrepresented among homeless and runaway populations across the United States, which can expose them to drugs, sexual abuse, and other health risks.

RECOMMENDATIONS FOR CARE

Evaluation

The goal of GLB pediatric care is physical health, social and emotional well-being, and healthy development. Physicians should provide nonjudgmental care to all adolescents, including those who are GLB or questioning (see Chapter 153, Table 153.1, and Table 154.1). They should receive the age-appropriate history, examination, and anticipatory guidance recommended for adolescents in general. The physical examination and laboratory evaluation of GLB and questioning adolescents are the same as for any teenager. However, providers should appropriately screen for special potential medical and psychosocial threats to GLB teenagers' health.

A nonjudgmental healthcare environment is important, with open communication and a positive relationship with youth and families. In the waiting room, written material about sexual orientation, support groups, and community resources will signal openness to discussing sexuality. Registration forms recognizing the possibility of same-gender parents signal a safe setting (e.g., forms can list parent/guardian #1, parent/guardian #2). Sexual history questions should avoid heterosexual assumptions (e.g., ask "Are you dating someone?" vs "Do you have a boyfriend/girlfriend?"). This is important at all ages. For example, asking a 6-year-old male if he has a girlfriend may convey an unsupportive message if he discovers later that he would like a boyfriend. Explaining confidentiality and incorporating into each adolescent visit private time with no parent in the room (see Chapter 137) may facilitate discussing sexual orientation, as may use of appropriate health history forms such as the American Medical Association's Guidelines for Adolescent Prevention Services Questionnaire.

Clinicians should remember that any youth might be GLB whether or not they are identified or perceived as such, so clinicians should not presuppose a particular orientation (see Table 154.1). Competency in conveying sensitivity, acceptance, and respectfulness; effective communication skills; and appropriate attention to privacy and confidentiality (including practices related to billing and record requests) are fundamental to providing high-quality care. While remaining attuned to youth's preferences, explicit or implied, for discussing sexual orientation, providers can tactfully take the lead, if necessary, regarding any pressing areas of clinical concern.

Medical and Sexual Health

STIs are covered in Chapter 163, but issues specific to GLB youth are included here. Use of latex condoms for fellatio, and dental dams and cut-open latex condoms for anilingus and cunnilingus, should be discussed with adolescents. Recommendations also include use of latex condoms for sexual appliances. In addition, it is important to emphasize that people who have been using alcohol or other drugs are at increased likelihood for engaging in riskier sexual activity. It is important not to assume that a gay male or female who does not identify as bisexual has not had sex with someone of a different sex or gender; lesbians can still have an unplanned pregnancy. Therefore prevention counseling about unintended pregnancy is relevant to all adolescents. Similarly, youth who identify as heterosexual and whose attractions are not to those of the same sex or gender may still have sexual activity with a partner of the same sex or gender.

Although vaccination against hepatitis A and B is recommended for all children, it is particularly recommended that nonvaccinated adolescent males who are having (or are likely to have) sex with males receive catch-up vaccines. The same recommendation applies to the human papillomavirus (HPV) vaccine for males. The Centers for Disease Control and Prevention (CDC) recommends that males who are engaging in sexual activity with males have annual testing for HIV, hepatitis A, hepatitis B, syphilis, urethral gonorrhea, and chlamydia (if engaging in insertive oral or anal intercourse), oral gonorrhea (if engaging in receptive oral intercourse), and rectal gonorrhea and chlamydia (if engaging in receptive anal intercourse). The CDC also recommends HIV pre-exposure prophylaxis (PrEP) for adolescents who are engaging in or plan to engage in sexual behavior placing them at "substantial ongoing risk of HIV exposure and acquisition."

Mental Health

Awareness of mental health and social problems is important when caring for GLB youth, as for all youth. Clinicians should monitor for depression, suicidality, anxiety, and substance abuse and know their community's mental health resources. Minor psychosocial problems might be handled by referral to a support group for patients (e.g., a school gay-straight or genders-sexualities alliance, other community support group) or for parents and others (e.g., Parents, Families and Friends of Lesbians and Gays). In some communities, agencies and organizations serving the GLB community can help with social, educational, vocational, housing, and other needs.

Individuals or families who harbor negative attitudes may inquire about mental health treatment to avert or change a gay or bisexual orientation (conversion therapy). However, a GLB orientation is not an illness, and all leading health organizations have concluded that such change is neither possible nor warranted. Conversion therapy is illegal in 18 states; 22 states have no law or policy.

It is important to distinguish between a GLB orientation, which is not a mental illness, and mental health problems (e.g., depression) for which GLB youth are at elevated risk. While understanding different families' values, clinicians must recognize the morbidity and mortality associated with stigma and attempt to foster physical and emotional health. Individual or family therapy might be indicated.

Clinicians should also monitor for specific stressors, such as bullying and other homophobic victimization, family nonacceptance, and abuse. Failure to confront harassment constitutes tacit assent. Anticipatory guidance, referral, and substance abuse treatment should be considered for the subset of GLB youth who use alcohol, drugs, or tobacco, some of whom may be using these to manage painful feelings related to conflicts over their sexuality.

Adolescents with serious psychiatric symptoms, such as suicidality, depression, and substance abuse, should be referred to mental health specialists with competency in treating GLB adolescents (see Chapter 40).

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

Chapter 155

The Epidemiology of Adolescent Health Problems

Samantha V. Hill and Tamera Coyne-Beasley

Adolescence is the first period of life where the major determinants of morbidity and mortality are *behavioral* rather than congenital or infectious. As adolescents make the transition from childhood to adulthood, they establish behaviors that affect both their current and future health. Adolescence is a time of immense biologic, psychologic, and social change (see Chapter 150). Many of the psychologic changes have a biologic substrate in the development and eventual maturation of the central nervous system, particularly the frontal lobe areas responsible for executive functioning (Fig. 155.1). In addition to cognitive development, there are both risk and protective factors for adverse adolescent health behaviors that are dependent on the social environment and the mental health of an adolescent (Table 155.1).

Many adolescents continually confront the task of making healthy choices while struggling with impulsivity that can lead to unintentional consequences, such as injuries, sexually transmitted infections (STIs), or drug overdoses. Adolescents are also challenged with adopting behaviors that will affect their future adult health, such as eating nutritiously; engaging in physical activity; and choosing not to use tobacco (including vapes and e-cigarettes), alcohol, cannabis, or illicit substances. Environmental factors and social determinants of health in and among an individual's family, peers, school, and community also contribute to adolescents' health and risk behaviors. The U.S. Centers for Disease Control and Prevention (CDC) **Youth Risk Behavior Surveillance Survey**, a school-based survey of a nationally representative sample of U.S. high school students, demonstrates that youth begin engaging in behaviors that place their health at risk during adolescence (Fig. 155.2).

Although according to the 2018 CDC National Health Interview Survey (https://www.cdc.gov/nchs/nhis/shs/tables.htm), a probability sample survey conducted annually, an estimated 83% of 12- to 17-year-olds report excellent or very good health, 11% reported limitation in usual activities because of one or more chronic conditions, 10% missed 6-10 school days in the past year, 6% are uninsured, 5% have no usual place of healthcare, 10% have asthma, 12% have respiratory allergies, 10% have a learning disability, 13% have attention-deficit/hyperactivity disorder, and 18% take prescription medications routinely. In 2018 the mortality rate among adolescents 15-19 years of age was 49 deaths per 100,000 population. Although varying by gender, the leading causes of death overall among adolescents 15-19 years of age are (1) unintentional injuries, (2) suicide, and (3) homicide (Table 155.2).

Within the adolescent population, **disparities in health** occur. Adolescent health outcomes and behaviors vary among populations that can be defined by being Black, ethnicity, gender, education, income, disability, geographic location (e.g., rural or urban), or sexual orientation. Health disparities result from multiple factors affecting social determinates of health, including poverty, environmental threats, inadequate access to healthcare, individual and behavioral factors, racism and other systemic biases, and educational and other inequalities (Table 155.3).

ACCESS TO HEALTHCARE

Adolescents in the United States make fewer visits to physicians for ambulatory office visits than any other age-group; school-age children and adolescents are more likely than younger children to have unmet health needs and delayed medical care. Adolescents who actually receive preventive care may still not have access to time alone with their provider to discuss confidential health issues such as STIs, HIV, or pregnancy prevention. Less than half (22% of 13- to 14-year-olds and 43% of 15- to 18-year-olds) of adolescents have time alone with their healthcare provider during a preventive healthcare visit; sexually experienced teens report sexual health discussions more often than nonsexually experienced teens, but the frequency is still low at 81% and 65% for sexually experienced young women and men, respectively.

The 2010 Patient Protection and Affordable Care Act (ACA) has improved access to care for young adults 18 to 24 years old. The ACA permits children to receive benefits from their parents' health plans through age 26 years. Although accomplishments have been made in improving adolescent health, *Healthy People* provides science-based, 10-year national objectives for measuring and improving the health of all Americans by establishing benchmarks and monitoring progress over time. The ***Healthy People 2030*** agenda includes 24 adolescent-specific objectives with a goal of improving the healthy development, health, safety, and well-being of adolescents and young adults over the next 10 years (Table 155.4). This science-based initiative is centered around a framework for public health prevention priorities and actions to improve the health status of U.S. youth.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

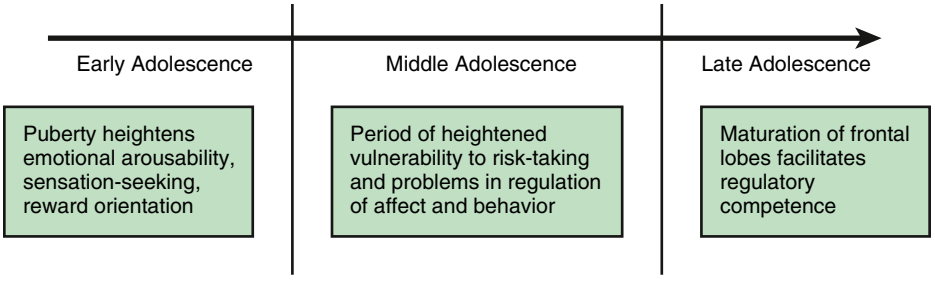

Fig. 155.1 It has been speculated that the impact of puberty on arousal and motivation occurs before the maturation of the frontal lobes is complete. This gap may create a period of heightened vulnerability to problems in the regulation of affect and behavior, which might help to explain the increased potential in adolescence for risk-taking, recklessness, and the onset of emotional and behavioral problems. *(From Steinberg L. Cognitive and affective development in adolescence. Trends Cogn Sci. 2005;9:69–74.)*

Table 155.1 Identified Risk and Protective Factors for Adolescent Health Behaviors

BEHAVIOR	RISK FACTORS	PROTECTIVE FACTORS
Smoking	Depression and other mental health problems, alcohol use, disconnectedness from school or family, difficulty talking with parents, minority ethnicity, low school achievement, peer smoking	Family connectedness, perceived healthiness, higher parental expectations, low prevalence of smoking in school
Alcohol and drug misuse	Depression and other mental health problems, low self-esteem, easy family access to alcohol, working outside school, difficulty talking with parents, risk factors for transition from occasional to regular substance misuse (smoking, availability of substances, peer use, other risk behaviors)	Connectedness with school and family, religious affiliation
Teenage pregnancy	Deprivation, city residence, low educational expectations, sexual intercourse, lack of access to sexual health services, drug and alcohol use	Connectedness with school and family, religious affiliation
Sexually transmitted infections	Mental health problems, substance misuse, exploration of sexuality and sexual identity (sexual activity)	Connectedness with school and family, religious affiliation

Adapted from McIntiosh N, Helms P, Smyth R, eds. *Fofar and Arneil's Textbook of Pediatrics*, 6th ed. Edinburgh: Churchill Livingstone; 2003:1757–1768; and Viner R, Macfarlane A. Health promotion. *BMJ*. 2005;330:527–529.

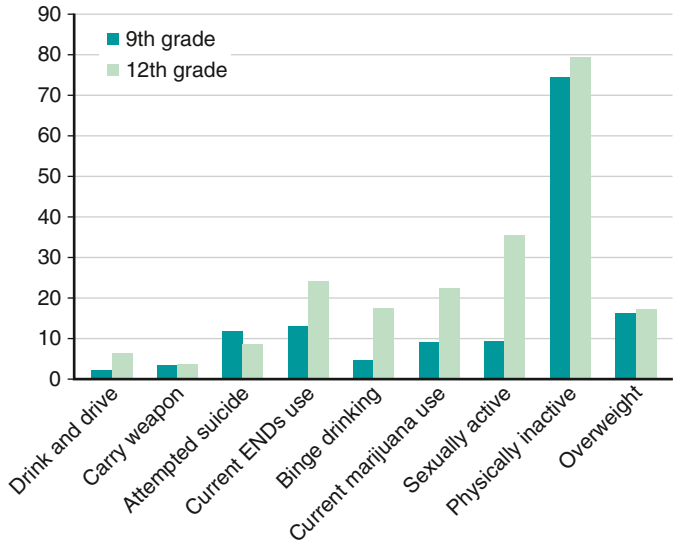

Fig. 155.2 Selected health behaviors among 9th-and 12th-grade high school students. ENDs, Electronic nicotine delivery systems. *(Data from Centers for Disease Control and Prevention: 1991-2021 High school youth risk behavior survey data. http://nccd.cdc.gov/youthonline.)*

Table 155.2 Leading Causes of Death Among 15- to 19-Year-Olds by Gender, United States, 2018-2021*

LEADING CAUSES OF DEATH	MALE		FEMALE	
	CAUSE OF DEATH	MORTALITY RATE PER 100,000 POPULATION	CAUSE OF DEATH	MORTALITY RATE PER 100,000 POPULATION
#1	Unintentional injuries	32.4	Accidents (unintentional injuries)	14.3
#2	Assault (homicide)	21.6	Intentional self-harm (suicide)	5.2
#3	Intentional self-harm	16.1	Malignant neoplasms	3.6

*Based on data from Heron M. Deaths: leading causes for 2018-2019, CDC WONDER Online Database 2021. https://wonder.cdc.gov/

Table 155.3 Adolescent Health Outcomes by Ethnicity, United States, 2018-2019

OUTCOME	WHITE	BLACK	AI/AN	API	HISPANIC
Deaths*	45.4	79.8	62.8	23.4§	29.3
Births†	11.4	25.8	29.2	2.7§	18.2
Obese‡‡	12.5	18.2	7.9	33.3§	37.1
Asthma‡	10.1	18.0	17.8	8.2§	12.5
Depressed**	14.0	9.5	16.3	11.5§	13.8
Chlamydia*	857.5	4,894.0	2343.1	310.3§	1080.4
Gonorrhea*	134.5	1506.1	559.9	44.9§	179.8
HIV*	2.1	34.8	5.6	12.2§	7.4

*2019 rates per 100,000 15- to 19-yr-old population by race/ethnicity.
†2019 rates of births in per 1,000 15- to 19-yr-old females by race/ethnicity.
‡Percent high school students reporting health outcome in 2018.
**Prevalence of 12- to 17-yr-olds reporting health outcome in 2017.
‡‡Percent high school students reporting health outcome in 2017.
§Rates of Asian-only race.
AI/AN, American Indian or Alaska Native; API, Asian or Pacific Islander; HIV, human immunodeficiency virus.

Table 155.4 *Healthy People 2030* Adolescent Health (AH) Objectives

- **AH-01:** Increase the proportion of adolescents who had a preventive healthcare visit in the past year.
- **AH-02:** Increase the proportion of adolescents who speak privately with a provider at a preventive medical visit.
- **AH-03:** Increase the proportion of adolescents who have an adult they can talk to about serious problems.
- **AH-04**: Increase the proportion of students participating in the School Breakfast Program.
- **AH-05:** Increase the proportion of 4th-graders with reading skills at or above the proficient level.
- **AH-06:** Increase the proportion of 4th-graders with math skills at or above the proficient level.
- **AH-07:** Reduce chronic school absence among early adolescents.
- **AH-08:** Increase the proportion of high school students who graduate in 4 years.
- **AH-09:** Reduce the proportion of adolescents and young adults who are not in school or working.
- **AH-10:** Reduce the rate of minors and young adults committing violent crimes.
- **AH-D01:** Increase the proportion of trauma-informed early childcare settings and elementary and secondary schools.
- **AH-D02:** Increase the proportion of children and adolescents with symptoms of trauma who get treatment.
- **AH-D03**: Reduce the proportion of public schools with a serious violent incident.
- **AH-R01:** Increase the proportion of adolescents who get support for their transition to adult healthcare.
- **AH-R02:** Increase the proportion of adolescents in foster care who show signs of being ready for adulthood.
- **AH-R03:** Increase the proportion of eligible students participating in the Summer Food Service Program.
- **AH-R04:** Increase the proportion of 8th-graders with reading skills at or above the proficient level.
- **AH-R0:** Increase the proportion of 8th-graders with math skills at or above the proficient level.
- **AH-R06:** Increase the proportion of schools requiring students to take at least two health education courses from 6 to 12.
- **AH-R07:** Increase the proportion of secondary schools with a start time of 8:30 AM or later.
- **AH-R08:** Increase the proportion of secondary schools with a full-time registered nurse.
- **AH-R09**: Increase the proportion of public schools with a counselor, social worker, and psychologist.
- **AH-R10:** Increase the proportion of students served under the Individuals with Disabilities Education Act who earn a high school diploma.
- **AH-R11:** Reduce the rate of adolescents and young adult victimization from violent crimes.

From U.S. Department of Health and Human Services: *Healthy People 2030*, available at: https://health.gov/healthypeople/about/workgroups/adolescent-health-workgroup.

Chapter 156

Violent Behavior

Michael N. Levas and Marlene D. Melzer-Lange

Violence is recognized by the World Health Organization (WHO) as a leading worldwide public health problem. The WHO defines violence as "the *intentional* use of physical force or power, threatened or actual, against oneself, another person, or against a group or community that either results in or has a high likelihood of resulting in *injury*, death, psychologic harm, maldevelopment or deprivation" (see Chapter 15). Youths may be perpetrators, victims, or observers of violence (or any combination of the three roles, wherein the roles are unclear), with varying severity of impact on the individual, family, and larger community. Risk factors for youth violence include poverty, socially disorganized communities, war and other regional conflicts, substance misuse (in the child or family), behavioral health disorders (attention-deficit, hyperactivity, conduct disorder), poor school performance, social isolation, child trafficking, runaway youth, criminal or gang involvement (child or family), bullying, and low parental involvement.

EPIDEMIOLOGY

In 2019 (and 2021), **homicide** in the United States was the third leading cause of death for 10- to 24-year-olds, totaling 4,965 deaths, which were largely males (85%) killed by a handgun (79%). The 2019 homicide rate for teens age 12-17 years was 3.43/100,000 youth, down 63% from 8.4/100,000 youth in 1993. The WHO reports that other than the United States, where the youth and young adult homicide rate was 11/100,000, most countries with homicide rates above 10/100,000 are developing nations or countries with socioeconomic instability. In the United States the prevalence of behaviors that contribute to violence has not decreased, as fighting, weapon carrying, and cyberbullying remain prevalent among youth. Furthermore, the rate of homicide in youth had been declining since the peak in the 1990s but showed an increase in 2017 that has continued (Fig. 156.1). Adolescent reports of **physical fighting** have decreased from 42% in 1991 to 22% in 2019.

Violence at U.S. schools remains a significant problem, with 8.1% of students reporting being in a physical fight on school property one or more times in the preceding 12 months in 2019. The 2019 Youth Risk Behavior Surveillance System reported 13.1% of youths overall carried a weapon such as a gun, knife, or club in the last 30 days; 2.8% carried the weapon to school; and 7.4% reported being threatened or injured with a type of weapon on school property. Males are more likely than females to carry a gun or weapon and therefore may need more support and engagement at home and at school. These **violence-related behaviors** at school affect the general students' perception of safety. More than 8.7% of students did not go to school on one or more days in the preceding 30 days because they felt it was unsafe. School-based prevention programs initiated at the elementary school level have been found to decrease violent behaviors in students. Increased surveillance of students is warranted both on and around school property to improve student safety.

Adolescent relationship abuse (dating violence/reproductive coercion) occurs between two people in a close relationship and can be physical (punching, kicking, hitting, shoving), emotional (shaming, bullying, controlling, stalking), or sexual (forcing a partner to engage in a sexual act when he or she does not consent to it). Incidents of adolescent relationship abuse are not uncommon, with 22.4% of females and 15% of males experiencing some type of partner violence between the ages of 11 and 17 years. It may start with teasing, name calling, or shaming but often progresses electronically, with frequent calls, texting, or posting sexual pictures of a partner on social media. Risk factors for being a victim of adolescent relationship abuse include those who use alcohol, believe violence is acceptable, have a lack of adult supervision, or have a peer who is in a violent relationship. Most teens do not report the behaviors because of fear of retaliation from the partner. Teens who are victims of adolescent relationship abuse are more likely to experience decreased school performance, have thoughts about suicide, use drugs and alcohol, develop an eating disorder, experience depression, and are more likely to be victimized during college and into adulthood. School-based prevention programs that address attitudes and behaviors linked with adolescent relationship abuse, such as **Safe Dates** and **Dating Matters**, offer training experiences to change social norms among teens.

ETIOLOGY

The WHO places youth violence in a model within the context of three larger types of violence: self-inflicted, interpersonal, and collective. **Interpersonal violence** is subdivided into violence largely between family members or partners and includes child abuse. **Community violence** occurs between individuals who are unrelated. **Collective violence** incorporates violence by people who are members of an identified group

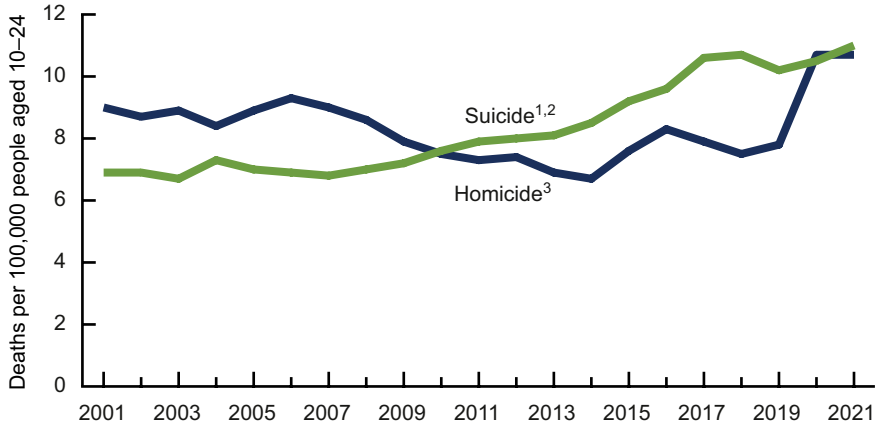

Fig. 156.1 Suicide and homicide death rates among people aged 10–24, United States, 2001–2021. [1]No statistically significant trend from 2001–2007, then significant increasing trend from 2007–2021 ($p < 0.05$). [2]Rate significantly lower than the rates for homicide from 2001–2009 and significantly higher from 2011–2019 ($p < 0.05$). [3]No statistically significant trend for homicides from 2001–2006, then significant decreasing trend from 2006–2014, and a significant increasing trend from 2014–2021 ($p < 0.05$). The rate in 2021 was not significantly different than the rate in 2020 ($p < 0.05$). NOTES: Suicides are identified with International Classification of Diseases, 10th Revision codes U03, X60–X84, and Y87.0, and homicides with codes U01–U02, X85–Y09, and Y87.1. Access data table at: https://www.cdc.gov/nchs/data/databriefs/db471-tables.pdf#1. SOURCE: National Center for Health Statistics, National Vital Statistics System, Mortality data file. *(From Curtin SC, Garnett MF. Suicide and Homicide Death Rates Among Youth and Young Adults Aged 10–24: United States, 2001–2021. NCHS Data Brief. 2023 Jun;(471):1–8. Fig 1.)*

against another group of individuals with social, political, or economic motivation. The types of violence in this model have behavioral links, such that child abuse victims are more likely to experience violent and aggressive interpersonal behavior as adolescents and adults. Overlapping risk factors for the types of violence include firearm availability, alcohol use, and socioeconomic inequalities. The benefit to identifying common risk factors for the types of violence lies in the potential for intervening with prevention efforts and gaining positive outcomes for more than one type of violent behavior. The model further acknowledges four categories that explore the potential nature of violence as involving physical, sexual, or psychologic force and deprivation.

The social-ecologic model of public health focuses on both population-level and individual-level determinants of health and their respective interventions. On the individual level, there may be two types of antisocial youth: life course persistent and limited. **Life course–limited offenders** have no childhood aberrant behaviors and are more likely to commit *status* offenses such as vandalism, running away, and other behaviors symbolic of their struggle for autonomy from parents. **Life course–persistent offenders** exhibit aberrant behavior in childhood, such as problems with temperament, behavioral development, and cognition; as adolescents they participate in more *victim-oriented* crimes. The existence of **adverse childhood experiences** foretells future health issues and subsequent violence. This hypothesis proposes that precursors such as child abuse and neglect, a child witnessing violence, adolescent sexual and physical abuse, and adolescent exposure to violence and violent assaults predispose youths to outcomes of violent behavior, violent crime, delinquency, violent assaults, suicide, or premature death. This public health model also emphasizes the community environment and resiliency of the individual and family. An additional common paradigm for high-risk violence behavior poses a balance of risk and protective factors at the individual, family, and community levels.

CLINICAL MANIFESTATIONS

The identified risk factors for youth violence include poverty, association with delinquent peers, poor school performance or low education status, disconnection from adult role models or mentors, prior history of violence or victimization, poor family functioning, childhood abuse, substance misuse, and certain mental health disorders. The most common disorders associated with **aggressive behavior** in adolescents are intellectual disabilities, learning disabilities, moderately severe language disorders, and mental health disorders such as attention-deficit/hyperactivity disorder (ADHD) and mood disturbances. In general, youth with mental health disorders are not violent. However, the link between severe mental illness and violent behaviors is strongest for those with coexisting alcohol or substance abuse or dependence.

Inability to master prosocial skills such as the establishment and maintenance of positive family/peer relations and poor resolution of conflict may put adolescents at higher risk of physical violence and other risky behaviors. The single, most protective factor is the existence of one or more significant adult mentors in the child's life. **Conduct disorder** and **oppositional defiant disorder** are specific psychiatric diagnoses whose definitions are associated with violent behavior (Table 156.1). They occur with other disorders such as ADHD (see Chapter 50) and increase an adolescent's vulnerability for juvenile delinquency, substance use or abuse, sexual promiscuity, adult criminal behavior, incarceration, and antisocial personality disorder. Other co-occurring risk factors for youth violence include use of anabolic steroids, gang tattoos, belief in one's premature death (inability to see oneself as surviving to adulthood), preteen alcohol use, and placement in a juvenile detention center.

DIAGNOSIS

The assessment of an adolescent at risk or with a history of violent behavior or victimization should be a part of the health maintenance visit of all adolescents. The answers to questions about recent history of involvement in a physical fight, carrying a weapon, or firearms in the household, as well as concerns that the adolescent may have about personal safety, may suggest a problem requiring a more in-depth evaluation. The **FISTS** mnemonic provides guidance for structuring the assessment (Table 156.2). Another screening tool, **Violence Injury Protection and Risk Screen (VIPRS)**, has been validated to predict *future* violence among youth in the primary care setting (Table 156.3). The additional factors of physical or sexual abuse, serious problems at school, poor school performance and attendance, multiple incidents of trauma, substance use, and symptoms associated with behavioral disorders are indications for evaluation by a behavioral health professional. In a situation of acute trauma, assault victims are not always forthcoming about the circumstances of their injuries for fear of retaliation or police involvement. Stabilization of the injury or the gathering of forensic evidence in sexual assault is the treatment priority; however, once this is achieved, addressing a more comprehensive set of issues surrounding the assault is appropriate.

Table 156.1 Oppositional Defiant Disorder and Conduct Disorder

OPPOSITIONAL DEFIANT DISORDER	CONDUCT DISORDER
• Often being angry or losing one's temper • Often arguing with adults or refusing to comply with adults' rules or requests • Often resentful or spiteful • Deliberately annoying others or becoming annoyed with others • Often blaming other people for one's own mistakes or misbehavior	• Breaking serious rules, such as running away, staying out at night when told not to, or skipping school • Being aggressive in a way that causes harm, such as bullying, fighting, or being cruel to animals • Lying, stealing, or damaging other people's property on purpose

Courtesy Centers for Disease Control and Prevention: Children's Mental Health, https://www.cdc.gov/childrensmentalhealth/behavior.html, accessed August 4, 2021.

Table 156.2 FISTS Mnemonic to Assess an Adolescent's Risk of Violence

F: Fighting (How many fights were you in last year? What was the last?)
I: Injuries (Have you ever been injured? Have you ever injured someone else?)
S: Sex (Has your partner hit you? Have you hit your partner? Have you ever been forced to have sex?)
T: Threats (Has someone with a weapon threatened you? What happened? Has anything changed to make you feel safer?)
S: Self-defense (What do you do if someone tries to pick a fight? Have you carried a weapon in self-defense?)

Adapted with permission from the Association of American Medical Colleges. Alpert EJ, Sege RD, Bradshaw YS. Interpersonal violence and the education of physicians. *Acad Med.* 1997;72:S41–S50.

TREATMENT

In the patient with acute injury secondary to violent assault, the treatment plan should follow standard protocols, which include the stabilization of the injury, evaluation and treatment of the injury, evaluation of the assault circumstance, psychologic evaluation and support, social service evaluation of the circumstances surrounding the assault, and a treatment plan on discharge that is designed to protect the adolescent from subsequent injury episodes, prevent retaliation, and minimize the development of psychologic disability. Victims and *witnesses* of violence are at risk for posttraumatic stress disorder and future aggressive or violent behavior. Using a **trauma-informed care** approach enables providers to help these victims and witnesses so that they can develop linkages to recovery and resilience. **Hospital-based violence intervention programs** have shown success by supporting violently injured youth and their families in the emergency department, hospital, or community. Credible messenger and violence interrupter programs have shown promise in decreasing the cycle of violence and retaliation in the community after violent events.

Table 156.3 Violence Injury and Perpetration Risk Screen (VIPRS Scale): Percent and Odds of Future Violence Perpetration by Question Type

PROTECTIVE FACTORS	%	ODDS OF ASSOCIATION WITH VIOLENCE PERPETRATION IF PROTECTIVE FACTOR NOT PRESENT OR (95% CI)
1. Do your parents expect you to do well at school?		6.1 (1.1-33.83)
Most of the time	93	
Sometimes	6.1	
Rarely/never	0.6	
2. Are your grades mostly		5.8 (1.7-19.2)
A/B average	77.9	
C average	16.6	
D/F average	5.5	
RISK FACTORS	**% POSITIVE**	**ODDS OF ASSOCIATION WITH FUTURE VIOLENCE PERPETRATION IF RISK FACTOR PRESENT (OR 95% CI)**
3. Have you been suspended from school in the last year?		
Yes	17	47 (11.1-201)
4. How many fights have you been in during the last year?		
0	82	
1-5	18	10.7 (3.2-35.6)
5. Have you ever smoked marijuana or used other drugs?		
Yes	23	4.6 (1.5-14.2)
6. Have you or your friends ever been in trouble with the law?*		
Yes	38.2	2.1 (0.72-6.2)
Males	40.8	8.6 (1.4-54.2)
Females	36.2	0.85 (0.19-3.8)
7. Are you or your friends involved with a gang or tagging crew?		
Yes	7.0	4.6 (0.93-23.0)
8. Do you feel you are hyperactive, or have you ever been diagnosed with ADHD*		
Yes	14.8	3.0 (0.88-10.3)
Males	15.9	0.83 (0.08-8.5)
Females	14.0	6.4 (1.3-30.7)
9. Have you had any friends who have committed suicide?		
Yes	11	3.7 (0.93-14.4)
10. Have you ever been injured in a fight?		
Yes	10	4.3 (1.1-17.6)
11. When was the last time you hurt someone else in a fight?		
In the past month	4.3	
Between 1 and 6 mo ago	6.7	
Between 6 and 12 mo ago	3.7	
Over 1 yr ago	11.6	
Never	73.8	
Positive if ≤12 mo ago	14.6	24.6 (4.3-138.7)
12. When was the last time you watched a fight?		
In the past month	25	
Between 1 and 6 mo ago	13.4	
Between 6 and 2 mo ago	11.6	
Over 1 yr ago	22.6	
Never	27.4	
Positive if ≤12 mo ago	50	6.1 (1.6-22)

Continued

Table 156.3 Violence Injury and Perpetration Risk Screen (VIPRS Scale): Percent and Odds of Future Violence Perpetration by Question Type—cont'd

RISK FACTORS	% POSITIVE	ODDS OF ASSOCIATION WITH FUTURE VIOLENCE PERPETRATION IF RISK FACTOR PRESENT (OR 95% CI)
13. How many times has someone beat you up in the last 6 mo?		
0	91.2	
1-6	9.8	6.2 (1.1-34.2)
14. How many times has someone asked you to fight in the last 6 mo?		
0	75	
1-6	25	3.6 (1.1-11.7)

*Questions 6 and 8 display gender differences, because these two questions reveal statistically significant differences between genders.
Modified from Sigel EJ, Hoffenberg A, Hart J, Dodge M. Development and psychometric properties of a violence screening tool for primary care. *J Adolesc Health*. 2011;48:358–365, Table 4.

Table 156.4 Preventing Youth Violence (CDC)

STRATEGY	APPROACH
Promote family environments that support healthy development	Early childhood home visitation Parenting skill and family relationship programs
Provide quality education early in life	Preschool enrichment with family engagement
Strengthen youth skills	Universal school-based programs
Connect youth to caring adults and activities	Mentoring programs After-school programs
Create protective community environments	Modify the physical and social environment Reduce exposure to community-level risks Street outreach and community norm change
Intervene to lessen harms and prevent future risk	Treatment to lessen the harms of violence exposures Treatment to prevent problem behavior and further involvement in violence Hospital-community partnerships

From David-Ferdon, C, Vivolo-Kantor AM, Dahlberg LL, et al. *A Comprehensive Technical Package for the Prevention of Youth Violence and Associated Risk Behaviors.* Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention; 2016.

Table 156.5 Prevention of Youth Violence (WHO)

Promising prevention programs include:
- Life skills and social development programs designed to help children and adolescents manage anger, resolve conflict, and develop the necessary social skills to solve problems
- Whole-school approaches to violence prevention in educational facilities
- Programs that support parents and teach positive parenting skills
- Preschool programs that provide children with academic and social skills at an early age
- Therapeutic approaches for youths at high risk of being involved in violence
- Reducing access to alcohol
- Interventions to reduce the harmful use of drugs
- Restrictive firearm licensing
- Community and problem-oriented policing
- Interventions to reduce concentrated poverty and to upgrade urban environments

Preventing youth violence requires a comprehensive approach that addresses the social determinants of violence, such as income inequality, rapid demographic and social change, and low levels of social protection.
Courtesy World Health Organization: Youth Violence. https://www.who.int/news-room/fact-sheets/detail/youth-violence, accessed August 11, 2022.

Multiple treatment modalities are used simultaneously in managing adolescents with persistent violent and aggressive behavior and range from cognitive-behavioral therapy involving the individual and family to specific family interventions (parent management training, multisystemic treatment) and pharmacotherapy. Treatment of comorbid conditions, such as ADHD, depression, anxiety, and substance abuse, appears to reduce aggressive behavior.

PREVENTION

The WHO recognizes a multifactorial approach to prevention: parenting and early childhood development strategies, school-based academic and social skills development strategies, strategies for young people at higher risk of or already involved in violence, and community- and society-level strategies (Tables 156.4 and 156.5). **Parenting and early childhood development approaches** concentrate on working with families to provide nonviolent parenting through home visitation and parent groups as well as teaching coping strategies and nonviolent conflict resolution for all children and families. **School-based social skills development strategies** focus on students' families and peer relationships, especially those with the potential to trigger aggressive or violent responses. Solutions include improving coping or problem-solving skills, anti-bullying campaigns, peer mediation, adolescent relationship abuse prevention, and after-school programs. **Strategies for young people at higher risk of, or already involved in, violence** include therapeutic behavioral health approaches, crime victim services, vocational training, mentoring, and gang intervention. These youth are at highest risk for repeat injury or incarceration. **Community- and societal-level approaches** include broader advocacy and legislative actions and changing the cultural norm toward violent behaviors.

A specific prevention strategy can incorporate several approaches, such as the handgun/firearm prevention recommendations that include gun-lock safety, public education, and legislative advocacy. Other efforts are directed toward establishing a national database to track and define the problem of youth violence. The **National Violent Death Reporting System** collects and analyzes violent death data from all 50 states, the District of Columbia, and Puerto Rico and aims to improve surveillance of current trends, to share information state to state, to build partnerships among state and community organizations, and to develop and implement prevention and intervention programs. The Centers for Disease Control and Prevention characterizes specific successful prevention programs, including Striving to Reduce Youth Violence Everywhere (STRYVE), and summarizes program content on its website (www.cdc.gov).

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

Chapter 157
Substance Use Disorder

Cora Collette Breuner

Many adolescents engage in the use of a wide range of substances, including alcohol, tobacco products, natural marijuana and synthetic cannabinoids, opiates, psychoactive agents (amphetamine, cocaine, MDMA, 3,4-methylenedioxymethamphetamine), hallucinogens, inhaled products (glue, organic solvents, nitrous oxide), and stimulants. Their reactions to and the consequences of these exposures are influenced by a complex interaction among biologic and psychosocial development, environmental messages, legality, and societal attitudes. The potential for adverse outcome with occasional use, such as motor vehicle crashes, violence, and other injuries, is sufficient justification to consider any substance use in adolescents a considerable risk.

Individuals who initiate substance use at an early age are at a greater risk for developing a **substance use disorder** than those who begin using substances in early adulthood. Substance use disorder is diagnosed when the recurrent use of the substance causes clinically significant impairment, including health problems, disability, and failure to meet major responsibilities at work, school, or home. Substance use in younger adolescents may act as a substitute for developing age-appropriate coping strategies and enhance vulnerability to poor decision-making. Most (88%) people report that their age of first alcohol use was <21 years old, the legal drinking age in the United States. Inhalants have been identified as a popular first substance for youth in eighth grade (age 13-14 years).

Substance use disorder is a pervasive phenomenon and infiltrates every socioeconomic and cultural segment of the population. It is one of the costliest and most challenging public health problems facing all societies and cultures. The challenge to the clinician is to identify youth at risk for substance use disorder and offer early intervention. The challenge to the community and society is to create norms that decrease the likelihood of adverse health outcomes for adolescents and promote and facilitate opportunities for adolescents to choose healthier and safer options. Recognizing those substances with the greatest harm, and at times focusing on harm reduction with or without abstinence, is essential in the approach to the adolescent with substance use disorder (Fig. 157.1).

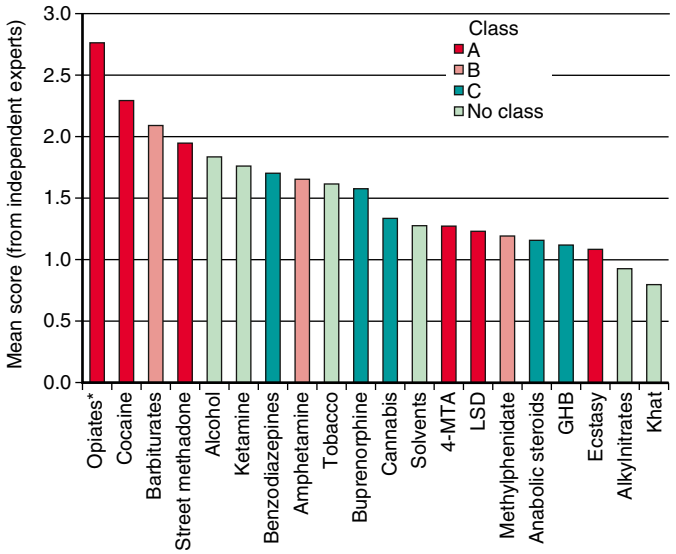

Fig. 157.1 Mean harm scores for 20 substances as determined by an expert panel based on three criteria: physical harm to user, potential for dependence, and effect on family, community, and society. Classification under the Misuse of Substances Act, when appropriate, is shown by the color of each bar. Class A substances are deemed potentially most dangerous; class C least dangerous. *Heroin, fentanyl, fentanyl derivatives. *(From Nutt D, King LA, Saulsbury W, et al. Development of a rational scale to access the harm of substances of potential misuse. Lancet 2007;369:1047–1053.)*

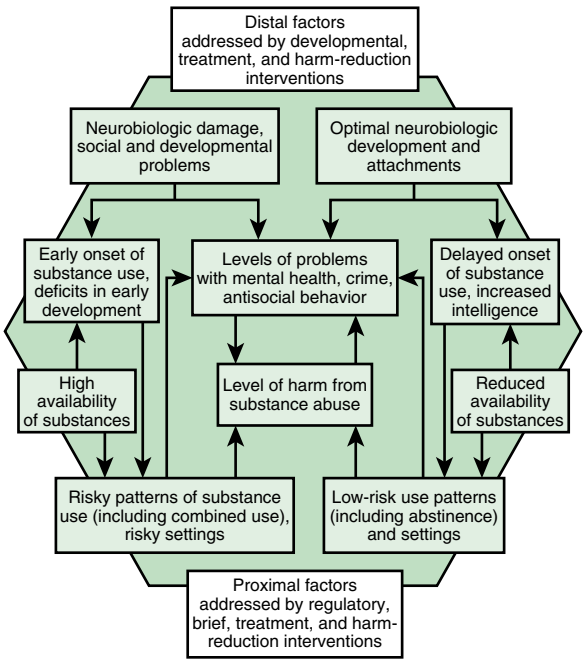

Fig. 157.2 Protection and risk model for distal and proximal determinants of risky substance use disorder and related harms. *(From Toumbourou JW, Stockwell T, Neighbors C, et al. Interventions to reduce harm associated with adolescent substance use. Lancet 2007;369:1391–1571.)*

ETIOLOGY

Substance use disorder has multifactorial origins (Fig. 157.2). Social determinants of health, including economic stability, education, health and healthcare, neighborhood environment, and social and community context, all have an impact on adolescents and can lead to substance use disorder and use. Biologic factors, including genetic predisposition, are established contributors. Behaviors such as ineffective self-control, poor school performance, involvement with the juvenile justice system, and emotional trends such as low self-esteem are frequently associated with or predate the onset of substance use. Psychiatric disorders often coexist with adolescent substance use. Conduct disorders and antisocial personality disorders are the most common diagnoses coexisting with substance use, particularly in males. Teens with depression (see Chapter 39.1), attention-deficit disorder (Chapter 50), anxiety (Chapter 38), and eating disorders (Chapter 41) have high rates of substance use. The determinants of adolescent substance use disorder and substance use are explained using numerous theoretical models and include factors at the individual level, the level of significant relationships with others, and the level of the setting or environment. These models include a balance of risk and protective or coping factors contributing to individual differences among adolescents with similar risk factors who escape adverse outcomes.

Risk factors for adolescent *substance use disorder* may differ from those associated with adolescent substance use. Adolescent substance use is more commonly related to social and peer factors, whereas *use disorder* is more often a function of psychologic and biologic factors. The likelihood that an otherwise normal adolescent would experiment with substances may depend on the availability of the substance to the adolescent, the perceived positive or otherwise functional value to the adolescent, the perceived risk associated with use, and the presence or absence of restraints, as determined by the adolescent's cultural or other important value systems.

Specific historical questions can assist in determining the severity of the substance problem through a rating system (Table 157.1). The type of substance used (marijuana vs cocaine), the circumstances of use (alone or in a group setting), the frequency and timing of use (daily before school vs occasionally on a weekend), current mental health status, and general functional status, including sleep habits and screen use, should all be considered in evaluating any adolescent found to be using a substance. The stage of substance use should also be considered (Table 157.2). A teen may spend months or years in the experimentation phase trying a variety of illicit substances, including the most common substances: alcohol, tobacco products, and marijuana. Often it is not until regular use of substances results in negative consequences (problem use) that the adolescent is identified as having a problem, either by parents, friends, teachers, or a healthcare provider. Having emotionally supportive parents with open communication styles, involvement in organized school activities, having mentors or role models outside the home, and recognition of the importance of academic achievement are examples of important protective factors against developing problematic use.

EPIDEMIOLOGY

Alcohol, tobacco products, and marijuana are the most commonly reported substances used among U.S. teens (Table 157.3). The prevalence of substance use and associated risky behaviors vary by age, gender, race/ethnicity, and other sociodemographic factors. Younger teenagers tend to report less use of substances than do older teenagers, except for inhalants (in 2016, 4.4% in 8th grade, 2.8% in 10th grade, 1.0% in 12th grade). In 2019, a total of 50.1% of U.S. high school students had ever used electronic vapor products, and 24.1% had ever tried cigarette smoking. Current electronic vapor product use was 32.7%, current cigarette smoking was 6.0%, current cigar smoking was 5.7%, and current smokeless tobacco use was 3.8%. Approximately 36.5% of students were current users of any tobacco product, and 8.2% were current users of two or more tobacco products. Males have higher rates of substances use than females, with greatest differences seen in their higher rates of use of tobacco products including vaping, chewing and cigarettes/cigars, and anabolic steroids.

Fewer students engaged in some high-risk substance use–related behaviors from 2009 through 2019. However, approximately one in seven students are still reporting lifetime use of any illicit drug or misuse of prescription medicine.

Marijuana use has been trending down over the past several years among adolescents, though there is variation in the extent and rate of use in different racial/ethnic groups. Use also depends on grade level, urban vs rural location, class size, and state laws regarding legalization of recreational or medical marijuana. The magnitude of the increase was greater in states with legal medical or recreational marijuana. Synthetic cannabinoids have significant psychotropic effects and addictive potential. Severe neuropsychiatric toxicity is often different from and more severe than marijuana.

The number of 12th graders who report using any of the **prescription psychotherapeutic** substances, including amphetamines, sedatives (barbiturates), tranquilizers, and narcotics other than heroin, decreased in 2019. Prevalence was 14% for ever used and 7.0% for 30-day use, indicating that a substantial portion of adolescents still misuse prescription substances including opioids. Rural adolescents are also more likely than urban adolescents to misuse prescription substances. In a large-scale study of 16,209 adolescent exposures to prescription substances, 52.4% were females, and the mean age was 16.6 years. The five most frequently misused substances were hydrocodone (32%),

Table 157.2 Stages of Adolescent Substance Use

STAGE	DESCRIPTION
1	Potential for use • Decreased impulse control • Need for immediate gratification • Available substances, alcohol, inhalants • Need for peer acceptance
2	Experimentation: learning the euphoria • Use of inhalants, tobacco, marijuana, and alcohol with friends • Few, if any, consequences • Use may increase to weekends regularly • Little change in behavior
3	Regular use: seeking the euphoria • Use of other substances (e.g., stimulants, LSD, sedatives) • Behavioral changes and some consequences • Increased frequency of use; use disorder alone • Buying or stealing substances
4	Regular use: preoccupation with the "high" • Daily use of substances • Loss of control • Multiple consequences and risk taking • Estrangement from family and "straight" friends
5	Burnout: use of substances to feel normal • Polysubstance use/cross-addiction • Guilt, withdrawal, shame, remorse, depression • Physical and mental deterioration • Increased risk taking, self-destructive, suicidal

Table 157.1 Assessing the Seriousness of Adolescent Substance Use

VARIABLE	0	+1	+2
Age (yr)	>15	<15	
Sex	Male	Female	
Family history of substance use		Yes	
Setting of substance use	In group		Alone
Affect before substance use	Happy	Always poor	Sad
School performance	Good, improving		Recently poor
Use disorder before driving	None		Yes
History of accidents	None		Yes
Time of week	Weekend	Weekdays	
Time of day		After school	Before or during school
Type of substance	Marijuana, beer, wine	Hallucinogens, amphetamines	Whiskey, opiates, cocaine, barbiturates

Total score: 0-3, less worrisome; 3-8, serious; 8-18, very serious.

Table 157.3 Trends in Annual Prevalence (%) of Use Disorder of Various Substances for Grades 8, 10, and 12 Combined

																	PEAK YEAR–2021 CHANGE		LOW YEAR–2021 CHANGE	
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019[E]	2020	2021	2020–2021 CHANGE	ABSOLUTE CHANGE	PROPORTIONAL CHANGE (%)[a]	ABSOLUTE CHANGE	PROPORTIONAL CHANGE (%)[a]
Any illicit drug[c]	24.8	24.9	25.9	27.3	27.6	27.1	28.6‡	27.2	26.8	25.3	26.5	27.1	**27.7**	27.3	*19.9*	−7.4 sss	−7.8 sss	−28.1	—	—
Any illicit drug other than marijuana[c]	12.4	11.9	11.6	11.8	11.3	10.8	11.4‡	**10.9**	10.5	9.7	9.4	9.3	9.0	9.2	*5.6*	−3.6 sss	−5.3 sss	−48.7	—	—
Any illicit drug including inhalants[c]	27.6	27.6	28.5	29.7	29.8	29.0	30.5‡	28.5	28.4	26.3	28.3	28.8	29.0	**29.2**	*21.5*	−7.8 sss	−7.8 sss	−26.6	—	—
Marijuana/hashish	21.4	21.5	22.9	24.5	25.0	24.7	25.8	24.2	23.7	22.6	23.9	24.3	25.2	2	*17.9*	−6.7 sss	−12.1 sss	−40.3	—	—
Synthetic marijuana	—	—	—	—	—	**8.0**	6.4	4.8	4.2	3.1	2.8	2.6	2.9	2.2	*1.6*	−0.6 ss	−6.4 sss	−80.3	—	—
Inhalants	6.4	6.4	6.1	6.0	5.0	4.5	3.8	3.6	3.2	*2.6*	2.9	2.9	2.9	3.4	2.9	−0.5	−7.3 sss	−71.6	+0.2	+0.3
Hallucinogens	3.8	3.8	3.5	3.8	3.7	3.2	3.1	2.8	2.8	2.8	2.7	2.7	2.9	3.4	*2.4*	−1.0 s	−3.6 sss	−60.4	—	—
LSD	1.7	1.9	1.6	1.8	1.8	1.6	1.6	1.7	1.9	2.0	2.1	2.0	2.2	2.5	1.5	−0.9 ss	−4.8 sss	−75.6	+0.1	+0.6
Hallucinogens other than LSD	3.3	3.2	3.0	3.3	3.1	2.7	2.5	2.1	1.9	1.8	1.8	1.7	1.9	2.0	*1.7*	−0.3	−2.4 sss	−58.3	—	—
Ecstasy (MDMA)[d]	3.0	2.9	3.0	3.8	3.7	2.5	2.8‡	**3.4**	2.4	1.8	1.7	1.5	1.6	1.3	*0.8*	−0.5 s	−2.6 sss	−76.0	—	—
Salvia	—	—	—	3.5	**3.6**	2.7	2.3	1.4	1.2	1.2	0.9	0.8	0.8	0.8	*0.5*	−0.3 s	−3.1 sss	−85.1	—	—
Cocaine	3.4	2.9	2.5	2.2	2.0	1.9	1.8	1.6	1.7	1.4	1.6	1.5	1.4	1.4	*0.7*	−0.8 ss	−3.8 sss	−85.0	—	—
Crack	1.5	1.3	1.2	1.1	1.0	0.9	0.8	0.7	0.8	0.6	0.7	0.6	0.7	0.6	*0.4*	−0.2	−2.0 sss	−82.6	—	—
Other cocaine	2.9	2.6	2.1	1.9	1.7	1.7	1.5	1.5	1.5	1.2	1.3	1.3	1.3	1.4	*0.5*	−0.9 sss	−3.5 sss	−86.6	—	—
Heroin	0.8	0.8	0.8	0.8	0.7	0.6	0.6	0.5	0.4	0.3	0.3	0.3	0.3	0.2	*0.2*	−0.1	−1.1 sss	−85.5	—	—
With a needle	0.5	0.5	0.5	0.6	0.5	0.4	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	*0.1*	0.0	−0.6 sss	−84.3	—	—
Without a needle	0.7	0.6	0.5	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	*0.1*	0.0	−1.0 sss	−92.7	—	—
OxyContin	3.5	3.4	**3.9**	3.8	3.4	2.9	2.9	2.4	2.3	2.1	1.9	1.7	1.7	1.4	*0.9*	−0.5	−3.0 sss	−77.3	—	—
Vicodin	6.2	6.1	6.5	5.9	5.1	4.3	3.7	3.0	2.5	1.8	1.3	1.1	1.0	0.9	*0.6*	−0.2	−5.9 sss	−90.6	—	—
Amphetamines[c]	6.5	5.8	5.9	6.2	5.9	5.6	7.0‡	**6.6**	6.2	5.4	5.0	5.0	4.6	4.6	*2.7*	−1.9 sss	−3.9 sss	−59.5	—	—
Ritalin	2.8	2.6	2.5	2.2	2.1	1.7	1.7	1.5	1.4	1.1	0.8	0.8	0.9	1.0	*0.5*	−0.6	−3.7 sss	−88.3	—	—
Adderall	—	—	4.3	**4.5**	4.1	4.4	4.4	4.1	4.5	3.9	3.5	3.5	3.1	3.3	*1.7*	−1.6 sss	−2.8 sss	−61.3	—	—
Methamphetamine	1.4	1.3	1.3	1.3	1.2	1.0	1.0	0.8	0.6	0.5	0.5	0.5	0.5	0.7	*0.2*	−0.5 ss	−3.9 sss	−96.1	—	—
Bath salts (synthetic stimulants)	—	—	—	—	—	0.9	**0.9**	0.8	0.7	0.8	*0.5*	0.7	—	—	—	—	—	—	—	—
Tranquilizers	4.5	4.3	4.5	4.4	3.9	3.7	3.3	3.4	3.4	3.5	3.6	3.2	3.1	2.7	*1.2*	−1.4 sss	−4.3 sss	−77.8	—	—
OTC cough/cold medicines	5.0	4.7	5.2	4.8	4.4	4.4	4.0	3.2	3.1	3.2	3.0	3.2	2.8	3.7	*2.7*	−1.1 s	−2.7 sss	−50.3	—	—
Rohypnol	0.8	0.7	0.6	0.8	0.9	0.7	0.6	0.5	0.5	0.7	0.5	0.4	0.5	**1.0**	*0.2*	−0.7 sss	−0.7 sss	−71.3	—	—
GHB[b]	0.7	0.9	0.9	0.8	*0.8*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ketamine[b]	*1.0*	1.2	1.3	1.2	1.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Continued

Table 157.3 Trends in Annual Prevalence (%) of Use Disorder of Various Substances for Grades 8, 10, and 12 Combined—cont'd

																	PEAK YEAR–2021 CHANGE		LOW YEAR–2021 CHANGE	
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019[E]	2020	2021	2020–2021 CHANGE	ABSOLUTE CHANGE	PROPORTIONAL CHANGE (%)[a]	ABSOLUTE CHANGE	PROPORTIONAL CHANGE (%)[a]
Alcohol	50.2	48.7	48.4	47.4	45.3	44.3	42.8	40.7	39.9	36.7	36.7	36.1	35.9	38.3	*30.2*	−8.1 sss	−31.1 sss	−50.7	—	—
Been drunk	29.7	28.1	28.7	27.1	25.9	26.4	25.4	23.6	22.5	20.7	20.4	20.0	19.5	22.1	*15.5*	−6.6 sss	−21.4 sss	−57.9	—	—
Flavored alcoholic beverages	40.8	39.0	37.8	35.9	33.7	32.5	31.3	29.4	28.8	25.3	25.9	26.1	24.6	26.5	*20.0*	−6.5 sss	−24.5 sss	−55.1	—	—
Alcoholic beverages containing caffeine	—	—	—	—	**19.7**	18.6	16.6	14.3	13.0	11.2	10.6	10.1	9.2	8.6	*7.8*	−0.8 sss	−11.9 sss	−60.3	—	—
Any vaping	—	—	—	—	—	—	—	—	—	—	*21.5*	28.9	**31.9**	30.7	22.1	−8.6 sss	−9.9 sss	−30.9	+0.6	+2.6
Vaping nicotine	—	—	—	—	—	—	—	—	—	—	*13.9*	21.6	**27.3**	27.1	19.2	−7.9 sss	−8.1 sss	−29.7	+5.3 sss	+37.7
Vaping marijuana	—	—	—	—	—	—	—	—	—	—	*6.8*	9.9	15.6	**16.3**	11.6	−4.7 ss	−4.7 ss	−28.9	+4.8 sss	+69.7
Vaping just flavoring	—	—	—	—	—	—	—	—	—	—	17.2	**21.8**	18.6	15.8	*10.0*	−5.8 sss	−11.8 sss	−54.3	—	—
Juul	—	—	—	—	—	—	—	—	—	—	—	—	**23.8**	20.6	*9.1*	−11.5 sss	−14.7 sss	−61.7	—	—
Dissolvable tobacco products	—	—	—	—	—	**1.4**	1.4	1.2	1.1	0.9	0.9	1.0	1.0	0.9	*0.7*	−0.2	−0.7 s	−48.7	—	—
Snus	—	—	—	—	—	**5.6**	4.8	4.1	3.8	3.6	2.6	3.0	2.2	2.7	*1.6*	−1.1 ss	−4.0 sss	−72.0	—	—
Steroids	1.1	1.1	1.0	0.9	0.9	0.9	0.9	0.9	1.0	0.8	0.8	0.8	0.9	1.1	*0.4*	−0.7 sss	−1.6 sss	−79.5	—	—

[a]The proportional change is the percent by which the most recent year deviates from the peak year (or the low year) for the drug in question. So, if a drug was at 20% prevalence in the peak year and declined to 10% prevalence in the most recent year, that would reflect a proportional decline of 50%.

[b]Question was discontinued among 8th and 10th graders in 2012.

[c]In 2013, for the questions on the use of amphetamines, the text was changed on two of the questionnaire forms for 8th and 10th graders and four of the questionnaire forms for 12th graders. This change also affected the any illicit drug indices. Data presented here include only the changed forms beginning in 2013.

[d]In 2014, the text was changed on one of the questionnaire forms for 8th, 10th, and 12th graders to include "molly" in the description. The remaining forms were changed in 2015. Data for both versions of the question are presented here.

[e]Drug prevalence results in 2019 combine results from paper-and-pencil surveys with those completed using electronic tablets. In 2019, students in a randomly selected half of schools completed MTF surveys on paper-and-pencil and students in the other half completed the surveys using electronic tablets. Analysis of this randomized controlled trial demonstrated that these results did not significantly differ across survey mode (Miech RA, Couper MP, Heeringa SG, et al. The impact of survey mode on US national estimates of adolescent drug prevalence: results from a randomized controlled study, *Addiction*). Results for student attitudes and beliefs in 2019 are based on answers from paper-and-pencil surveys only because these appear more susceptible to survey mode effects.

Notes: – indicates data not available. ‡ indicates a change in the question text. When a question change occurs, peak levels after that change are used to calculate the peak year to current year difference. Values in bold equal peak levels since 1991. Values in *italics* equal peak level before wording change. Level of significance of difference between classes: s = 0.05, ss = 0.01, sss = 0.001. Any apparent inconsistency between the change estimate and the prevalence estimates for the two most recent years is the result of rounding.

Modified from Miech RA, Johnston LD, O'Malley PM, et al. *Monitoring the Future National Survey Results on Drug Use, 1975–2021: Volume I, Secondary School Students.* Ann Arbor, MI: Institute for Social Research, The University of Michigan; 2022. Available https://monitoringthefuture.org/wp-content/uploads/2022/12/mtf2022.pdf

amphetamines (18%), oxycodone (15%), methylphenidate (14%), and tramadol (11%). Many of these substances can be found in the home of friends; some are over-the-counter (OTC) substances (dextromethorphan, pseudoephedrine), whereas others are purchased from substance dealers at schools and colleges. Adolescents often combine opioids with marijuana, alcohol, cocaine, and tranquilizers, putting them at risk for serious complications and overdose.

CLINICAL MANIFESTATIONS

Although manifestations vary by the specific substance of use, adolescents who use substances often present in an office setting with no obvious physical findings. Substance use disorder is more frequently detected in adolescents who experience trauma such as motor vehicle crashes, bicycle injuries, or violence. Eliciting appropriate historical information regarding substance use, followed by blood alcohol and urine substance screens, is recommended in emergency settings. Although waning in popularity, the illicit substances known as "club drugs" still need to be considered in the differential diagnosis of a teen with an altered sensorium. An adolescent presenting to an emergency setting with an impaired sensorium should be evaluated for substance use as a part of the differential diagnosis (Table 157.4). Screening for substance use is recommended for patients with psychiatric and behavioral diagnoses. Other clinical manifestations of substance use are associated with the route of use; intravenous substance use is associated with venous "tracks" and needle marks, and nasal mucosal injuries are associated with nasal insufflation of substances. Seizures can be a direct effect of substances such as cocaine, synthetic marijuana, and amphetamines or an effect of substance withdrawal in the case of barbiturates or tranquilizers.

SCREENING FOR SUBSTANCE USE DISORDERS

In a primary care setting the annual health maintenance examination provides an opportunity for identifying adolescents with substance use disorder. The direct questions and the assessment of school performance, family relationships, and peer activities may necessitate a more in-depth interview if there are suggestions of difficulties in those areas. Several self-report screening questionnaires also are available, with varying degrees of standardization, length, and reliability. The **CRAFFT mnemonic** is specifically designed to screen for adolescents' substance use in the primary care setting (Table 157.5). Privacy and confidentiality must be established when asking the teen about specifics of their substance experimentation or use. Interviewing the parents can provide additional perspective on early warning signs that go unnoticed or disregarded by the teen. Examples of early warning signs of teen substance use disorder are change in mood, appetite, or sleep pattern; decreased interest in school or school performance; loss of weight; secretive behavior about social plans; or valuables such as money or jewelry missing from the home. The use of urine substance screening is recommended when select circumstances are present: (1) psychiatric symptoms to rule out comorbidity or dual diagnoses, (2) significant changes in school performance or other daily behaviors, (3) frequently occurring accidents, (4) frequently occurring episodes of respiratory problems, (5) evaluation of serious motor vehicular or other injuries, and (6) as a monitoring procedure for a recovery program. Most initial screening uses an immunoassay method, such as the enzyme-multiplied immunoassay technique, followed by a confirmatory test using highly sensitive, highly specific gas chromatography–mass spectrometry. The substances that can cause false-positive results should be considered, especially when there is a discrepancy between

Table 157.4 Most Common Toxic Syndromes

ANTICHOLINERGIC SYNDROMES	
Common signs	Delirium with mumbling speech, tachycardia, dry, flushed skin, dilated pupils, myoclonus, slightly elevated temperature, urinary retention, and decreased bowel sounds. Seizures and dysrhythmias may occur in severe cases.
Common causes	Antihistamines, antiparkinsonian medication, atropine, scopolamine, amantadine, antipsychotic agents, antidepressant agents, antispasmodic agents, mydriatic agents, skeletal muscle relaxants, and many plants (notably jimsonweed and *Amanita muscaria*).
SYMPATHOMIMETIC SYNDROMES	
Common signs	Delusions, paranoia, tachycardia (or bradycardia if the substance is a pure α-adrenergic agonist), hypertension, hyperpyrexia, diaphoresis, piloerection, mydriasis, and hyperreflexia. Seizures, hypotension, and dysrhythmias may occur in severe cases.
Common causes	Cocaine, amphetamine, methamphetamine (and its derivatives 3,4-methylenedioxyamphetamine, 3,4-methylenedioxymethamphetamine, 3,4-methylenedioxyethamphetamine, and 2,5-dimethoxy-4-bromoamphetamine), some synthetic marijuana, and OTC decongestants (phenylpropanolamine, ephedrine, and pseudoephedrine). In caffeine and theophylline overdoses, similar findings, except for the organic psychiatric signs, result from catecholamine release.
OPIATE, SEDATIVE, OR ETHANOL INTOXICATION	
Common signs	Coma, respiratory depression, miosis, hypotension, bradycardia, hypothermia, pulmonary edema, decreased bowel sounds, hyporeflexia, and needle marks. Seizures may occur after overdoses of some narcotics, notably propoxyphene.
Common causes	Narcotics, barbiturates, benzodiazepines, ethchlorvynol, glutethimide, methyprylon, methaqualone, meprobamate, ethanol, clonidine, and guanabenz.
CHOLINERGIC SYNDROMES	
Common signs	Confusion, central nervous system depression, weakness, salivation, lacrimation, urinary and fecal incontinence, gastrointestinal cramping, emesis, diaphoresis, muscle fasciculations, pulmonary edema, miosis, bradycardia or tachycardia, and seizures.
Common causes	Organophosphate and carbamate insecticides, physostigmine, edrophonium, and some mushrooms.

From Kulig K. Initial management of ingestions of toxic substances. *N Engl J Med* 1992;326:1677–1681.

Table 157.5 CRAFFT Mnemonic Tool

- Have you ever ridden in a **C**ar driven by someone (including yourself) who was high or had been using alcohol or substances?
- Do you ever use alcohol or substances to **R**elax, feel better about yourself, or fit in?
- Do you ever use alcohol or substances while you are by yourself (**A**lone)?
- Do you ever **F**orget things you did while using alcohol or substances?
- Do your **F**amily or **F**riends ever tell you that you should cut down on your drinking or substance use?
- Have you ever gotten into **T**rouble while you were using alcohol or substances?

From the Center for Adolescent Substance Use Research (CeASAR). *The CRAFFT Screening Interview.* (Copyright John R. Knight, MD, Boston Children's Hospital, 2015.)

the physical findings and the urine substance screen result. Current guidelines strongly discourage routine home-based or school-based testing.

DIAGNOSIS

The *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) no longer identifies substance use disorder as those of *abuse* or of *dependence*. A substance use disorder is defined by a cluster of cognitive, behavioral, and physiologic symptoms that indicate that an adolescent is using a substance even though there is evidence that the substance is harming the adolescent. Even after detoxification, a substance use disorder may leave persistent changes in brain circuits with resulting behavioral changes. There are 11 criteria that describe a pathologic pattern of behaviors related to use of the substance, falling into four categories: impaired control, social impairment, increased risk, and pharmacologic criteria. The first category, **impaired control**, describes an individual taking increasing amounts of the substance who expresses a persistent desire to decrease use, with unsuccessful efforts. The individual may spend a great deal of time obtaining the substance, using the substance, or recovering from its effects and expresses an intense desire for the substance, usually in settings where the substance had been available, such as a specific type of social situation. The second cluster of criteria (5-7) reflects **social impairment,** including the inability to perform as expected in school, at home, or at a job; increasing social problems; and withdrawing from the family. The third cluster addresses **increased risk** associated with use of the substance, and the fourth cluster addresses **pharmacologic responses** (tolerance and/or withdrawal). The total number of criteria present is associated with a determination of a *mild, moderate,* or *severe* disorder.

These criteria may have limitations with adolescents because of differing patterns of use, developmental implications, and other age-related consequences. Adolescents who meet diagnostic criteria should be referred to a program for substance use disorder treatment unless the primary care physician has additional training in addiction medicine.

COMPLICATIONS

Substance use disorder in adolescence is associated with significant comorbidities and acts of juvenile delinquency. Youth may engage in other high-risk behaviors such as robbery, burglary, substance dealing, or prostitution for the purpose of acquiring the money necessary to buy substances. Regular use of any substance eventually diminishes judgment and is associated with unprotected sexual activity with its consequences of pregnancy and sexually transmitted infections, including HIV, as well as physical violence. Substance use disorder is closely associated with trauma in the adolescent population. Several studies of adolescent trauma victims have identified cannabinoids and cocaine in blood and urine samples in significant proportions (40%), in addition to the more common identification of alcohol. Any use of injected substances involves the risk of hepatitis B and C viruses and HIV (see Chapter 322).

TREATMENT

Adolescent substance use disorder is a complex condition requiring a multidisciplinary approach that attends to the needs of the individual, not just substance use. Fundamental principles for treatment include accessibility to treatment, using a multidisciplinary approach, employing individual or group counseling, offering mental health services, monitoring of substance use while in treatment, and understanding that recovery from substance use/addiction may involve multiple relapses. For most patients, remaining in treatment for a minimum period of 3 months may result in a significant improvement.

PROGNOSIS

For adolescent substance users who have been referred to a substance treatment program, positive outcomes are directly related to regular attendance in posttreatment groups. Outcomes are worse for males with learning problems or conduct disorder than for those without such disorders. Peer use patterns and parental use have a major influence on outcome for males. The chronicity of a substance use disorder makes **relapse** an issue that must always be considered when managing patients after treatment, and appropriate assistance from a healthcare professional qualified in substance use disorder treatment should be obtained.

Table 157.6 Domains of Risk and Protective Factors for Substance Use Prevention

RISK FACTORS	DOMAIN	PROTECTIVE FACTORS
Early aggressive behavior	Individual	Self-control
Lack of parental supervision	Family	Parental monitoring
Substance use	Peer	Academic competence
Substance availability	School	Anti–substance use disorder policies
Poverty	Community	Strong neighborhood attachment

From National Institute on Substance Use. Preventing Substance Use Disorder Among Children and Adolescents: A Research-Based Guide for Parents, Educators, and Community Leaders, NIH Pub No 04-4212(B), 2nd ed. Bethesda, MD: NIDA; 2003.

PREVENTION

Preventing substance use disorder among adolescents requires prevention efforts aimed at the individual, family, school, and community levels. The National Institute on Drug Abuse (NIDA) of the U.S. National Institutes of Health has identified essential principles of successful prevention programs. Programs should enhance *protective factors* (parent support) and reduce *risk factors* (poor self-control), should address all forms of substance use (legal and illegal), should address the specific type(s) of substance use within an identified community, and should be culturally competent to improve effectiveness (Table 157.6). Prevention programs need to target emotionally and socially intense times such as life/school transitions for adolescents to adequately anticipate potential substance use disorder. Examples of effective research-based substance use prevention programs featuring a variety of strategies are listed on the NIDA website (www.drugabuse.gov) and on the Center for Substance Abuse Prevention website (www.prevention.samhsa.gov).

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

157.1 Alcohol

Cora Collette Breuner

Alcohol is the most widely used substance of abuse among America's youth, and a higher proportion use alcohol than use tobacco or other substances, but the numbers are trending down. According to the 2020 *Monitoring the Future (MTF)* study, by the end of high school, 61.5% of students had reported ever using alcohol and 26% of eighth graders had reported ever using alcohol. Early initiation of alcohol use increases the risk for a variety of developmental problems during adolescence and is frequently an indicator of future substance use. Drinking by children, adolescents, and young adults has serious negative consequences for the individuals, their families, their communities, and society as a whole. Underage drinking contributes to a wide range of costly health and social problems, including motor vehicle crashes (the greatest single mortality risk for underage drinkers); suicide; interpersonal violence (e.g., homicides, assaults, rapes); unintentional injuries such as burns, falls, and drowning; brain impairment; alcohol dependence; risky sexual activity; academic problems; and alcohol and other drug poisoning.

Multiple factors can affect a young teen's risk of developing a drinking problem at an early age (Table 157.7). One third of high school seniors admit to combining drinking behaviors with other risky behaviors, such as driving or taking additional substances. **Binge drinking**

Table 157.7 Risk Factors for a Teen Developing a Drinking Problem

FAMILY RISK FACTORS

- Low parental supervision
- Poor parent to teen communication
- Family conflicts
- Severe or inconsistent family discipline
- Having a parent with an alcohol or substance problem

INDIVIDUAL RISK FACTORS

- Poor impulse control
- Emotional instability
- Thrill-seeking behaviors
- Behavioral problems
- Perceived risk of drinking is low
- Begins drinking before age 14 yr

remains especially problematic among older teens and young adults; 31% of high school seniors report having five or more drinks in a row in the last 30 days. Higher rates of alcohol use disorder are seen in males (23.8%) than in females (19.8%). Teens with binge-drinking patterns are more likely to be assaulted, engage in high-risk sexual behaviors, have academic problems, and be injured than those teens without binge-drinking patterns.

Alcohol contributes to more deaths in young individuals in the United States than all the illicit substances combined. Among studies of adolescent trauma victims, alcohol is reported to be present in 32–45% of hospital admissions. Motor vehicle crashes are the most frequent type of event associated with alcohol use, but the injuries span several types, including self-inflicted wounds.

Alcohol is often mixed with energy drinks (caffeine, taurine, sugars), which can result in a spectrum of alcohol-related negative behaviors. Caffeine may counter the sedative effects of alcohol, resulting in more alcohol consumption and a perception of not being intoxicated, thus leading to risk-taking behavior such as driving while intoxicated. In addition, aggressive behavior, including sexual assaults and motor vehicle or other injuries, has been reported. Both alcohol and caffeine overdoses have also been reported.

PHARMACOLOGY AND PATHOPHYSIOLOGY

Alcohol (ethyl alcohol or ethanol) is rapidly absorbed in the stomach and is transported to the liver and metabolized by two pathways. The primary metabolic pathway contributes to the excess synthesis of triglycerides, a phenomenon that is responsible for producing a **fatty liver**, even in those who are well nourished. Engorgement of hepatocytes with fat causes necrosis, triggering an inflammatory process **(alcoholic hepatitis)**, later followed by fibrosis, the hallmark of **cirrhosis**. Early hepatic involvement may result in elevation in γ-glutamyltransferase (GGT) and serum glutamic-pyruvic transaminase (alanine transaminase). The second metabolic pathway, which is used at high serum alcohol levels, involves the microsomal enzyme system of the liver, in which the cofactor is reduced to nicotinamide-adenine dinucleotide phosphate. The net effect of activation of this pathway is to decrease metabolism of substances that share this system and to allow for their accumulation, enhanced effect, and possible toxicity.

CLINICAL MANIFESTATIONS

Alcohol acts primarily as a central nervous system (CNS) depressant. It produces euphoria, grogginess, talkativeness, impaired short-term memory, and an increased pain threshold. Alcohol's ability to produce vasodilation and hypothermia is also centrally mediated. At very high serum levels, respiratory depression occurs. Its inhibitory effect on pituitary antidiuretic hormone release is responsible for its diuretic effect. The gastrointestinal (GI) complications of alcohol use can occur from a single large ingestion. The most common is acute **erosive gastritis**, manifesting as epigastric pain, anorexia, vomiting, and heme-positive stools. Less frequently, vomiting and mid-abdominal pain may be caused by acute alcoholic **pancreatitis**; the diagnosis is confirmed by the finding of elevated serum amylase and lipase levels.

DIAGNOSIS

Primary care settings provide the opportunity to screen teens for alcohol use disorder or problem behaviors. Brief alcohol screening instruments such as CRAFFT (see Table 157.5) perform well in a clinical setting as techniques to identify alcohol use disorders A score of 2 or higher is a positive screen, indicating a need for additional assessment.

Teenagers in the early phases of alcohol use exhibit few physical findings. Recent use of alcohol may be reflected in elevated GGT and aspartate transaminase levels.

In acute care settings the **alcohol overdose syndrome** should be suspected in any teenager who appears disoriented, lethargic, or comatose. Although the distinctive aroma of alcohol may assist in diagnosis, confirmation by analysis of blood is recommended. At levels >200 mg/dL, the adolescent is at risk of death, and levels >500 mg/dL (median lethal dose) are usually associated with a fatal outcome. *When the level of obtundation appears excessive for the reported blood alcohol level, head trauma, hypoglycemia, or ingestion of other substances should be considered as possible confounding factors.*

TREATMENT

The usual mechanism of death from alcohol overdose syndrome is **respiratory depression**; artificial ventilatory support must be provided until the liver can eliminate sufficient amounts of alcohol from the body. In a patient *without* chronic alcohol use, it generally takes 20 hours to reduce the blood level of alcohol from 400 mg/dL to zero. Dialysis should be considered when the blood level is >400 mg/dL. As a follow-up to acute treatment, referral for treatment of the alcohol use disorder is indicated. Group counseling, individualized counseling, and multifamily educational intervention have proved to be effective interventions for teens.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

157.2 Tobacco, E-Cigarettes, and Other Tobacco Products

Brian P. Jenssen

CIGARETTES

Tobacco use and addiction often start in childhood or adolescence, a period when the brain has heightened susceptibility to nicotine addiction. Nearly 90% of adult cigarette smokers began smoking before age 18. Factors associated with youth tobacco use include exposure to smokers (friends, parents), tobacco availability, low socioeconomic status, poor school performance, low self-esteem, lack of perceived risk of use, and lack of skills to resist influences to use tobacco.

The landscape of tobacco product use among youth has shifted dramatically over the past decade. Various sources are used to capture data on tobacco use. Similar trends have been observed across cross-sectional surveys with data on youth use, including, for example, the National Youth Tobacco Survey, Monitoring the Future, and the Youth Risk Behavior Surveillance system.

Based on 2022 data, current use of any tobacco product was reported by 11.3% (3.08 million) of all students, including 16.5% (2.51 million) of high school and 4.5% (530,000) of middle school students. E-cigarettes were the most used tobacco product among high school (14.1%; 21.4 million) and middle school (3.3%; 380,000) students. Among high school students, 5.2% reported current use of any combustible tobacco product. By product, current use among high school students was highest for e-cigarettes (14.1%), followed by cigars (2.8%), cigarettes (2.0%), smokeless tobacco (1.6%), hookahs (1.5%), nicotine pouches (1.4%), heated tobacco products (1.1%), and pipe tobacco (0.7%). Among middle school students, 1.6% reported current use of any combustible tobacco product. By type of product, current use among middle school students

was highest for e-cigarettes (3.3%), followed by cigarettes (1.0%), smokeless tobacco (0.7%), heated tobacco products (0.7%), cigars (0.6%), hookahs (0.5%), nicotine pouches (0.5%), and pipe tobacco (0.3%).

Tobacco use tends to be higher among males compared to females and by those identifying as lesbian, gay, or bisexual compared to heterosexual or uncertain sexual identity. Tobacco is used by teens in all regions of the world, although the form of tobacco used differs. In the Americas and Europe, cigarette smoking is the predominant form of tobacco use, followed by cigars and smokeless tobacco; in the Eastern Mediterranean, hookah use is prevalent; in Southeast Asia, smokeless tobacco products are used; in the Western Pacific, betel nut is chewed with tobacco; and pipe, snuff, and rolled tobacco leaves are used in Africa. Cigarette use by teens in low- and middle-income nations is increasing.

PHARMACOLOGY

Nicotine, the primary active ingredient in cigarettes, is addictive. Nicotine is absorbed by multiple sites in the body, including the lungs, skin, GI tract, and buccal and nasal mucosa. The action of nicotine is mediated through nicotinic acetylcholine receptors located on noncholinergic presynaptic and postsynaptic sites in the brain and causes increased levels of dopamine. Nicotine also stimulates the adrenal glands to release epinephrine, causing an immediate elevation in blood pressure, respiration, and heart rate. The dose of nicotine delivered to the user in a cigarette depends on a variety of factors, including puffing characteristics. A smoker typically takes 10 puffs within the span of 5 minutes and absorbs 1-2 mg of nicotine (range: 0.5-3 mg). The Food and Drug Administration (FDA) is planning to reduce the permissible amount of nicotine in cigarettes. **Cotinine**, the major metabolite of nicotine, has a biologic half-life of 19-24 hours and can be detected in urine, serum, and saliva.

CLINICAL MANIFESTATIONS

Cigarettes are addictive by design and result in life-shortening diseases in half of their long-term users. Each year, approximately 480,000 deaths are attributable to smoking, responsible for 1 of every 5 deaths and 1 of every 3 cancer deaths in the United States. Cigarette smoking has severe adverse health consequences for youth and young adults, including increased prevalence of chronic cough, sputum production, wheezing, and worsening asthma. Smoking during pregnancy increases prenatal and perinatal morbidity and mortality, either causing or exacerbating the risks of preterm birth, low birthweight, congenital malformations, stillbirth, and sudden infant death syndrome (SIDS) and sudden unexplained infant death (SUID). **Withdrawal** symptoms, including irritability, decreased concentration, increased appetite, and strong cravings for tobacco, can occur when adolescents try to quit.

ELECTRONIC CIGARETTES (E-CIGARETTES)

E-cigarettes are handheld devices that produce an aerosol created from a solution of nicotine, flavoring chemicals, humectants such as propylene glycol, and often other constituents unknown and unadvertised to the consumer. There is wide variability in terminology, product design, and engineering of these products, with alternative names including e-cigs, electronic cigars, electronic hookah, e-hookah, and vaping devices. The tobacco industry continues to develop new products that contain nicotine but may not be recognized as a tobacco product by teens. The unique flavors offered in e-cigarette solutions, the majority of which are confectionary in nature and appealing to children, have been shown to encourage youth experimentation, regular use, and addiction.

Known harmful toxicants and carcinogens have been found in e-cigarette solutions, in device emissions, and within the bodies of adolescent users. Multiple systematic reviews and meta-analyses have found e-cigarette use is associated with an increased risk of subsequent cigarette smoking initiation and current cigarette smoking in young people. There is a critical need for e-cigarette regulation, legislative action, and counter-promotion to prevent children, adolescents, and young adults from transitioning from e-cigarettes to traditional cigarettes and minimize the potential public health harm from e-cigarette use. The FDA should regulate all tobacco and nicotine products to protect public health.

HOOKAH

Hookah (water pipe) smoking uses specially treated tobacco that comes in a variety of flavors. Many teens believe incorrectly that hookah does not contain nicotine. Emerging evidence indicates that hookah may involve comparable health risks to cigarettes, including nicotine dependence. Both human and machine simulation studies of hookah use consistently find that smoke content and user toxicant exposure, including carbon monoxide, tar, and nicotine, are at least comparable to that of cigarettes. Secondhand smoke from hookahs can be a health risk for nonsmokers exposed to harmful toxicants.

TREATMENT

The 2020 U.S. Surgeon Report on smoking cessation emphasizes that smoking cessation is beneficial at any age, reducing the risk of premature death, adding as much as a decade to life expectancy, while also reducing the risk of many adverse health effects. More than half of adolescents who use tobacco products report that they want to quit, and more than half report making at least one quit attempt in the past year. Thus for adolescents who want to stop tobacco or e-cigarette use, it is reasonable to consider referral to behavioral cessation supports. Behavioral interventions for adults have significant evidence supporting their effectiveness, and many youth and young adult supports are modeled off of these programs.

Little research has been conducted assessing the effectiveness of pharmacologic therapies for combustible tobacco use among adolescents. The 2020 U.S. Preventive Services Task Force recommendation concluded there was inadequate evidence on the benefits and harms of medications for tobacco cessation in children and adolescents. Nonetheless, consensus panels recommend that for adolescents who want to stop tobacco or e-cigarette use with moderate to severe tobacco dependence, it is reasonable to consider pharmacotherapy, especially nicotine replacement therapy (NRT). Cessation medications are not approved by the FDA for use with children or adolescents, and NRT cannot be purchased OTC by persons younger than 18 years of age. However, cessation medications can be prescribed for and used by youth under the supervision of a physician. NRT is also available as a patch, gum, inhaler, nasal spray, lozenge, or microtab (Table 157.8). Tobacco dependence treatment for youth should be tailored to the patient's level of nicotine dependence and readiness for change. Given the very high rates of nonadherence during therapy and relapse after discontinuation of therapy among adolescents in the trials of these medications, close follow-up is recommended.

Pediatric clinicians can connect patients to effective behavioral interventions, including telephone, text message, smartphone app, internet, and community-based resources. Free telephone-based treatment (800-QUIT-NOW) has been shown to improve smoking cessation rates. Smoke-free TXT, offered by the National Cancer Institute, engages teens to quit smoking using free, daily text messaging. Teens can sign up online (teen.smokefree.gov) or text QUIT to iQUIT (47848). A smartphone-based app, quitSTART, helps teens track cravings, monitor moods, use cessation tips, and follow quitting attempts. Truth Initiative has an evidence-based program, This Is Quitting, which is targeted to teens who want to stop using e-cigarettes (https://truthinitiative.org/thisisquitting). The American Academy of Pediatrics offers a brief, practical guide that is designed to support pediatric health clinicians in providing behavioral and pharmacologic support to help youth quit (https://services.aap.org/en/patient-care/tobacco-control-and-prevention/youth-tobacco-cessation/).

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

Table 157.8 Smoking Cessation Pharmacotherapy Available in the United States*

THERAPY BRAND	NAME	STRENGTHS	FDA-APPROVED ADULT DOSING	AVAILABILITY†	STUDIED IN ADOLESCENTS
NICOTINE REPLACEMENT THERAPY					
Gum‡	Nicorette	2 mg, 4 mg	The 4-mg strength should be used by patients who smoke ≥25 cigarettes a day; otherwise, 2-mg strength should be used. Wk 1-6: 1 piece every 1-2 hr Wk 7-9: 1 piece every 2-4 hr Wk 10-12: 1 piece every 4-8 hr	OTC*	Yes
Inhaler	Nicotrol Inhaler	4 mg	6-16 cartridges a day for up to 12 wk	Rx	No
Lozenge	Commit, Nicorette mini	2 mg, 4 mg	The 4-mg strength should be used by patients who smoke their first cigarette within 30 min of waking; otherwise, 2-mg strength should be used. Wk 1-6: 1 lozenge every 1-2 hr Wk 7-9: 1 lozenge every 2-4 hr Wk 10-12: 1 lozenge every 4-8 hr	OTC	No
Nasal spray	Nicotrol NS	0.5 mg/spray	1-2 sprays/hr up to a maximum of 80 sprays per day	Rx	Yes
Transdermal patch‡	NicoDerm CQ	7, 14, 21 mg/24 hr	For patients who smoke >10 cigarettes daily: Step 1: one 21-mg patch daily for wk 1-6 Step 2: one 14-mg patch daily for wk 7-8 Step 3: one 7-mg patch daily for wk 9-10 For patients who smoke <10 cigarettes daily: Begin with 14-mg patch daily for 6 wk, followed by 7-mg patch for 2 wk.	OTC	Yes
NONNICOTINE THERAPY					
Bupropion SR‡	Zyban	150-mg sustained-release tablets	150 mg PO in morning for 3 days, then increase to 150 mg PO bid	Rx	Yes
Varenicline	Chantix	0.5-, 1-mg tablets	0.5 mg PO in morning for 3 days; increase to 0.5 mg PO bid for 4 days, then increase to 1 mg PO bid	Rx	Yes

*None are FDA approved for use in patients younger than 18 years of age.
†OTC, Over the counter; Rx, prescription product; PO, by mouth (orally); bid, twice daily.
‡Generics are available.
From JP Karpinski et al: Smoking cessation treatment for adolescents. *J Pediatr Pharmacol Ther* 2010;15:249–260

157.3 Marijuana

Cora Collette Breuner

Marijuana (cannabis, pot, weed, hash, grass), derived from the *Cannabis sativa* hemp plant, is the most commonly used illicit substance. The main active chemical, tetrahydrocannabinol **(THC)**, is responsible for its hallucinogenic properties. THC is absorbed rapidly by the nasal or oral routes, producing a peak of subjective effect at 10 min and 1 hour, respectively. Marijuana is generally smoked as a cigarette (reefer, joint), in a pipe, or ingested (edibles). Although there is much variation in content, each cigarette contains 8–10% THC. Another popular form that is smoked, a "blunt," is a hollowed-out small cigar (tobacco leaf) refilled with marijuana, and thus also contains nicotine. Marijuana products (hash oil or leaf) can also be used in some vaping devices or hookah pens. **Hashish** is the concentrated THC resin in a sticky black liquid or oil. Although marijuana use by U.S. teens has declined in the last decade, ~25% of high school students have used marijuana at least once during the previous 30 days. About 8% of students report having tried marijuana before age 13, with a range of 4.3–18.5% across various states, indicating the need for early prevention efforts. Adolescents living in states where medical marijuana is legal report a higher use of cannabis edibles. It is important to recognize that as perceived harm drops, marijuana use increases. (Fig. 157.3). In addition, the potency of cannabis has increased substantially in part to marketing and legal sales.

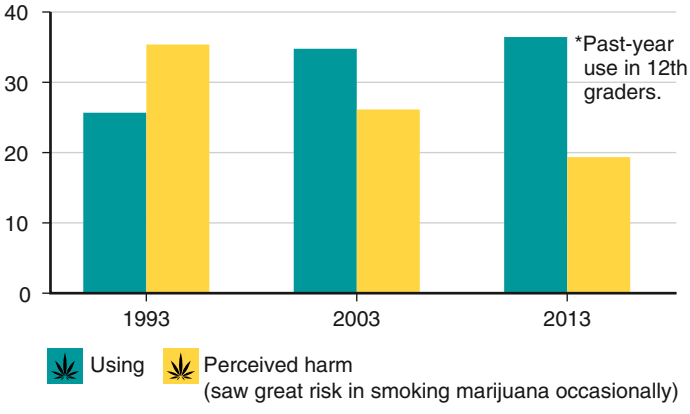

Fig. 157.3 As the perceived harm of marijuana drops, use disorder goes up. The 36.4% using in 2013 equates to about 11 students in the average class. *(From NIH National Institute on Substance Use.)*

Table 157.9 Acute and Chronic Adverse Effects of Cannabis Use

ACUTE ADVERSE EFFECTS

- Anxiety and panic, especially in naïve users
- Psychotic symptoms (at high doses)
- Road crashes if a person drives while intoxicated
- Cannabis hyperemesis syndrome

CHRONIC ADVERSE EFFECTS

- Cannabis dependence syndrome (in about 1 in 10 users)
- Chronic bronchitis and impaired respiratory function in regular smokers
- Psychotic symptoms and disorders in heavy users, especially those with a history of psychotic symptoms or a family history of these disorders
- Impaired educational attainment in adolescents who are regular users
- Subtle cognitive impairment in those who are daily users for 10 yr or more
- Impaired tasks of sequencing ability, cognitive processing speed, inhibition, and sustained attention

Modified from Hall W, Degenhardt L. Adverse health effects of non-medical cannabis use. *Lancet*. 2009;374:1383–1390.

Table 157.10 Rome IV Criteria for CHS Diagnosis

CATEGORY	FEATURES
Essential	Stereotypical episodic vomiting resembling CVS in terms of onset, duration, and frequency Presentation after prolonged, excessive cannabis use Relief of vomiting episodes by sustained cessation of cannabis use
Supportive remarks	May be associated with pathologic bathing behavior (prolonged hot baths or showers)

CHS, Cannabinoid hyperemesis syndrome; CVS, cyclic vomiting syndrome.
From Zhu JW, Gonsalves CL, Issenman RM, Kam AJ. Diagnosis and acute management of adolescent cannabinoid hyperemesis syndrome: a systematic review. *J Adolesc Health*. 2021;68:246–254, Table 1, p. 248.

CLINICAL MANIFESTATIONS

In addition to the desired effects of elation and euphoria, marijuana may cause impairment of short-term memory, poor performance of tasks requiring divided attention (e.g., those involved in driving), loss of critical judgment, decreased coordination, and distortion of time perception (Table 157.9). Visual hallucinations and perceived body distortions occur rarely, but "flashbacks" or recall of frightening hallucinations experienced under marijuana's influence may occur, usually during stress or with fever.

Smoking marijuana for a minimum of 4 days/week for 6 months appears to result in dose-related suppression of plasma testosterone levels and spermatogenesis, prompting concern about the potential deleterious effect of smoking marijuana before completion of pubertal growth and development. There is an antiemetic effect of oral THC or smoked marijuana, often followed by appetite stimulation, which is the basis of the substance's use in patients receiving cancer chemotherapy.

An **amotivational syndrome** has been described in long-term marijuana users who lose interest in age-appropriate behavior; proof of the causative relationship remains equivocal. Chronic use is associated with increased anxiety and depression, learning problems, poor job performance, hyperemesis, and respiratory problems such as pharyngitis, sinusitis, bronchitis, and asthma (see Table 157.9).

Cannabinoid hyperemesis syndrome (CHS) is characterized by recurrent episodes of vomiting associated with abdominal pain and nausea; patients often find relief by taking a hot shower or bath (Table 157.10). Cannabis use typically has been chronic (>1-2 year) and frequent (multiple times per week). There is considerable similarities between CHS and cyclic vomiting syndrome (see Chapter 390). Treatment of CHS includes stopping marijuana use, antiemetics, and topical capsaicin.

The increased THC content of marijuana of 5- to 15-fold compared to that of the 1970s is related to the observation of a **withdrawal syndrome** occurring 24-48 hours after discontinuing the substance. Heavy users experience malaise, irritability, agitation, insomnia, substance craving, shakiness, diaphoresis, night sweats, and GI disturbance. The symptoms peak by the fourth day and resolve in 10-14 days. Certain substances may interact with marijuana to potentiate sedation (alcohol, diazepam) and stimulation (cocaine, amphetamines) or may be antagonistic (propranolol, phenytoin).

Behavioral interventions, including **cognitive-behavioral therapy (CBT)** and motivational incentives, have shown to be effective in treating marijuana dependency.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

157.4 Inhalants

Cora Collette Breuner

Inhalants, found in many common household products, comprise a diverse group of volatile substances whose vapors can be inhaled to produce psychoactive effects. The practice of inhalation is popular among younger adolescents and decreases with increasing age. Young adolescents are attracted to these substances because of their rapid action, easy availability, and low cost. Products that are abused as inhalants include *volatile solvents* (paint thinners, glue, e-cigarette solvents known as "dripping," toluene, acetone, refrigerants, gasoline, cleaning fluids, correction fluids), *aerosols* (spray paint, nitrous oxide, hair spray), *gases* (propane tanks, lighter fluid), *nitrites* ("poppers" or "video head cleaner"), and *propellants* used in whipped cream dispensers. The most popular inhalants among young adolescents are glue, shoe polish, and spray paint. The various products contain a wide range of chemicals with serious adverse health effects (Table 157.11). **Huffing**, the practice of inhaling fumes, can be accomplished using a paper bag containing a chemical-soaked cloth; spraying aerosols directly into the nose/mouth; or using a balloon, plastic bag, or soda can filled with fumes. The percentage of adolescents using inhalants has remained stable, with 5.8% of high school students reporting having ever used inhalants. Eighth and ninth graders report highest use, suggesting targeted prevention strategies for this age-group.

CLINICAL MANIFESTATIONS

The major effects of inhalants are psychoactive (Table 157.12). The intoxication lasts only a few minutes, so a typical user will huff repeatedly over an extended period (hours) to maintain the high. The immediate effects of inhalants are similar to alcohol: euphoria, slurred speech, decreased coordination, and dizziness. **Toluene**, the main ingredient in model airplane glue and some rubber cements, causes relaxation and pleasant hallucinations for up to 2 hours. Euphoria is followed by violent excitement; coma may result from prolonged or rapid inhalation. **Volatile nitrites**, such as amyl nitrite, butyl nitrite, and related compounds marketed as room deodorizers, are used as euphoriants, enhancers of musical appreciation, and sexual enhancements among older adolescents and young adults. They may result in headaches, syncope, and lightheadedness; profound hypotension and cutaneous flushing followed by vasoconstriction and tachycardia; transiently inverted T waves and depressed ST segments on electrocardiography; methemoglobinemia; increased bronchial irritation;

Table 157.11 Hazards of Chemicals Found in Commonly Used Inhalants

Amyl nitrite, butyl nitrite ("poppers," "video head cleaner"): sudden sniffing death syndrome, suppressed immunologic function, injury to red blood cells (interfering with oxygen supply to vital tissues)

Benzene (found in gasoline): bone marrow injury, impaired immunologic function, increased risk of leukemia, reproductive system toxicity

Butane, propane (found in lighter fluid, hair and paint sprays): sudden sniffing death syndrome via cardiac effects, serious burn injuries (because of flammability)

Freon (used as a refrigerant and aerosol propellant): sudden sniffing death syndrome, respiratory obstruction and death (from sudden cooling/cold injury to airways), liver damage

Methylene chloride (found in paint thinners and removers, degreasers): reduction of oxygen-carrying of blood, changes to the heart muscle and heartbeat

Nitrous oxide ("laughing gas, Whippits, i.e., whipped cream dispensers), **hexane**: death from lack of oxygen to the brain, altered perception and motor coordination, loss of sensation, limb spasms, blackouts caused by blood pressure changes, depression of heart muscle functioning; vitamin B_{12} deficiency

Toluene (found in gasoline, paint thinners and removers, correction fluid): brain damage (loss of brain tissue mass, impaired cognition, gait disturbance, loss of coordination, loss of equilibrium, limb spasms, hearing and vision loss), liver and kidney damage

Trichloroethylene (found in spot removers, degreasers): sudden sniffing death syndrome, cirrhosis of the liver, reproductive complications, hearing and vision damage

Table 157.12 Stages in Symptom Development After Use of Inhalants

STAGE	SYMPTOMS
1: Excitatory	Euphoria, excitation, exhilaration, dizziness, hallucinations, sneezing, coughing, excess salivation, intolerance to light, nausea and vomiting, flushed skin and bizarre behavior
2: Early CNS depression	Confusion, disorientation, dullness, loss of self-control, ringing or buzzing in the head, blurred or double vision, cramps, headache, insensitivity to pain, and pallor or paleness
3: Medium CNS depression	Drowsiness, muscular incoordination, slurred speech, depressed reflexes, and nystagmus or rapid involuntary oscillation of the eyeballs
4: Late CNS depression	Unconsciousness that may be accompanied by bizarre dreams, epileptiform seizures, and EEG changes

CNS, Central nervous system; EEG, electroencephalogram.
From Harris D. Volatile substance use. *Arch Dis Child Educ Pract Ed.* 2006;91:ep93–ep100.

Table 157.13 Documented Clinical Presentations of Acute and Chronic Volatile Substance Use

Ventricular fibrillation	Muscle weakness
Asystolic cardiac arrest	Abdominal pain
Myocardial infarction	Cough
Ataxia	Aspiration pneumonia
Agitation	Chemical pneumonitis
Limb and trunk incoordination	Coma
Tremor	Visual and auditory hallucinations
Visual loss	Acute delusions
Tinnitus	Nausea and vomiting
Dysarthria	Pulmonary edema
Vertigo	Photophobia
Hyperreflexia	Rash
Acute confusional state	Jaundice
Conjunctivitis	Anorexia
Acute paranoia	Slurred speech
Depression	Diarrhea
Oral and nasal mucosal ulceration	Weight loss
Halitosis	Epistaxis
Convulsions/fits	Rhinitis
Headache	Cerebral edema
Peripheral neuropathy	Visual loss
Methemoglobinemia	Burns
Acute trauma	Renal tubular acidosis

and increased intraocular pressure. There may be dermatologic findings, including perianal/perioral dermatitis ("huffer rash"), frostbite, and contact dermatitis, as well as epistaxis, nasal ulcers, and conjunctivitis.

COMPLICATIONS

Model airplane glue is responsible for a wide range of complications related to chemical toxicity, to the method of administration (in plastic bags, with resultant suffocation), and to the dangerous setting in which the inhalation occurs (roof tops). Common neuromuscular changes reported in chronic inhalant users include difficulty coordinating movement, gait disorders, muscle tremors, and spasticity, particularly in the legs (Table 157.13). Chronic use may cause pulmonary hypertension, restrictive lung defects or reduced diffusion capacity, peripheral neuropathy, hematuria, tubular acidosis, and possibly cerebral and cerebellar atrophy. Chronic inhalant use has long been linked to widespread brain damage and cognitive abnormalities that can range from mild impairment (poor memory, decreased learning ability) to severe dementia. High-frequency inhalant users were significantly more likely than moderate- and low-frequency users to experience adverse consequences of inhalant intoxication, such as behavioral, language, and memory problems. Certain risky behaviors and consequences, such as engaging in unprotected sex or fighting while high on inhalants, were dramatically more common among high-frequency than low-frequency inhalant users. Death in the acute phase may result from cerebral or pulmonary edema or myocardial involvement (see Table 157.13).

DIAGNOSIS

Diagnosis of inhalant abuse is difficult because of the ubiquitous nature of the products and decreased parental awareness of the dangers. In the primary care setting, providers need to ask parents if they have witnessed any unusual behaviors in their teen; noticed high-risk products in the teen's bedroom; seen paint on the teen's hands, nose, or mouth; or found paint- or chemical-coated rags. Complete blood count, coagulation studies, and hepatic and renal function studies may identify the complications. In extreme intoxication, a user may manifest symptoms of restlessness, general muscle weakness, dysarthria, nystagmus, disruptive behavior, and occasionally hallucinations. Toluene is excreted rapidly in the urine as hippuric acid, with the residual detectable in the serum by gas chromatography.

TREATMENT

Treatment is generally supportive and directed toward control of arrhythmia and stabilization of respirations and circulation. Withdrawal symptoms do not usually occur.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

157.5 EVALI

E-cigarette or vaping use–associated lung injury.
See Chapter 450.

157.6 Hallucinogens

Cora Collette Breuner

Several naturally occurring and synthetic substances are used by adolescents for their hallucinogenic properties. They have chemical structures similar to neurotransmitters such as serotonin, but their exact mechanism of action remains unclear. Lysergic acid diethylamide **(LSD)**, methylenedioxymethamphetamine **(ecstasy**, **MDMA)**, and hallucinogenic magic mushrooms **(psilocybins)** are the most commonly reported hallucinogens used. Peyote **(mescaline)** derived from a cactus flower is chemically related to MDMA. **Ayahuasca** is another plant-derived hallucinogen found in South America whose active agents are N,N-dimethyltryptamine **(DMT)** and harmala alkaloids, which act as a monoamine oxidase inhibitor. Another hallucinatory agent is derived from a poisonous toad *(Bufo alvarius),* native to the Sonoran Desert, which produces **5-MeO-DMT** in its venom gland. 251-NBOMe **(N-Bomb)** is a designer substance that interacts with the 5HT-2a receptor and has sympathomimetic and hallucinogenic properties (Table 157.14).

LYSERGIC ACID DIETHYLAMIDE

LSD (acid, big "d," blotters) is a very potent hallucinogen that is made from lysergic acid found in ergot, a fungus that grows on rye and other grains. Its high potency allows effective doses to be applied to absorbent paper, or it can be taken as a liquid or a tablet. The onset of action can be 30-60 minutes, and it peaks at 2-4 hours. By 10-12 hours, individuals return to the preingestion state. Among U.S. 12th graders, 4% report trying LSD at least once.

Clinical Manifestations

The effects of LSD can be divided into three categories: somatic (physical effects), perceptual (altered changes in vision and hearing), and psychic (changes in sensorium). The common somatic symptoms are dizziness, dilated pupils, nausea, flushing, elevated temperature, and tachycardia. The sensation of *synesthesia,* or "seeing" smells and "hearing" colors, as well as major distortions of time and self, have been reported with high doses of LSD. Delusional ideation, body distortion, and suspiciousness to the point of toxic psychosis are the more serious of the psychic symptoms. LSD is not considered to be an addictive substance because it does not typically produce substance-seeking behavior.

Treatment

An individual is considered to have a "bad trip" when the sensory experiences cause the user to become terrified or panicked. These episodes should be treated by removing the individual from the aggravating situation and placing them in a quiet room with a calming friend. In situations of extreme agitation or seizures, use of benzodiazepines may be warranted. "Flashbacks," or LSD-induced states after the drug has worn off, and tolerance to the effects of the drug are additional complications of its use.

METHYLENEDIOXYMETHAMPHETAMINE

MDMA ("X," ecstasy, Molly), a phenylisopropylamine hallucinogen, is a synthetic compound similar to hallucinogenic cactus-derived mescaline and the stimulant methamphetamine. Like other hallucinogens, this substance is proposed to interact with serotoninergic neurons in the CNS. It is the preferred substance at "raves," all-night dance parties, and is also known as one of the "club substances" along with γ-hydroxybutyrate (GHB) and ketamine. Nationwide, the prevalence of having ever used MDMA was 8.4% of college students; 12th-grade lifetime use was 2.8% in 2021.

Clinical Manifestations

Euphoria, a heightened sensual awareness, and increased psychic and emotional energy are acute effects. Compared to other hallucinogens, MDMA is less likely to produce emotional lability, depersonalization, and disturbances of thought. Nausea, jaw clenching, teeth grinding, and blurred vision are somatic symptoms, whereas anxiety, panic attacks, and psychosis are the adverse psychiatric outcomes. A few deaths have been reported after ingestion of the substance. In high doses, MDMA can interfere with the body's ability to regulate temperature. The resultant hyperthermia in association with vigorous dancing at a "rave" has resulted in severe liver, kidney, and cardiovascular system failure and death. No specific treatments are recommended for acute toxicity.

Chronic MDMA use can lead to changes in brain function, affecting cognitive tasks and memory. These symptoms may occur because of MDMA's effects on neurons that secrete serotonin as a neurotransmitter. The serotonin system plays an important role in regulating mood, aggression, sexual activity, sleep, and sensitivity to pain. A high rate of dependence has been found among MDMA users. MDMA exposure may be associated with long-term neurotoxicity and damage to serotonin-containing neurons. In nonhuman primates, exposure to MDMA for only 4 days caused damage to serotonin nerve terminals that was evident 6-7 years later. There are no specific pharmacologic treatments for MDMA addiction. Substance use recovery groups are recommended.

PHENCYCLIDINE

Phencyclidine **(PCP)** (Sernyl, angel dust, hog, peace pill, sheets) is an arylcyclohexalamine whose popularity is related in part to its ease of synthesis in home laboratories. One of the by-products of home synthesis can cause cramps, diarrhea, and hematemesis. It is a "dissociative substance" that produces feelings of detachment from the surrounding environment and self. The substance is thought to potentiate adrenergic effects by inhibiting neuronal reuptake of catecholamines. PCP is available as a tablet, liquid, or powder, which may be used alone or sprinkled on cigarettes (joints). The powders and tablets generally contain 2-6 mg of PCP, whereas joints average 1 mg for every 150 mg of tobacco leaves, or approximately 30-50 mg per joint. The prevalence of PCP use (a hallucinogenic substance) among U.S. 12th graders is approximately 1%.

Clinical Manifestations

The clinical manifestations are dose related and produce alterations of perception, behavior, and autonomic functions. Euphoria, nystagmus, ataxia, and emotional lability occur within 2-3 minutes after smoking 1-5 mg and last for 4-6 hours. At these low doses the user is likely to experience shallow breathing, flushing, generalized numbness of extremities, and loss of motor coordination. Hallucinations may involve bizarre distortions of body image that often precipitate panic reactions. With doses of 5-15 mg, a toxic psychosis may occur, with disorientation, hypersalivation, and abusive language lasting for >1 hour. Hypotension, generalized seizures, and cardiac arrhythmias typically occur with plasma concentrations of 40-200 mg/dL. Death has been reported during psychotic delirium from hypertension, hypotension, hypothermia, seizures, and trauma. The coma of PCP may be distinguished from that of the opiates by the absence of respiratory depression; the presence of muscle rigidity, hyperreflexia, and nystagmus; and lack of response to naloxone. PCP psychosis may be difficult to distinguish from schizophrenia. In the absence of a history of use, the diagnosis depends on urinalysis.

Treatment

Management of the PCP-intoxicated patient includes placement in a darkened, quiet room on a floor pad, safe from injury. Acute alcohol intoxication may also be present. For recent oral ingestion, gastric absorption is poor, and induction of emesis or gastric lavage is useful. Diazepam, in a dose of 5-10 mg orally or 2-5 mg intravenously, may

Table 157.14 Classes of Hallucinogens

CHEMICAL NAMES	PLANTS OR NATURAL SOURCES; SYNTHETIC AGENTS; "SLANG NAMES"
INDOLEAMINES	
Lysergamides (Ergolines)	
d-Lysergic acid diethylamide	LSD; Delysid; "acid," "blotter," "stamps," "dots," "trips," "paper," "a-bombs," "pyramids"
d-Lysergic acid amide	*Ipomoea violacea* (morning glory), *Rivea corymbosa* (Mexican ololiuqui), *Argyreia nervosa* (Hawaiian baby woodrose), *Merremia tuberose* (Hawaiian woodrose)
Alkytryptamines	
α-Methyltryptamine	AMT; "alpha"
N,N-dimethyltryptamine (DMT)	*Piptadenia peregrina, Anadenanthera peregrina, Prestonia amazenicum, Mimosa hostilis, Vivola calophylla*; "businessman's trip"
5-Methoxy-*N,N*-dimethyltryptamine (5-MeO-DMT)	*Bufo alvarius*
Psilocybin (4-phophoryloxy-DMT)	*Psilocybe* sp, *Panaeolus* sp, *Conocybe* sp, *Inocybe* sp, *Gymnopilus* sp, *Lycoperdon* sp, *Pluteus* genus; "magic mushrooms," "shrooms," "alice"
Psilocin (4-OH-DMT)	
5-Methoxy-*N,N*-diisopropyltryptamine (5-MeO-DIPT)	"Foxy methoxy," "foxy"
Bufotenine (5-OH-DMT)	Ch'an Su
Diethyltryptamine	DET
Ibogaine	*Tabernanthe iboga*
PHENYLETHYLAMINES	
Mescaline (3,4,5-trimethoxyphenethylamine)	Peyote cactus *(Lophophora williamsii)*
3,4-methylenedioxymethamphetamine (MDMA)	Ecstasy; "XTC," "X," "E," "Adam," "the hug drug"
3,4-methylenedioxyethamphetamine (MDEA)	"Eve"
Methylenedioxyamphetamine (MDA)	
4-Bromo-2,5-dimethoxyamphetamine (DOM)	"Serenity, tranquility, and peace" [STP]
Paramethoxyamphetamine (PMA)	
ARYLCYCLOHEXYLAMINES (PIPERIDINE DERIVATIVES)	
Phencyclidine (PCP)	Angel dust; "hog," "wacky weed," "T," "killer weed"
Ketamine	Ketalar, ketaject, ketanest, "special K," "K," "K-hole," "vitamin K"
Dextromethorphan	"DXM," "dex," "robotripping," "CCC," "skittles," "red devils"
PIPERAZINES	
Benzylpiperazine (BZP)	"Legal E," "legal X," "A2"
Trifluoromethylphenylpiperazine (TFMPP)	
Methylenedioxybenzylpiperazine (MDBP)	
m-Chlorophenylpiperazine (mCPP)	
p-Methoxyphenylpiperazine (MeOPP)	
TETRAHYDROCANNABINOIDS	
Tetrahydrocannabinol (Δ^9-THC, Δ^1-THC)	Dronabinol (Marinol); *Cannabis sativa* (marijuana, hashish)
DITERPENE ALKALOIDS	
Salvinorin A, C	*Salvia divinorum*; sage
Myrisicin, saffron	*Myristica fragrans* (nutmeg, mace)
ANTICHOLINERGIC AGENTS	
Atropine (d,l-hyoscyamine)	*Atropa belladonna* (deadly nightshade), *Datura stramonium* (jimson weed)
Scopolamine (L-hyoscine)	Transderm Scop; *Datura stramonium* (jimson weed), *Hyoscyamus niger* (henbane)

From Traub SJ. Hallucinogens. In Shannon MW, Borron SW, Burns MJ, eds. *Haddad and Winchester's Clinical Management of Poisoning and Drug Overdose*, 4th ed. Philadelphia: Elsevier; 2007: Table 45.1.

be helpful if the patient is agitated and not comatose. Rapid excretion of the substance is promoted by acidification of the urine. Supportive therapy of the comatose patient is indicated with particular attention to hydration, which may be compromised by PCP-induced diuresis. Inpatient and/or behavioral treatments can be helpful for chronic PCP users.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

157.7 Cocaine

Cora Collette Breuner

Cocaine, an alkaloid extracted from the leaves of the South American *Erythroxylum coca*, is supplied as the hydrochloride salt in crystalline form. With **snorting**, it is rapidly absorbed into the bloodstream from the nasal mucosa, detoxified by the liver, and excreted in the urine as benzoylecgonine. Smoking the cocaine alkaloid **(freebasing)** involves inhaling the cocaine vapors in pipes or cigarettes mixed with tobacco

or marijuana. Accidental burns are potential complications of this practice. With **crack** cocaine, the crystallized rock form, the smoker feels "high" in <10 seconds. The risk of addiction with this method is higher and more rapidly progressive than from snorting cocaine. Tolerance develops, and the user must increase the dose or change the route of administration, or both, to achieve the same effect. To sustain the high, cocaine users repeatedly use cocaine in short periods known as "binges." Substance dealers often place cocaine in plastic bags or condoms and swallow these containers during transport. Rupture of a container produces a sympathomimetic crisis (see Table 157.4). Cocaine use disorder among U.S. high school students has decreased in the last decade, with 2.5% of 12th graders having tried the substance (any route) at least once.

CLINICAL MANIFESTATIONS

Cocaine is a strong CNS stimulant that increases dopamine levels by preventing reuptake. Cocaine produces euphoria, increased motor activity, decreased fatigability, and mental alertness. Its sympathomimetic properties are responsible for pupillary dilation, tachycardia, hypertension, and hyperthermia. Snorting cocaine chronically results in loss of sense of smell, nosebleeds, and chronic rhinorrhea. Injecting cocaine increases risk for HIV infection. Chronic users experience anxiety, irritability, and sometimes paranoid psychosis. Lethal effects are possible, especially when cocaine is used in combination with other substances, such as heroin, in an injectable form known as a "speedball." When taken with alcohol, cocaine is metabolized by the liver to produce cocaethylene, a substance that enhances the euphoria and is associated with a greater risk of sudden death than with cocaine alone. Pregnant adolescents who use cocaine place their fetus at risk of premature delivery, complications of low birthweight, and possibly developmental disorders.

TREATMENT

There are no FDA-approved medications for treatment of cocaine addiction. CBT has been shown to be effective when provided in combination with additional services and social support. Oral sustained-release dexamphetamine has been shown to be partially effective in adults with cocaine dependence.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

157.8 Amphetamines

Cora Collette Breuner

Methamphetamine, commonly known as **meth**, is a nervous system stimulant and Schedule II substance with a high potential for abuse. Most of the methamphetamine currently used is produced in illegal laboratories. It is a white, odorless, bitter-tasting powder that is particularly popular among adolescents and young adults because of its potency and ease of absorption. It can be ingested orally, smoked, needle-injected, or absorbed across mucous membranes. Amphetamines have multiple CNS effects, including release of neurotransmitters and an indirect catecholamine agonist effect. Approximately 0.6% of 12th graders reported using methamphetamine at least once.

CLINICAL MANIFESTATIONS

Methamphetamine rapidly increases the release and blocks the reuptake of dopamine, a powerful "feel good" neurotransmitter (Table 157.15). The effects of amphetamines can be dose related. In small amounts, amphetamine effects resemble other stimulants: increased physical activity, rapid and/or irregular heart rate, increased blood pressure, and decreased appetite. High doses produce slowing of cardiac conduction in the face of ventricular irritability. Hypertensive and hyperpyrexic episodes can occur, as can seizures (see Table 157.4). Binging may result in the development of psychotic ideation with the potential for sudden violence. Cerebrovascular damage, psychosis, severe receding of the gums with tooth decay, and infection with HIV and hepatitides B and C can result from long-term use. A withdrawal syndrome is associated with amphetamine use, with early, intermediate, and late phases (see Table 157.15). The early phase is characterized as a "crash" phase with depression, agitation, fatigue, and desire for more of the substance. Loss of physical and mental energy, limited interest in the environment, and anhedonia mark the intermediate phase. In the final phase, substance craving returns, often triggered by particular situations or objects.

TREATMENT

Acute agitation and delusional behaviors can be treated with haloperidol or droperidol. Phenothiazines are contraindicated and may cause

Table 157.15 Signs and Symptoms of Intoxication and Withdrawal

	OPIATES	AMPHETAMINES/COCAINE	BENZODIAZEPINES
INTOXICATION			
Behavior	Apathy and sedation; disinhibition; psychomotor retardation; impaired attention and judgment	Euphoria and sensation of increased energy; hypervigilance; grandiosity, aggression, argumentative; labile mood; repetitive stereotyped behaviors; hallucinations, usually with intact orientation; paranoid ideation; interference with personal functioning	Euphoria; apathy and sedation; abusiveness or aggression; labile mood; impaired attention; anterograde amnesia; impaired psychomotor performance; interference with personal functioning
Signs	Drowsiness; slurred speech; pupillary constriction (except anoxia from severe overdose—dilation); decreased level of consciousness	Dilated pupils; tachycardia (occasionally bradycardia, cardiac arrhythmias); hypertension; nausea/vomiting; sweating and chills; evidence of weight loss; dilated pupils; chest pain; convulsions	Unsteady gait; difficulty in standing; slurred speech; nystagmus; decreased level consciousness; erythematous skin lesions or blisters
Overdose	Respiratory depression; hypothermia	Sympathomimetic symptoms	Hypotension; hyperthermia; depression of gag reflex; coma
Withdrawal	Craving to use; lacrimation; yawning; rhinorrhea/sneezing; muscle aches or cramps; abdominal cramps; nausea/vomiting/diarrhea; sweating; dilated pupils; anorexia; irritability; tremor; piloerection/chills; restlessness; disturbed sleep	Dysphoric mood (sadness/anhedonia); lethargy and fatigue; psychomotor retardation or agitation; craving; increased appetite; insomnia or hypersomnia; bizarre or unpleasant dreams	Tremor of tongue, eyelids, or outstretched hands; nausea or vomiting; tachycardia; postural hypotension; psychomotor agitation; headache; insomnia; malaise or weakness; transient visual, tactile, or auditory hallucinations or illusions; paranoid ideation; grand mal convulsions

From Haber PS, Demirkol A, Lange K, et al. Management of injecting substance users admitted to hospital. *Lancet.* 2009;374:1284–1292.

a rapid drop in blood pressure or seizure activity. Other supportive treatment consists of a cooling blanket for hyperthermia and treatment of the hypertension and arrhythmias, which may respond to sedation with lorazepam or diazepam. For the chronic user, comprehensive CBT interventions have been demonstrated as effective treatment options.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

157.9 Stimulant Use and Diversion

Cora Collette Breuner

In MTF 2021, 4.6% of 12th graders reported using OTC diet pills in their lifetime and 1.1% in the past 30 days. These include nonprescription stimulants of two general types: pseudoamphetamines, usually sold by internet/mail order, and OTC stimulants, primarily diet and "stay-awake" pills. These substances usually contain caffeine, ephedrine, and/or phenylpropanolamine.

The *misuse* of a stimulant medication, defined as taking a stimulant not prescribed by a healthcare provider and not in accordance with healthcare provider guidance, has been growing over the past two decades, with an increase in prevalence rates of nonprescription stimulant use among both adolescents and young adults in the past 10 years. Nonprescription use of methylphenidate **(MPH)** in 2000 was 1.2%, increasing to 2% for MPH and 7.5% for nonprescription mixed amphetamine salts **(AMPs)** in 2015.

The majority of nonprescription stimulant users reported obtaining the substances by **diversion**, a process for obtaining the substance from peers. Diversion occurs quite often and can begin in childhood, adolescence, or young adulthood. Lifetime rates of diversion ranged from 16–29% of students with stimulant prescriptions. One survey reported that 23.3% of middle and high school students taking prescribed stimulants had been solicited to divert their medication to others at a rate that increased from middle to high school. It has been shown that 54% of college students prescribed stimulants for attention-deficit/hyperactivity disorder (ADHD) had been approached to divert their medication.

In U.S. college students, nonprescription use of stimulants is more prevalent among particular subgroups (males; members of fraternities/sororities; with lower grade point averages; more likely to use alcohol, cigarettes, marijuana, MDMA, or cocaine) and types of colleges (northeastern region, with more competitive admission standards). Lifetime prevalence of nonprescription stimulant use was 6.9% and past-month prevalence 2.1%. According to a survey of 334 ADHD-diagnosed college students taking prescription stimulants, 25% misused their own prescription medications. Scholastic pressures, including the need to succeed academically, and persistent social and financial demands place many students at an increased risk for misuse of various substances, especially at the end of school terms. A web-based survey of medical and health profession students found that the most common reason for nonprescription stimulant use was to focus and concentrate during studying.

CLINICAL MANIFESTATIONS

Misuse of stimulants is associated with psychosis, seizures, dysrhythmias, myocardial infarction, cardiomyopathy, and even sudden death. Intentional misuse of MPH or AMPs in combination with other substances leads to adverse medical consequences. Importantly, 14% of the emergency department (ED) visits for stimulant use were associated with cardiovascular (CV) events. Psychosis includes visual hallucinations, delusions, anorexia, flattening of affect, and insomnia mediated by dopaminergic excess. The CV effects include hypertension, arrhythmias, tachycardia, cardiomyopathy, cardiac dysrhythmias, necrotizing vasculitis, and CV accidents. Case reports include serious CV adverse drug reactions (ADRs), sudden death, and psychiatric disorders. Many patients report sleep difficulties (72%), irritability (62%), dizziness and lightheadedness (35%), headaches (33%), stomachaches (33%), and sadness (25%). Other health risks include loss of appetite, weight loss, and nervousness. Many users are involved in heavy episodic alcohol use while using MPH or AMPs. Most users of MPH or AMPs are unaware of these adverse effects and predominantly "feel good" about taking these medications.

Despite reports that MPH misuse is a healthcare issue, >82% of primary care physicians did not suspect misuse of prescribed ADHD medication in one report, and <1% thought that their patients were diverting prescribed ADHD medication. Improved monitoring for malingering and patient misuse may assist stopping diversion of these medications. An ADHD diagnosis should be confirmed in those requesting ADHD medication, and they should be screened for use of other substances.

TREATMENT

Treatment for nonprescription stimulant overdose is similar as that for amphetamine overdose. Haloperidol or droperidol is recommended for acute agitation and delusional behaviors. Phenothiazines are contraindicated and may cause a rapid drop in blood pressure or seizure activity. Hyperthermia may require use of a cooling blanket, and sedation with a benzodiazepine is recommended for treatment of the hypertension and arrhythmias. In those with chronic use, inpatient or outpatient substance use interventions using CBT have been shown to be the most effective treatment option.

Monitoring of the diversion and misuse of pharmaceutical stimulants must be a priority. More data need to be obtained on the prevalence, patterns, and harmful effects in adolescents and young adults.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

157.10 Opiates/Opioids

Cora Collette Breuner

Opiates refers to natural derived drugs (morphine, codeine, opium), whereas opioids refers to natural, semisynthetic, and synthetic agents. **Heroin** is a highly addictive synthetic opiate substance made from a naturally occurring substance **(morphine)** in the opium poppy plant. It is a white or brown powder that can be injected (intravenously or subcutaneously), snorted/sniffed, or smoked. Intravenous (IV) injection produces an immediate effect, whereas effects from the subcutaneous route occur in minutes, and from snorting, in 30 minutes. After injection, heroin crosses the blood-brain barrier, is converted to morphine, and binds to opiate receptors. Tolerance develops to the euphoric effect, and the chronic user must take more heroin to achieve the same intense effect. Heroin use among U.S. teens peaked in the mid-1990s but is resurgent in some suburban communities, as is the use of **prescription opioids** found in the home. Nationwide, 2.9% of high school students report having tried heroin at least once. **Fentanyl** is a more potent opiate and is responsible for many opiate overdoses. Other opioid drugs are noted in Table 157.16. Synthetic opioid fentanyl-derived analogues or nitrazene drugs (novel potent opioids:NPO) are much more potent than fentanyl and require higher and multiple doses of naloxone to reverse an overdose. NPOs include brorphine, isotonitazene, metonitazene, and N-piperidinyl etonitazene. Fentanyl is often illicitly manufactured and may be mixed with other substances, including xylazine, a nonopioid sedative. Xylazine, also known as *tranq*, is a veterinary drug that in humans produces central nervous system and respiratory depression, as well as bradycardia and hypotension. Xylazine also produces poorly healing cutaneous ulcerations at the site of injection and at distal sites. In 2022, fentanyl-xylazine combinations have been responsible for a significant number of overdose deaths; there is no antidote for xylazine.

CLINICAL MANIFESTATIONS

The clinical manifestations are determined by the purity of the heroin or its adulterants, combined with the route of administration (oral vs injection). The immediate effects include euphoria, diminution in pain, flushing of the skin, and pinpoint pupils (see Table 157.15). An effect on the hypothalamus is suggested by the lowering of body temperature. The most common dermatologic lesions are the "tracks," the hypertrophic linear scars that follow the course of large veins. Smaller, discrete peripheral scars, resembling healed insect bites, may be easily overlooked. The adolescent who injects heroin subcutaneously may have fat necrosis, lipodystrophy, and atrophy over portions

Table 157.16 Types and Actions of the Most Commonly Prescribed and Used Opioids

	TYPE OF OPIOID	ACTION ON OPIOID RECEPTOR
Alfentanil	Fully synthetic	Agonist of μ-receptors
Buprenorphine	Semisynthetic	Partial agonist of μ-receptors and NOP receptors; antagonist of κ-receptors
Codeine	Natural	Weak agonist of μ-receptors
Diamorphine (heroin)	Semisynthetic	Agonist of μ-receptors, δ-receptors, and κ-receptors; predominant binding to μ-receptors
Dihydrocodeine	Semisynthetic	Agonist of μ-receptors
Fentanyl	Fully synthetic	Agonist of μ-receptors, δ-receptors, and κ-receptors; predominant binding to μ-receptors
Hydromorphone	Semisynthetic	Agonist of μ-receptors and κ-receptors; predominant binding to μ-receptors
Methadone	Fully synthetic	Agonist of μ-receptors
Morphine	Natural	Agonist of μ-receptors, δ-receptors, and κ-receptors; predominant binding to μ-receptors
Oxycodone	Semisynthetic	Weak agonist of μ-receptors, δ-receptors, and κ-receptors; predominant binding to μ-receptors
Pentazocine	Fully synthetic	Partial agonist of δ-receptors and κ-receptors; antagonist of μ-receptors
Pethidine (meperidine)	Fully synthetic	Agonist of κ-receptors
Tramadol	Fully synthetic	Weak agonist of μ-receptors

Information presented is from the DrugBank and PubChem databases.
NOP, Nociceptin opioid peptide.
From Fountas A, Van Uum S, Karavitaki N. Opioid-induced endocrinopathies. *Lancet Diabetes Endocrinol*. 2020;8:68–80.

of the extremities. Attempts to conceal these stigmata may include amateur tattoos in unusual sites. Skin abscesses secondary to unsterile techniques of substance administration are usually found. There is a loss of libido; the mechanism is unknown. The chronic heroin user may resort to prostitution to support the habit, thus increasing the risk of sexually transmitted diseases (including HIV), pregnancy, and other infectious diseases. Constipation results from decreased smooth muscle propulsive contractions and increased anal sphincter tone. The absence of sterile technique in injection may lead to cerebral microabscesses or endocarditis, usually caused by *Staphylococcus aureus* or *Pseudomonas aeruginosa*. Abnormal serologic reactions are also common, including false-positive Venereal Disease Research Laboratories and latex fixation tests. Infectious complications are usually not seen with oral prescription opioid use unless the pills are dissolved and injected.

WITHDRAWAL

After ≥8 hours without heroin, the addicted individual undergoes a series of physiologic disturbances over 24-36 hours, referred to collectively as "withdrawal" or **abstinence syndrome** (see Table 157.15). The earliest sign is yawning, followed by lacrimation, mydriasis, restlessness, insomnia, "goose flesh," cramping of the voluntary musculature, bone pain, hyperactive bowel sounds and diarrhea, tachycardia, and systolic hypertension. Although the administration of **methadone** is the most common method of detoxification, **buprenorphine**, an opiate agonist-antagonist, is available for detoxification and maintenance treatment of heroin and other opiates. Buprenorphine has the advantage of offering less risk of addiction, overdose, and withdrawal effects and can be dispensed in the privacy of a physician's office. Combined with behavioral interventions, it has a greater success rate of detoxification. A combination substance, buprenorphine plus naloxone, has been formulated to minimize use during detoxification. Clonidine and tramadol have also been used to manage opioid withdrawal.

Substances used to treat **opioid use disorder**, a chronic relapsing problem, traditionally include methadone maintenance and buprenorphine. Use-deterrent opioid pill formulations (when pain control requires an opioid) include pills resistant to crushing that form a viscous gel when dissolved or pills with a sequestered opioid antagonist (naltrexone).

OVERDOSE SYNDROME

Overdose syndrome is an acute reaction after administration of an opiate. It is the leading cause of death among substance users. Many opiate overdoses are complicated by polydrug use (Fig. 157.4). The clinical signs include stupor or coma, seizures, miotic pupils (unless severe anoxia has occurred), respiratory depression, cyanosis, and pulmonary edema. The differential diagnosis includes CNS trauma, diabetic coma, hepatic (and other) encephalopathy, Reye syndrome, and overdose of alcohol, barbiturates, PCP, or methadone. Diagnosis of opiate toxicity is facilitated by IV administration of naloxone 0.1 mg/kg, not to exceed 2 mg, which causes dilation of pupils constricted by the opiate. Diagnosis is confirmed by the finding of opiates in the urine and/or serum.

TREATMENT

Treatment of acute heroin overdose consists of maintaining adequate oxygenation and continued administration of **naloxone**, a pure opioid antagonist (see Chapter 94). It may be given intravenously, intramuscularly, subcutaneously, as a nasal spray, or by endotracheal tube. Naloxone has an ultra-rapid onset of action (1 minute) and duration of action of 20-60 minutes. Naloxone is often available in the field, carried by first responders. Take-home naloxone may also be given to substance users, their family, or friends; such programs have been effective in treating overdoses. If there is no response, other etiologies for the respiratory depression must be explored. Naloxone may have to be repeated if given by nasal route or continued for 24 hours if methadone, rather than shorter-acting heroin, has been taken. Higher and prolonged naloxone dosing is required for novel potent opioid overdoses. Admission to the intensive care unit is indicated for patients who require continuous naloxone infusions (rebound coma, respiratory depression) and for those with life-threatening arrhythmias, shock, and seizures.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

157.11 Synthetic Cannabinoids

Cora Collette Breuner

Bath salts refers to a group of previously OTC, but now illicit, often home synthesized, substances containing one or more chemicals similar to **cathinone**, an amphetamine-like stimulant found in the khat

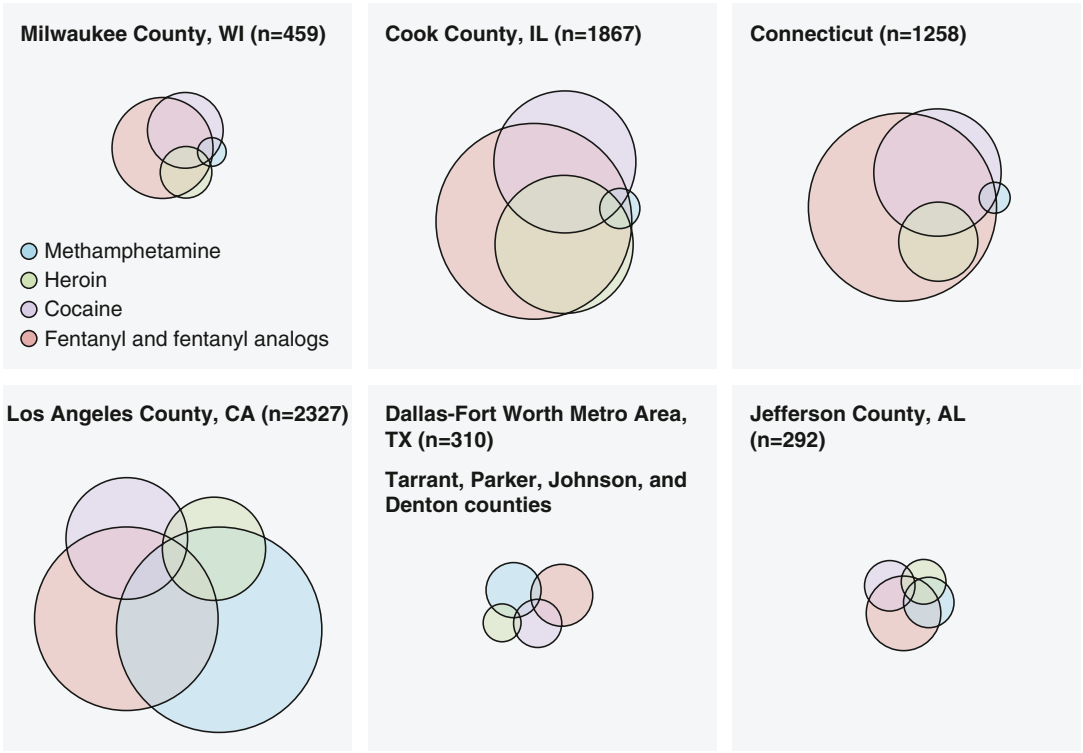

Fig. 157.4 Proportional drug combinations involved in fatal overdoses in U.S. jurisdictions with detailed medical examiner data available, 2020. Based on death investigations that were completed at the time of data request. Official counts by jurisdictions may differ as all investigations are completed. These areas were chosen to provide a country-wide view. *(From Humphreys K, Shover CL, Andrews CM, et al. Responding to the opioid crisis in North America and beyond: recommendations of the Stanford-Lancet commission. Lancet. 2022;399:555–604, Fig. 5.)*

plant. The bath salts, marketed under ever-changing brand names (e.g., Lunar Wave, Cloud Nine, Vanilla Sky), are sold online or in substance paraphernalia stores as a white or brown crystalline powder and can be ingested, inhaled, or injected. The most current information about teen use of bath salts is from the 2016 MTF survey of 8th, 10th, and 12th graders, who report use of 0.9%, 0.8%, and 0.8%, respectively. The synthetic cathinones found in bath salts include methylone, mephedrone, and 3,4-methylenedioxypyrovalerone (MDPV), all of which are chemically similar to amphetamines and MDMA (ecstasy).

CLINICAL MANIFESTATIONS

The chemicals in bath salts raise brain dopamine levels, causing the user to feel a surge of euphoria, with increased sociability and sex drive. In addition, the user may experience a surge in norepinephrine, causing reactions such as an elevated heart rate, chest pain, vasoconstriction, diaphoresis, hyperthermia, dilated pupils, seizures, arrhythmias, and high blood pressure. Users also experience psychiatric symptoms such as aggressive behavior, panic attacks, paranoia, psychosis, delirium, self-mutilation, and hallucinations caused by elevated serotonin levels. Intoxication from bath salts may cause **excited delirium syndrome**, which includes dehydration, rhabdomyolysis, and kidney failure.

TREATMENT

Treatment of overdose should be directed at specific complications but often includes benzodiazepines or propofol for agitation and other neuropsychiatric manifestations. The synthetic cathinones in bath salts are highly addictive, triggering intense cravings in those who consume them frequently. This may result in dependence, tolerance, and strong withdrawal symptoms, as seen in other highly addictive substances. The sale of two of the synthetic cathinones, mephedrone and MDPV, is illegal in the United States.

SYNTHETIC CANNABINOIDS (MARIJUANA)

Spice, K2, crazy clown, aroma, black mamba, blaze, dream, and funky monkey are some of the common street names for synthetic marijuana, which is a mixture of herbs or plant materials that have been sprayed with artificial chemicals similar to THC, the psychoactive ingredient in marijuana. One active group of chemicals is the **carboxamides**, which *are not detected* by standard assays to detect THC. In the United States the chemicals in "spice" are designated a Schedule I controlled substance (as is marijuana) by the Drug Enforcement Administration (DEA), thereby making it illegal to sell, buy, or possess them. Nonetheless, synthetic marijuana is the second most common illicit substance used by high school seniors. More than 10% of high school seniors used synthetic marijuana in the last year.

Synthetic marijuana is mainly used by smoking, or mixed with marijuana, or brewed as a tea for drinking. The chemicals in synthetic marijuana affect the same receptors as THC and produce similar effects as seen in cannabis use, such as relaxation, elevated mood, and altered perception. In addition, sympathomimetic symptoms are quite common and are the cause of significant toxicity. Symptoms of **intoxication** depend on the individual compounds in the community and include vomiting, tachycardia, hypertension, hyperthermia, confusion, extreme anxiety, profuse sweating, agitation, aggression, dysphoria, hallucinations, seizures, rhabdomyolysis, dystonia, unresponsiveness, confusion, catatonia, "zombie-like" behaviors, psychosis, coma, and myocardial ischemia. Some of the neuropsychiatric manifestations may last for 1-4 weeks and at times resemble autoimmune encephalitis syndromes. Patients often require psychopharmacology for agitation or frank psychosis. In response to legislation to ban the chemicals in OTC synthetic marijuana products, manufacturers alter and substitute the chemicals in the product, keeping it on the legal market and leaving teens particularly vulnerable to potential health effects.

Synthetic marijuana is not detected by standard toxicology screening but can be identified in specialized laboratories.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

Chapter 158

The Breast

Cynthia M. Holland-Hall

Breast development is often the first visible sign of puberty in the adolescent female. Pediatric practitioners must be able to distinguish normal breast development, including normal variants, from pathologic breast disorders. Visual inspection of the breast tissue should routinely be a component of the adolescent's general physical examination. Breast development during puberty is described using the **Sexual Maturity Rating (SMR)** scale, progressing from SMR 1 to SMR 5 as the breast becomes more mature (see Chapter 150, Fig. 150.2).

FEMALE DISORDERS

See Chapter 588.

MALE DISORDERS

Pubertal gynecomastia, benign glandular proliferation in the male breast, occurs in up to 65% of healthy adolescent males (see Chapter 625). The incidence of gynecomastia has increased over the past 20 years, suggesting that changes in the endogenous or exogenous sex-steroid environment have occurred. It is thought that an imbalance of estrogen and androgen concentrations contributes, at least in part, to the development of gynecomastia. Elevations of insulin-like growth factor (IGF)-1 have also been demonstrated. The onset of physiologic gynecomastia typically is between 10 and 13 years, peaking at SMR 3-4. Careful physical examination is essential to distinguish between **true gynecomastia**, characterized by a discrete disk of palpable glandular tissue under the nipple-areolar complex, and **pseudogynecomastia**, characterized by more diffuse, bilateral adiposity of the anterior chest wall. Physiologic gynecomastia regresses spontaneously in up to 90% of adolescents within 18-24 months but may transition into lipomastia. Reassurance and continued observation are recommended in most patients; surgery may be indicated in severe or persistent cases. No medical therapies for gynecomastia have been approved for use in adolescents by the U.S. Food and Drug Administration. Small, noncontrolled trials of antiestrogens, such as tamoxifen, appear promising, but more evidence is needed. Conditions associated with nonphysiologic gynecomastia include endocrine disorders, liver disease, neoplasms, chronic disease, and trauma. It can also be seen as a late effect in childhood cancer survivors. Although dozens of medications are implicated as possible causes of gynecomastia, convincing evidence exists only for a few, including several antiandrogens and other exogenous hormones, isoniazid, antiretrovirals, and histamine-2 receptor blockers. Calcium channel blockers, isotretinoin, statins, certain antipsychotics, proton pump inhibitors, lavender, and tea tree oil may be causative. Among drugs of misuse, alcohol, opioids, and anabolic steroids may be associated with gynecomastia, but minimal evidence supports an association with marijuana or amphetamines.

Other breast pathology in males is uncommon. Benign masses such as neurofibromas, lipomas, and dermoid cysts have been reported in the male breast. Males with Klinefelter syndrome have an elevated risk of breast cancer (see Chapter 623), but this malignancy is otherwise exceedingly rare in adolescents.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

Chapter 159

Menstruation-Related Disorders

Fareeda Haamid and Gina S. Sucato

See also Chapter 587.

At least 400 lifetime episodes of menstruation are predicted in those who menstruate, yet many adolescents consistently report stigma, inadequate health education, and hesitance to discuss their menses with trusted adults. Clinicians should normalize menstruation and avoid unnecessarily medicalizing this natural process. Menstrual disturbances, including delayed onset, irregularity, heavy flow, and pain, occur in 75% of adolescent females. For adolescents with minor variations from normal (Table 159.1), an explanation of symptoms and reassurance may be all that is needed. Severe dysmenorrhea or prolonged menstrual bleeding can be not only frightening but a cause of persistent morbidity requiring more intensive management, potentially including referral to a specialist in adolescent gynecology.

NORMAL MENSTRUATION

The average age of **menarche**, or first menses, was thought to vary according to ethnic origin and socioeconomic status (SES). A prospective U.S. study of nearly 1,100 diverse females demonstrated no correlation between SES and menarche yet a statistically significant correlation with SES and thelarche; lower SES was associated with earlier pubertal onset. There is often a close concordance of the age at menarche between mother and daughter, which suggests genetic factors are determinants in addition to individual factors such as weight, exercise level, and chronic medical conditions. The age of menarche has declined in countries and populations experiencing improved nutritional standards and other living conditions. In U.S. females, the average age of menarche, 12.5 years, has been relatively stable over the last few decades. Higher body mass index (BMI) is associated with earlier onset of menarche.

The onset of breast budding **(thelarche)** is the first sign of puberty in most females, though it has decreased worldwide by a mean of roughly 3 months per decade from 1977 to 2013. Menarche typically occurs within 2-3 years of thelarche during breast **sexual maturity rating** (**SMR**; i.e., Tanner stage) 4. Longer cycle lengths ranging between 21 and 45 days occur initially then periods gradually become more regular. However, for most adolescents, by 3 years postmenarche, menstrual cycle patterns are similar to adults, occurring every 21-35 days.

MENSTRUAL IRREGULARITIES

In young adolescents, many menstrual variations are explained by **anovulation** caused by immaturity of the hypothalamic-pituitary-ovarian

Table 159.1 Characteristics of Normal Menses*

Cycle length**	21-35 days 21-45 days during first 3 yr after menarche
Duration of menses	7 or fewer days
Blood flow	6 or fewer soaked menstrual products per day Infrequent overflow of menstrual cups

*Adolescents with two or more cycles outside this range or who skip their period for 3 consecutive months warrant evaluation.

**A cycle begins with the first day of one period and extends to the first day of the next.

axis governing the menstrual cycle. Significant deviations from normal should prompt a search for organic pathology in a logical and cost-effective manner. An accurate menstrual history is an important, but often lacking, first step toward a diagnosis. At menarche, all patients should be encouraged to track their periods.

A range of terms has previously been used to describe abnormal menstrual bleeding. Terms such as "menorrhagia and metrorrhagia" are imprecise, confusing, and not linked to any specific underlying pathology. **Abnormal uterine bleeding (AUB)** is the preferred term for uterine bleeding that is abnormal in regularity, volume, frequency, or duration. AUB is further specified by adding descriptive terms such as *heavy menstrual* bleeding or *intermenstrual* bleeding. A qualifier is added to categorize the etiology of abnormal bleeding. Of the nine categories, the three most relevant to adolescents are **ovulatory dysfunction** (AUB-**O**), previously referred to as *dysfunctional uterine bleeding* and discussed in Chapter 159.2; **coagulopathy** (AUB-**C**); and **not otherwise classified** (AUB-**N**).

In addition to a standard medical history noting hospitalizations, chronic illness, and medication and supplement use, a complete history for evaluating a patient with menstrual irregularity should include the timing of pubertal milestones, such as onset of pubic and axillary hair and breast development; a detailed patient menstrual history; age of menarche and overall menstrual pattern of mother and sisters; and a family history of gynecologic problems. The complete review of systems should elicit any changes in headache pattern or vision; the presence of galactorrhea; and any changes in skin, hair, or bowel patterns. Changes in diet, level of exercise, and sports participation are also important factors when generating a differential diagnosis. The patient should be interviewed alone, and the confidential history should assess substance use, consensual sexual activity, forced sexual behavior, abuse, and other psychosocial stressors.

Assessment of basic growth parameters should include weight, height, and BMI and a thorough review of the growth chart. Physical examination should document heart rate, blood pressure, SMR, signs of androgen excess, such as hirsutism or severe acne, and signs suggestive of an eating disorder (see Chapter 41), such as bradycardia, cachexia, lanugo, or knuckle calluses. A careful external genital examination should be performed. An internal pelvic examination is rarely necessary in the absence of sexual activity. Any internal exam being considered for young adolescents should be performed with proper equipment and technique by a clinician with expertise in this age-group. Transabdominal pelvic ultrasound can be a useful adjunct for evaluating anatomic abnormalities in the adolescent; when indicated, MRI can provide greater detail of pelvic anatomy.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

Table 159.2 Causes of Primary or Secondary Amenorrhea

Pregnancy (regardless of history can cause primary or secondary amenorrhea)
Functional hypothalamic states (stress, weight loss, undernutrition, high levels of exercise, energy deficit even at normal weight)
Relative energy deficiency in sport (RED-S) (inadequate energy intake causing impaired physiologic function, including amenorrhea, bradycardia, and low bone density)
Eating disorders
Premature ovarian insufficiency (autoimmune, idiopathic, galactosemia, or secondary to radiation or chemotherapy)
Hypothalamic and/or pituitary damage (e.g., irradiation, tumor, traumatic brain injury, surgery, hemochromatosis, midline central nervous system defects such as septooptic dysplasia, autoimmune pituitary hypophysitis)
Thyroid disease (hyper- or hypo-; hypothyroidism more likely to be associated with increased bleeding)
Prolactinoma
Systemic disease (e.g., inflammatory bowel disease, cyanotic congenital heart disease, sickle cell disease, cystic fibrosis, celiac disease)
Hyperandrogenism (polycystic ovary syndrome, nonclassic congenital adrenal hyperplasia, adrenal tumor or dysfunction)
Drugs and medications (e.g., illicit drugs, atypical antipsychotics, hormones)
Turner syndrome (including mosaicism)

Table 159.3 Additional Causes of Primary Amenorrhea

Physiologic/constitutional delay
Anatomic abnormalities
Müllerian agenesis
Imperforate hymen
Transverse vaginal septum
Genetic disorders
46,XY disorders of sexual development (e.g., androgen insensitivity syndrome, 5α-reductase deficiency, 17α-hydroxylase deficiency)
Mixed gonadal dysgenesis (associated with various chromosome patterns)
Turner syndrome (resulting from 45,X or a variety of mosaic or other abnormal karyotypes)
Genetic hypogonadotropic hypogonadism (e.g., X-linked Kallmann syndrome)

159.1 Amenorrhea

Fareeda Haamid and Gina S. Sucato

Amenorrhea, the absence of menstruation, generally requires evaluation at age 15 years, or if there has been no menstruation within 3 years of the onset of puberty **(primary amenorrhea)**, or if there has been no menstruation for the length of three previous cycles in a postmenarchal patient **(secondary amenorrhea)**. However, the following caveats exist: lack of any pubertal signs by age 13 years in a female should prompt evaluation for pubertal delay; in sexually active patients, or those with other symptoms suggesting pathology, evaluation should be initiated without waiting for three missed cycles; in patients whose breast development started between age 8 and 9 years, observation for >3 years may be warranted in some cases, given data suggesting that the age of thelarche has decreased but the age of menarche has not. Conversely, expectant management with close follow-up can be considered in a patient whose history, physical examination showing some pubertal development, and family history suggest constitutional delay of puberty.

The differential diagnosis of amenorrhea is broad (Table 159.2) and requires a careful history and physical exam to guide any necessary diagnostic studies. Understanding the timing and tempo of the patient's pubertal milestones is key to the evaluation. The first step in the amenorrhea evaluation is to ascertain whether the patient has ever had any menstrual bleeding. Conditions that can interrupt the menstrual cycle can also prevent menarche; therefore some aspects of the evaluation of primary and secondary amenorrhea are identical. In females with primary amenorrhea, genetic and anatomic conditions must also be considered (Table 159.3).

HISTORY AND PHYSICAL EXAMINATION

Important historical elements include dietary intake, exercise level, and a thorough review of any ongoing symptoms, including fever, headache, vision changes, chronic respiratory or gastrointestinal (GI) complaints, bowel habit changes, galactorrhea, changes in hair or nails, excessive body hair, severe acne, unexplained musculoskeletal complaints, and changes in

vaginal discharge, which may decrease in females who are hypoestrogenic. Any underlying medical conditions and the adequacy of their control should be noted, as well as the presence of any renal or skeletal anomalies, some of which may have associated reproductive system anomalies. Clinicians should document medications, particularly those for psychiatric conditions. Family history of menarcheal age, eating disorders (see Chapter 41), and **polycystic ovary syndrome (PCOS**; see Chapter 589) should be elicited. A thorough social history is necessary, especially concerning the presence or absence of sexual activity or abuse (see Chapter 16.1).

Physical examination should begin with careful attention to growth chart trajectories. In addition to a search for undiagnosed systemic disease, clues to an eating disorder, thyroid disease, or hyperandrogenism should be sought. The exam should assess for BMI, orthostatic pulses, blood pressure, abnormal dentition, anosmia or hyposmia (suggestive of Kallmann syndrome; see Chapter 623.2), parotid enlargement, thyroid gland palpation, hepatosplenomegaly, abdominal mass, lymphadenopathy, and SMR (see Chapter 150). Skin examination should note any lanugo, dry or doughy skin, loss of hair from scalp or eyebrows, striae, acanthosis nigricans, or acne. Clinicians should assess for glandular breast tissue via palpation in patients with primary amenorrhea. The external genital exam should note SMR and appearance of the vagina, which should be pink and moist; thin, dry, reddened mucosa suggests estrogen deficiency. The clitoral width should be <1 cm. In the patient with primary amenorrhea, vaginal patency can be painlessly assessed using a slender saline-moistened swab and careful avoidance of the hymen. If physical assessment of the cervix and uterus is not tolerated, a transabdominal pelvic ultrasound is advisable in patients with primary amenorrhea, followed by MRI if more detail is needed.

LABORATORY STUDIES

A urine pregnancy test, serum prolactin levels, thyroid-stimulating hormone, and follicle-stimulating hormone (FSH) are reasonable to measure in all patients presenting with amenorrhea (Fig. 159.1). Elevation of FSH (>30 mIU/mL) in an amenorrheic female suggests ovarian insufficiency, and if confirmed with repeat testing, should be followed with a pelvic ultrasound, karyotype, and specialist referral. Diagnostic tests in the patient presenting with amenorrhea should be tailored to the history and physical exam.

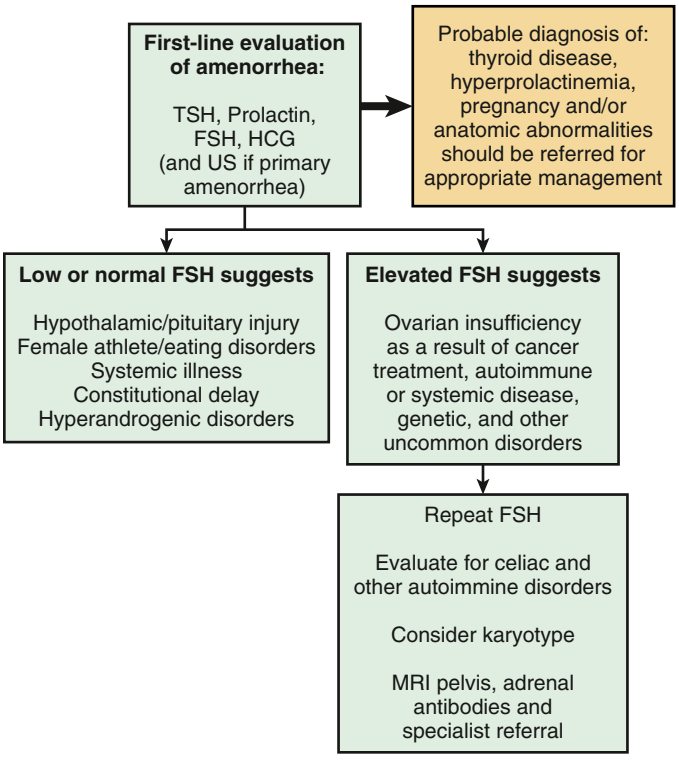

Fig. 159.1 Initial diagnostic testing algorithm to evaluate amenorrhea. FSH, Follicle-stimulating hormone; HCG, human chorionic gonadotropin; LH, luteinizing hormone; MRI, magnetic resonance imaging; US, ultrasound.

In patients with signs of androgen excess (e.g., severe acne or hirsutism) or other physical stigmata associated with PCOS (rapid pubertal weight gain, acanthosis nigricans) consider measuring levels of 17-hydroxyprogesterone (17-OHP), free and total testosterone, dehydroepiandrosterone sulfate (DHEAS), and androstenedione; all preferably collected in the morning. PCOS affects up to 15% of females; diagnostic criteria for adolescents are controversial but include variations of menstrual irregularity (ranging from amenorrhea to AUB) and clinical or biochemical hyperandrogenism. The interpretation of polycystic ovarian morphology identified on ultrasound in adolescents can be challenging, and an ultrasound is not necessary for diagnosis in adolescents.

With the exceptions of pregnancy, constitutional delay, and imperforate hymen, conditions causing primary amenorrhea are associated with reduced fertility; thus their diagnosis may cause profound emotional responses in patients and families. Therefore before ordering studies to confirm these diagnoses (e.g., karyotype, MRI of reproductive anatomy), the clinician should carefully consider the implications and be prepared to refer to specialists with experience managing the long-term treatment of such diagnoses.

In patients presumed to have hypothalamic amenorrhea, based on prepubertal luteinizing hormone (LH) and low FSH levels using an ultrasensitive assay and consistent history and physical exam, MRI of the brain is not necessary in all patients. However, MRI should be considered for patients presenting with a headache history that has changed from baseline; persistent emesis; change in thirst, urination, or vision; elevated prolactin or galactorrhea; or other neurologic symptoms.

TREATMENT

Treatment for amenorrhea widely varies depending on the underlying cause. Many diagnoses require referral to clinicians in specialties such as endocrinology, adolescent medicine, and gynecology; often, collaboration with other disciplines such as psychology or nutrition is indicated. The mainstay of PCOS treatment is suppression of ovarian androgens, typically with **combined hormonal contraception** (i.e., estrogen and progestin) and **lifestyle modifications** to decrease obesity and insulin resistance. Patients with abnormal glucose tolerance may benefit from the addition of **metformin**. **Spironolactone**, an androgen receptor blocker, can also be used to reduce androgen effects, including hirsutism. **Metabolic syndrome** is highly prevalent in PCOS; thus clinicians should evaluate for comorbid diabetes and hyperlipidemia with periodic lipid and hemoglobin A_{1c} screening. It is crucial to normalize weight and improve nutritional status for patients with eating disorders or other hypoestrogenic conditions of energy imbalance. It is not routinely recommended to initiate hormonal therapy in these patients. However, short-term use of **transdermal estrogen therapy** (E2) to protect bone health may be considered for those who remain amenorrheic after a trial of nutritional and activity modification. For females with amenorrhea due to partial or total ovarian insufficiency, exogenous hormones are required for all pubertal development. Experts recommend starting at age 10-12 years with low-dose transdermal estrogen, progressing to increased doses of estrogen and cyclic progestin. Continued maintenance therapy can be accomplished with higher-dose combination products, as found in typical combined hormonal contraceptive pills, patches, and vaginal rings.

In the absence of a clear indication such as PCOS, hormonal medications (e.g., combined hormonal methods) to produce monthly bleeding are not recommended for patients with **secondary amenorrhea** because it will mask the patient's subsequent menstrual pattern. However, in patients with normal postpubertal estrogen levels, progesterone can be useful to periodically (every 4-12 weeks) induce shedding of the endometrial lining to avoid buildup and subsequent heavy menses. One commonly used regimen is **medroxyprogesterone** 10 mg PO daily for the first 7-14 days of the month.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

159.2 Abnormal Uterine Bleeding

Fareeda Haamid and Gina S. Sucato

Abnormal uterine bleeding (AUB) is a broad term used to describe any menstrual bleeding pattern that deviates from physiologic patterns. Clinicians are encouraged to categorize the abnormal pattern based on the patient's complaint, which is typically irregular (AUB/**IMB: intermenstrual bleeding**) or heavy (AUB/**HMB: heavy menstrual bleeding**).

IRREGULAR MENSTRUAL BLEEDING

Menstrual status should be treated as a *vital sign;* at every preventative care or comprehensive visit clinicians should document the first day of the last menstrual period and the menstrual pattern. Although menses are frequently irregular in the early postmenarcheal years, further evaluation is necessary when menstrual patterns vary too widely from what is normal for age. Even in the first postmenarcheal year, menses are usually not less frequent than every 45 days. Menses become increasingly regular with age, and by 3 years after menarche typically occur every 21-35 days, lasting 3-7 days. Personal cycle duration is usually established by age 19 or 20 years.

In the early postmenarcheal years, the most common cause of AUB in adolescents is anovulation caused by immaturity of the hypothalamic-pituitary-ovarian axis. In the absence of a mid-cycle LH surge to stimulate ovulation, there is no corpus luteum production of progesterone. Without the stabilizing effects of progesterone on the endometrial lining, there is increased risk of irregular bleeding. **AUB caused by ovulatory dysfunction (AUB-O**; previously termed *dysfunctional uterine bleeding*), describes irregular bleeding in the absence of specific anatomic, systemic, or endocrinologic disease. Although it is the most common cause of abnormal menstrual bleeding in adolescents, AUB-O is a diagnosis of exclusion. It is important to remember that most conditions that cause amenorrhea can first cause anovulation, which is a key risk for heavy irregular bleeding. Table 159.4 lists the causes of AUB and vaginal bleeding. Adolescents rarely present with complaints of unusually short or light menses. However, short, light, or infrequent menstrual patterns that have changed from a previously established pattern may need to be evaluated similarly to secondary amenorrhea.

Unscheduled bleeding during the use of hormonal contraception frequently occurs, particularly with progestin-only methods. Common causes include medication nonadherence, interactions with prescribed or over-the-counter medications, and smoking. Patients should be reassured such bleeding is benign and not an indication to stop an otherwise satisfactory contraceptive method.

HEAVY AND PROLONGED MENSTRUAL BLEEDING

Irregular bleeding, particularly from anovulation, can be long and heavy (see Table 159.4). However, a hematologic cause **(AUB-C)** should be strongly considered in patients with regular, cyclic menses that are long and/or heavy, especially if heavy menses occurs at the onset of menarche and bleeding disorder symptoms are present. **von Willebrand disease** and other coagulation disorders are found in up to 13% and 20%, respectively, of patients with heavy menstrual bleeding. Other symptoms suggestive of bleeding disorders include changing

Table 159.4 Causes of Vaginal Bleeding in Adolescence

CAUSES OF VAGINAL BLEEDING	EXAMPLES	FEATURES
Immature hypothalamic-pituitary-ovarian axis (AUB-O)	Patient within 2 yr of menarche	Patient responds to hormonal treatment.
Weight changes, disordered eating, or excessive exercise	Anorexia nervosa, bulimia, weight gain or loss of more than 10 pounds from any etiology	Weight loss more frequently results in lighter, less frequent menses.
Endocrinologic causes	Thyroid disease, polycystic ovary syndrome (PCOS)	Bleeding typically increases with hypothyroidism and decreases with PCOS and hyperthyroidism.
Pregnancy complication	Threatened abortion, postpartum or postabortal endometritis	History of sexual activity and/or pregnancy
Infection	Cervicitis, condyloma, pelvic inflammatory disease	Bleeding is usually not heavy and may occur during or after sexual intercourse.
Trauma	Sexual assault, straddle injuries	History will be evident in patients of menstruating age unless there is cognitive disability.
Vaginal foreign body	Toilet paper, broken condoms, tampons	Associated with odor and vaginal discharge, but usually not heavy bleeding.
Hematologic causes (AUB-C)	Type 1, 2, 3 von Willebrand disease, platelet function disorders, thrombocytopenia (idiopathic thrombocytopenic purpura, drug induced), symptomatic hemophilia carrier, clotting factor deficiency, leukemia, aplastic anemia	Bleeding is heavy and/or long and frequently regular, may present at menarche, and may be accompanied by a suggestive personal or family history (hysterectomy, uterine ablation, cautery for epistaxis) or physical exam (ecchymoses, petechiae).
Medications	Estrogens and progestins in combined hormonal contraception Androgens Drugs that affect prolactin (estrogens, phenothiazines, tricyclic antidepressants, metoclopramide) Anticoagulants (heparin, warfarin, aspirin, NSAIDs) SSRIs	Affect the hypothalamic-pituitary-ovarian axis, endometrial lining, platelets, or coagulation pathway.
Anatomic	Partial obstruction of vagina or uterus causing asynchronous bleeding; cervical or endometrial polyps or myomas; hemangioma; uterine vascular malformation; genital/reproductive tract cancer	Most of these entities are extremely rare, especially reproductive tract cancers.
Systemic disease	Celiac disease, rheumatoid arthritis, Ehlers-Danlos syndrome and other connective tissue disorders	Accompanied by other condition-specific signs.

a pad or tampon more than hourly, passing clots larger than 1 inch in diameter, iron deficiency, menses longer than 7 days, a history of hemorrhagic ovarian cysts, excessive bleeding from wounds or postoperatively, mucosal bleeding (epistaxis or GI tract), and first-degree relatives with heavy menses or epistaxis requiring medical treatment. Inherited collagen disorders such as Ehlers-Danlos syndrome are associated with vascular collagen abnormalities; thus patients with heavy menses and manifestations of joint hyperflexibility may require a hematology referral.

LABORATORY FINDINGS

Table 159.5 lists laboratory tests to consider in patients with long, heavy bleeding. Females with persistent heavy bleeding despite negative first-line testing should be referred to a hematologist for testing for platelet function disorders, factor deficiencies, and other less common disorders. In the initial evaluation, rapidity of blood loss in conjunction with the hemoglobin establishes the **bleeding severity**: **mild** (hemoglobin 10-11 g/dL), **moderate** (hemoglobin 7-10 g/dL), or **severe** (hemoglobin <7 g/dL). Iron deficiency is defined as serum ferritin of <15 µg/mL.

TREATMENT

In bleeding that has resulted in **mild** anemia, the patient should keep a menstrual calendar to follow the subsequent flow patterns. **Nonsteroidal antiinflammatory drugs** (NSAIDs; e.g., naproxen) are more effective than placebo in treating heavy bleeding and can also treat concurrent dysmenorrhea. Clinicians may need to educate patients and families about the noncontraceptive medical indications for hormonal contraception given the unnecessary stigma commonly associated with these medications. Active bleeding typically responds well to cycling with any **combined hormonal contraceptive method** containing estrogen and progestin starting with once-daily dosing; up to twice-daily dosing may be considered until bleeding stops. Patients with estrogen contraindications such as migraine with aura, uncontrolled hypertension, or thrombotic risks can be treated with progestins alone, such as medroxyprogesterone 10 mg orally daily or norethindrone acetate 5-10 mg PO daily, either continuously or for 10-14 days per month. The latter regimen will be followed by monthly bleeding.

Iron deficiency with or without anemia should be treated with **65 mg elemental oral iron** once daily until serum ferritin >30 µg/mL. Dosing more frequently than daily has not been shown to be beneficial. Ferritin and hemoglobin should be repeated 4 weeks after treatment is initiated. Once anemia is corrected, iron should be continued once daily for 3 months to replenish iron stores. A referral to hematology may be warranted for insufficient response or intolerance of oral iron for consideration of **intravenous (IV) iron therapy**.

With **moderate** anemia, any of the hormonal regimens noted earlier can be used. However, it may be necessary in patients with more brisk bleeding to start with three to four **combined oral contraceptive (COC) pills** (or three to four doses of **medroxyprogesterone** 10 mg) per day, with additional medication to control nausea. The dose can usually be tapered to daily dosing over the next 2 weeks. Patients with ongoing rapid bleeding, syncope or lightheadedness, hemodynamic instability, or hemoglobin of <7 g/dL should be treated in the hospital.

Patients with **severe** anemia should be treated with one of the hormone tapers described earlier, in addition to **IV fluid or blood products** as indicated; it is advisable to draw necessary hematologic laboratory studies before transfusion. Patients with emesis or other significant symptoms may be initially treated with **conjugated estrogens** 25 mg IV every 4-6 hours for 1-2 days. A COC or progestin regimen should be added within 24-48 hours because progestin is needed to stabilize the endometrial lining and can be used as maintenance therapy after hospital discharge. In the exceptionally rare case of a patient whose bleeding cannot be controlled hormonally, options for gynecologic interventions include **intrauterine Foley balloon placement** or **uterine packing** to tamponade the uterus mechanically. Dilation and curettage, performed frequently in adults, is almost never indicated in adolescents and can increase blood loss in patients with bleeding disorders.

Hormonal AUB treatment should continue for at least 3-6 months, depending on the patient's age, prior menstrual history, and severity of presentation, before reassessing the need for ongoing therapy. Additional options for maintenance therapy include **combined hormonal transdermal patches and vaginal rings**; **depot medroxyprogesterone acetate** 150 mg intramuscularly (IM) or 104 mg subcutaneously (SC) every 3 months; and placement of a **levonorgestrel intrauterine device** (IUD), depending on the patient's preference and/or concurrent need for long-term contraception. For patients who need or choose to avoid hormonal therapy, **antifibrinolytics such as tranexamic acid** 1,300 mgPO 3 times daily can be used for up to 5 days during monthly menstruation in patients who do not have an increased risk of thrombosis.

Females with a known bleeding disorder may be up to 5 times more likely to develop heavy menstrual bleeding. Therefore it can be helpful while the patient is premenarcheal to devise a proactive plan in collaboration with the patient's hematology team in the event of acute heavy menstrual bleeding, which can occur at menarche.

Table 159.5 Laboratory Tests to Evaluate Patients with Abnormal Uterine Bleeding

Complete blood count with platelets
Ferritin
Urine pregnancy test (regardless of history)
Thyroid function studies
Total and free testosterone*
Liver and kidney function studies
Nucleic acid amplification test (NAAT) or equivalent testing for *Chlamydia trachomatis, Neisseria gonorrhoeae*, and *Trichomonas vaginalis*
Prothrombin time and partial thromboplastin time
von Willebrand factor antigen, vWF activity (such as ristocetin cofactor), and factor VIII† activity
Pelvic ultrasound (if palpable mass or bleeding persists despite treatment)

*In patients with signs or symptoms suggestive of polycystic ovary syndrome, such as acne, hirsutism, obesity, acanthosis nigricans, and a history of infrequent menses.
†Any abnormalities should be referred to a hematologist. False-negative von Willebrand tests and false-positive platelet function studies have been observed in the setting of anemia. It is preferable to obtain tests before estrogen treatment is started to minimize false-negative results. Repeat testing is common in patients for whom there is a high pretest suspicion.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

159.3 Dysmenorrhea

Fareeda Haamid and Gina S. Sucato

Dysmenorrhea, painful uterine cramps that precede and accompany menses, occur in up to 90% of 17- to 24-year-olds. Although dysmenorrhea is frequently severe enough to interfere with school and other activities, many adolescents undertreat their symptoms, and fewer seek medical care.

Dysmenorrhea may be primary or secondary. **Primary dysmenorrhea**, characterized by the absence of any specific pelvic pathologic condition, is the more commonly occurring form, accounting for approximately 90% of cases. After ovulation, withdrawal of progesterone results in synthesis of prostaglandins by the endometrium, which stimulates local vasoconstriction, uterine ischemia and pain, and smooth muscle contraction, explaining uterine and GI symptoms.

Secondary dysmenorrhea results from underlying pathology, such as anatomic abnormality, or infection, such as pelvic inflammatory disease. However, the most common cause of secondary dysmenorrhea in adolescents is **endometriosis**, a condition in which implants of endometrial tissue are found outside the uterus, usually near the fallopian tubes and ovaries. Often, other family members have endometriosis. Severe menstrual pain is characteristic of endometriosis; however, adolescents may also have noncyclic pain. Although primary dysmenorrhea is almost always the cause, a careful history and physical examination are required for adolescents who present with **pelvic pain**. An internal pelvic exam is not required in females who are not sexually experienced and whose presentation is consistent with primary dysmenorrhea. Constipation can vary cyclically in many females, especially those with irritable bowel syndrome, and often significantly contributes to the pain. **Mittelschmerz**, brief severe pain with ovulation, occurs at mid-cycle. Table 159.6 lists the differential diagnosis and "red flags" for secondary dysmenorrhea. Ovarian cysts, a frequent concern of families, are usually transient and painless.

Treatment for primary dysmenorrhea is aimed at preventing or decreasing prostaglandin production. The mainstay of first-line treatment is prostaglandin synthetase inhibition with **NSAIDs** (Table 159.7) beginning at,

Table 159.6 Differential Diagnosis of Dysmenorrhea in Adolescents*

	PRESENTATION	DIAGNOSIS
Primary	Crampy pelvic pain may be accompanied by aching/heaviness in lower back and upper thighs, nausea, emesis, diarrhea, headache, mastalgia, fatigue, and dizziness; symptoms begin at or shortly before menstrual flow onset and last 1-3 days.	Normal physical exam; internal exam only for sexually active adolescents. Ultrasound can be reserved for patients with atypical presentations (e.g., onset at menarche) or pain despite NSAIDs and hormonal therapy.
Endometriosis and adenomyosis†	**Increasingly severe dysmenorrhea despite adequate therapy**; pain exacerbated during menses or noncyclical pain.	Increased risk in patients with obstructive anomalies and possibly bleeding disorders; however, most adolescents with endometriosis have normal anatomy and bleeding indices; visual diagnosis is made during surgery and confirmed by tissue sample.
Müllerian anomalies with partial outflow obstruction	**Pain begins at or shortly after menarche** and occurs with bleeding; presence of **known renal tract anomaly** (often coexists with müllerian anomaly).	Pelvic ultrasound will demonstrate uterine anomalies (e.g., rudimentary uterine horn); MRI may be required to identify some lesions (e.g., obstructed hemivagina).
Pelvic inflammatory disease	Abrupt onset of dysmenorrhea more severe than baseline in a sexually active adolescent; presentation can range from mild discomfort to acute abdomen.	Clinical diagnosis made by finding **lower abdominal tenderness plus cervical motion tenderness, uterine or adnexal tenderness** on bimanual pelvic examination (see Chapter 146); supporting features include dysuria, dyspareunia, **vaginal discharge**, fever, and increased white blood cell count.
Pregnancy complication	Coincident pain and bleeding may be misdiagnosed as dysmenorrhea.	Urine test positive for human chorionic gonadotropin.

*__Bold__ entries indicate "red flags" for diagnosis.
†Adenomyosis is the presence of endometrial tissue within the uterine myometrium.

Table 159.7 Treatment for Dysmenorrhea

	MEDICATION	REGIMEN	COMMENTS
NSAIDs (for up to 5 days)	Ibuprofen 200 mg	2 tablets PO q4-6h	Over-the-counter
	Naproxen sodium 275 mg	550 mg loading dose, then 275 mg PO q6h	Patients may prefer the equivalent 550 mg PO q12h dosing regimen.
	Celecoxib (cyclooxygenase [COX]-2 inhibitor)*	400 mg loading dose, then 200 mg PO q12h prn pain	Can be used for patients with bleeding disorders.
Hormonal contraception	Combined hormonal contraceptive	Continuous hormone regimens vs standard 21 hormone days followed by 7 placebo days may offer better relief but may increase the risk of unscheduled intermenstrual bleeding.	Treatment can be based on patient preference.
	Progestin-only methods	DMPA 150 mg IM or 104 mg SC q3mo; levonorgestrel intrauterine device for up to 8 yr; etonogestrel implant	DMPA has potential side effects of weight gain, interference with expected bone density increase during adolescence, and higher discontinuation rates than LARC methods.
Gonadotropin-releasing hormone agonist	Depot leuprolide	11.25 mg IM q3mo	Consider for presumed endometriosis unresponsive to hormonal methods; add-back hormones advised to prevent bone loss.

*This medication may cause serious cardiovascular and gastrointestinal events. Use with caution in patients with impaired renal or liver dysfunction, heart failure, or a history of GI bleeding or ulcer. Full prescribing information can be found at https://www.accessdata.fda.gov/drugsatfda_docs/label/2018/020998s050lbl.pdf
DMPA, Depot medroxyprogesterone acetate; LARC, long-acting reversible contraceptive; NSAIDs, nonsteroidal antiinflammatory drugs.

Table 159.8 Criteria for Premenstrual Dysphoric Disorder

A. In the majority of menstrual cycles, at least five symptoms must be present in the final week before the onset of menses, start to *improve* with a few days after the onset of menses, and become *minimal* or absent in the week post menses.
B. One (or more) of the following symptoms must be present:
   1. Marked affective lability (e.g., mood swings; feeling suddenly sad or tearful, or increased sensitivity to rejection).
   2. Marked irritability or anger or increased interpersonal conflicts.
   3. Marked depressed mood, feelings of hopelessness, or self-deprecating thoughts.
   4. Marked anxiety, tension, and/or feelings of being keyed up or on edge.
C. One (or more) of the following symptoms must additionally be present, to reach a total of five symptoms when combined with symptoms from criterion B.
   1. Decreased interest in usual activities (e.g., work, school, friends, and hobbies).
   2. Subjective difficulty in concentration.
   3. Lethargy, easy fatigability, or marked lack of energy.
   4. Marked change in appetite, overeating, or specific food cravings.
   5. Hypersomnia or insomnia.
   6. A sense of being overwhelmed or out of control.
   7. Physical symptoms such as breast tenderness or swelling, joint or muscle pain, a sensation of "bloating," or weight gain.

Note: The symptoms in criteria A-C must have been met for most menstrual cycles that occurred in the preceding year.

D. The symptoms are associated with clinically significant distress or interference with work, school, usual social activities, or relationships with others (e.g., avoidance of social activities; decreased productivity and efficiency at work, school, or home).
E. The disturbance is not merely an exacerbation of the symptoms of another disorder, such as major depressive disorder, panic disorder, persistent depressive disorder (dysthymia), or a personality disorder (although it may co-occur with any of these disorders).
F. Criterion A should be confirmed by prospective daily ratings during at least two symptomatic cycles. (*Note:* The diagnosis may be made provisionally prior to this confirmation.)
G. The symptoms are not attributable to the physiologic effects of a substance (e.g., a drug of abuse, a medication, other treatment) or another medical condition (e.g., hyperthyroidism).

From the *Diagnostic and Statistical Manual of Mental Disorders*, 5th ed., pp. 171–172. Copyright 2013. American Psychiatric Association.

or preferably the day before, menstruation. High doses of around-the-clock treatment are rarely needed for more than the first 2 days. More data are needed to make specific treatment recommendations regarding exercise, but females should be reassured that participation in usual sports and extracurricular activities is not only permissible but a benchmark of adequate treatment.

For those adolescents whose pain does not optimally respond to dosed NSAIDs, or who also require contraception, the currently available forms of **hormonal contraception** will improve dysmenorrhea. Up to three cycles may be required to appreciate the full benefit. Methods and regimens that eliminate a placebo interval may provide better relief. Despite various studies of adjuvant treatments including heat, aromatherapy, acupressure, acupuncture, transcutaneous nerve stimulation, herbal remedies, yoga, and dietary supplements, hormonal medications are the mainstay of second-line treatment. Females whose pain persists despite more than 3 months of adequate hormonal therapy require further evaluation and treatment and referral to a specialist, as endometriosis has been found in up to 69% of adolescents who underwent laparoscopy for persistent pelvic pain.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

159.4 Premenstrual Syndrome and Premenstrual Dysphoric Disorder

Fareeda Haamid and Gina S. Sucato

Premenstrual syndrome (PMS), which occurs in up to 30% of adolescents, is marked by symptoms such as mood changes, bloating, and breast tenderness that begin in the luteal phase of the menstrual cycle (i.e., the time between ovulation and the first day of bleeding) and improve within a few days after the onset of menses. Adolescents are often reassured by education about the relationship of symptoms to the menstrual cycle. Lifestyle interventions such as exercise and stress reduction sometimes provide adequate relief. For more severe symptoms, cognitive-behavioral therapy may be useful. Current data do not support routine recommendations for any vitamin, mineral, or other dietary supplements in the absence of documented deficiency. There is not strong evidence supporting the effectiveness of combined hormonal contraceptive methods for PMS. However, some experts suggest this treatment option for adolescents who also have dysmenorrhea, acne, or contraceptive needs.

Premenstrual dysphoric disorder (PMDD) is distinguished from other depressive disorders by its timing; mood symptoms are precipitated by ovulation, recur in the luteal phase, and disappear at the end of menstruation. It is distinguished from PMS by the severity and consequences of the affective symptoms. PMDD causes significant distress and functional impairment and may be accompanied by physical and behavioral symptoms (Table 159.8). It is a distinct, treatment-responsive depressive disorder. PMDD occurs in 2–6% of menstruating females worldwide. Accurate diagnosis requires use of a menstrual calendar to prospectively document cyclic symptoms. Other mental health conditions such as depression and anxiety disorders may be exacerbated before or during menses, but symptoms will occur throughout the cycle.

Selective serotonin reuptake inhibitors (SSRIs) are first-line therapy for PMDD and severe PMS. In contrast to the treatment of depression, SSRIs can be rapidly effective for premenstrual symptoms and thus can be prescribed either continuously or intermittently, beginning at ovulation (or whenever in the luteal phase symptoms begin) and ending when symptoms resolve. Adolescents can be prescribed the standard regimens used for adults, such as fluoxetine 20 mg PO daily. For adolescents who also need contraception, the drospirenone 3 mg and ethinyl estradiol 0.02 mg combination pill delivered for 24 days followed by 4 inactive days has been approved by the Food and Drug Administration for PMDD.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

Chapter 160
Contraception

Mary E. Romano and Elizabeth M. Alderman

The consequences of sexual activity, including unintended pregnancy (see Chapter 161) and sexually transmitted infections (STIs; Chapter 163), occur in adolescents at higher rates than in adults. Significant barriers, including access to confidential care, may delay an adolescent's ability to access reproductive healthcare until after initiation of sexual activity, and many may become pregnant and/or acquire an STI during this interval. Early and appropriate counseling and education with adolescents, including direct discussion of the risks of unintended pregnancy and STI prevention, can help to mitigate these risks; adolescents who plan sexual initiation are 75% more likely to use contraception at sexual debut. Therefore appropriate patient-centered counseling and provision of contraception as warranted are an essential component of comprehensive healthcare for adolescents. *Female* refers to cisfemale but theoretically would include all those with a uterus engaging in sexual behaviors that put them at risk for pregnancy.

CONTRACEPTIVE EFFECTIVENESS

To decrease rates of unintended pregnancy, the American Academy of Pediatrics (AAP) and American College of Obstetricians and Gynecologists (ACOG) recommend that healthcare providers counsel about and ensure access to all contraceptive methods for their adolescent patients. Comparing typical effectiveness of contraceptive methods, Figure 160.1 illustrates a tiered system of contraceptive methods ranging from more effective to least effective. These tiers are categorized by **typical-use failure rates**, which reflect the effectiveness of a method for the average person who may not always use the method consistently or correctly (Table 160.1). For example, for oral contraceptive pills, the typical-use failure rate is 7%, whereas the *perfect-use* failure rate is <1%. **Tier 1** methods, the most effective, include those with failure rates of <1 pregnancy per 100 women in a year of typical use, and reversible Tier 1 methods include intrauterine devices (IUDs) and implants. **Tier 2** methods have failure rates of 4-7 pregnancies per 100 women in a year of typical use and include injectable contraception, oral contraceptive pills, contraceptive patches, and the vaginal ring. **Tier 3** methods have failure rates of >13 pregnancies per 100 women per year of typical use and include the male and female condom, the diaphragm, withdrawal, the sponge, fertility awareness–based methods, and spermicides.

160.1 Contraceptive Use

Mary E. Romano and Elizabeth M. Alderman

SEXUAL ACTIVITY

According to the 2021 Youth Risk Behavior Surveillance System, 30% of U.S. high school students had ever had sexual intercourse and approximately 22% reported being currently sexually active. These numbers have been decreasing since 2015. However, significant decreases noted from 2019 to 2021 may be attributable to the effect of the COVID pandemic on behaviors.

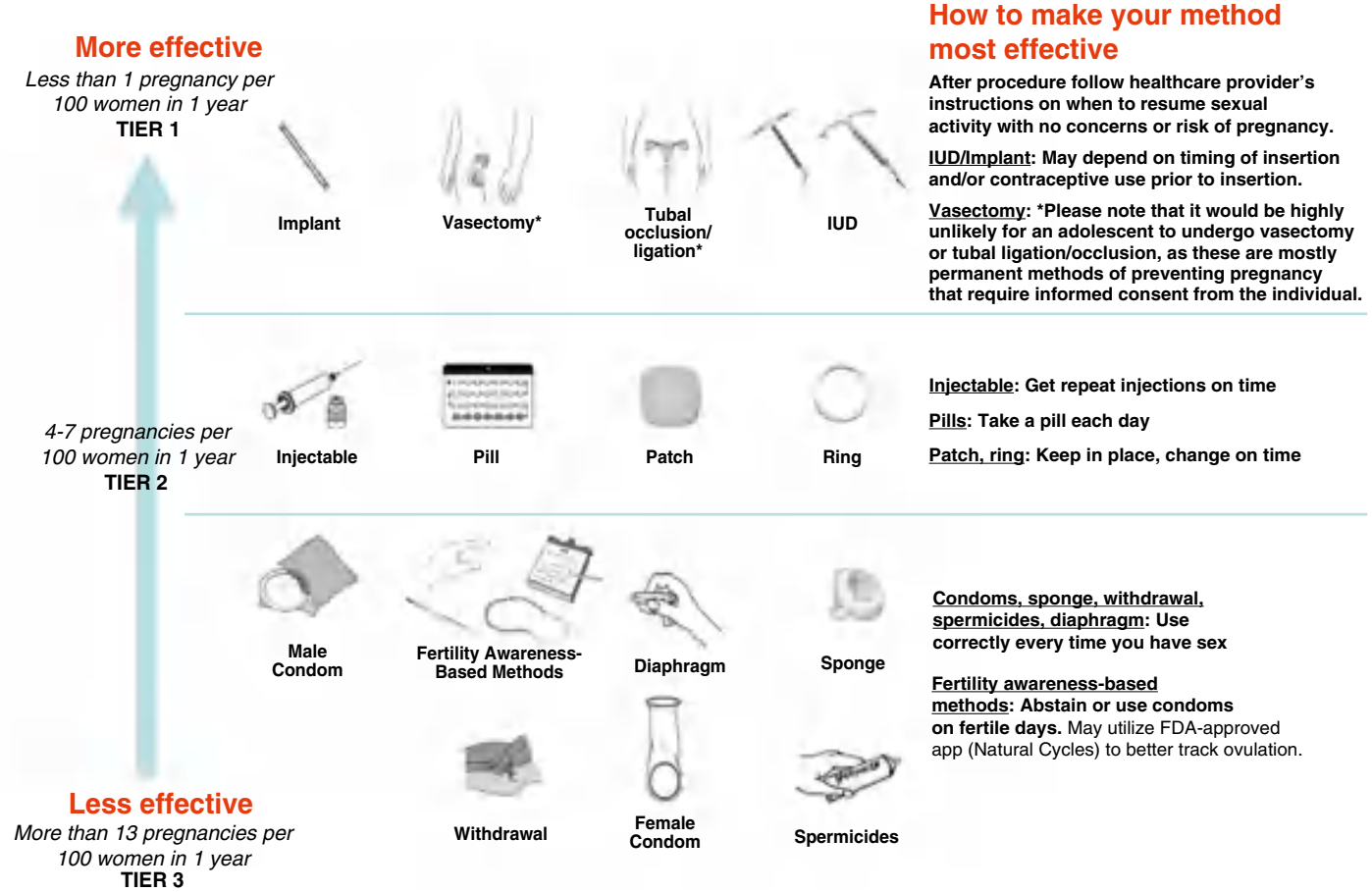

Fig. 160.1 Effectiveness of contraceptive methods. (*Modified from Trussell J, Aiken ARA, Micks E, Guthrie K. Contraceptive efficacy, safety, and personal considerations. In: Hatcher RA, Nelson AL, Trussell J, et al., eds. Contraceptive Technology, 21st ed. New York: Ayer Company Publishers; 2018:102.*)

Table 160.1 Efficacy of Contraceptives

METHOD	FAILURE RATE (%)* TYPICAL USE	PERFECT USE	SOME ADVANTAGES	SOME ADVERSE EFFECTS AND DISADVANTAGES
Implant				
Nexplanon	0.1	0.1	Convenience; long-term contraception; efficacy not dependent on patient adherence; rapid return of fertility after removal	Irregular bleeding; amenorrhea, insertion and/or removal complications
Intrauterine Devices (IUDs)			Convenience; long-term contraception; efficacy not dependent on patient adherence; rapid return of fertility after removal	Rare uterine perforation; risk of infection with insertion
ParaGard T380A	0.8	0.6	Effective for 10 yr; nonhormonal	Irregular/heavy bleeding and dysmenorrhea
Mirena	0.1	0.1	Effective for 8 yr; decreased menstrual bleeding and improved symptoms of dysmenorrhea	Irregular bleeding in first 3-6 mo, followed by amenorrhea; unpredictable suppression of ovulation and potential ovulatory SE (ovarian cysts, PMS, dysmenorrhea)
Liletta	0.1	0.1	Decreased menstrual bleeding and improved symptoms of dysmenorrhea	Irregular bleeding in first 3-6 mo; unpredictable suppression of ovulation and potential ovulatory SE (ovarian cysts, PMS, dysmenorrhea)
Kyleena	0.2	0.2	Smaller T-frame and narrower insertion tube	Irregular bleeding in first 3-6 mo; unpredictable suppression of ovulation and potential ovulatory SE (ovarian cysts, PMS, dysmenorrhea), unpredictable bleeding pattern for the duration of use
Skyla	0.4	0.3	Smaller T-frame and narrower insertion tube	Irregular bleeding in first 3-6 mo; unpredictable suppression of ovulation and potential ovulatory SE (ovarian cysts, PMS, dysmenorrhea), unpredictable bleeding pattern for the duration of use
Injectable				
Depo-Provera	4	0.2	Convenience of q3mo injections; same as progestin-only oral contraceptives	Delayed return to fertility, irregular bleeding, and amenorrhea; weight gain; decreased bone mineral density while receiving injections
Combination Oral Contraceptives	7	0.3	Protection against ovarian and endometrial cancer; suppresses ovulation, which can improve symptoms of PMS, PMDD, and dysmenorrhea; quick return to fertility upon discontinuation	Increased rate of thromboembolism, which increases with age and in those with underlying risks for blood clots, nausea; headache; contraindicated with breastfeeding
Progestin-Only Oral Contraceptives	7	0.3	Safe in breastfeeding women and those with underlying risk of blood clots	Irregular, unpredictable bleeding; must take at same time every day, unpredictable suppression of ovulation
Transdermal Patch	7	0.3	Convenience of once-weekly application; same benefits as combination oral contraceptives	Application site reactions; detachment; increased estrogen exposure as compared with oral contraceptives
Vaginal Ring	7	0.3	Convenience of once-monthly application, benefits similar to combination oral contraceptive pills	Discomfort of ring or with insertion; vaginal discharge
Diaphragm with Spermicide	17	16	Low cost	High failure rate; cervical irritation; there can be increased risk of urinary tract infection and toxic shock syndrome with improper and prolonged use; some require fitting by healthcare professional; may be difficult to obtain; available only by prescription
Condoms Only				
Female	21	5	Protection against STIs; covers external genitalia; OTC	High failure rate; difficult to insert; may be less appealing because of need to stop during sexual activity
Male	13	2	Protection against STIs, OTC, male participation	High failure rate; allergic reactions; may be less appealing because of need to stop during sexual activity; breakage possible
Cervical Cap	16–32	9–26	Effective for 48 hr; can be used for ~2 yr	High failure rate, cervical irritation, risk of toxic shock, limited sizes, requires prescription
Withdrawal	20	4	No drugs or devices	High failure rate
Sponge	14–27	9–20	OTC; low cost; no fitting required; provides 24 hr of protection	High failure rate; contraindicated during menses; increased risk of toxic shock syndrome with improper and prolonged use

Continued

Table 160.1 Efficacy of Contraceptives—cont'd

METHOD	FAILURE RATE (%)* TYPICAL USE	PERFECT USE	SOME ADVANTAGES	SOME ADVERSE EFFECTS AND DISADVANTAGES
Fertility Awareness–Based Methods	15	—	Low cost; no drugs or devices	High failure rate; can be difficult to use properly if periods/ovulation are not well established/regular, requires periods of abstinence
Spermicide			Available OTC	High failure rate; local irritation; must be reapplied with repeat intercourse; unknown effect on HIV transmission, cost
Nonoxynol-9	21	16	—	
Phexxi	14	5	Microbicidal effect, increased viscosity as compared to other spermicides	Requires a prescription, local irritation; must be reapplied with repeat intercourse; cannot be used with vaginal ring, cost/insurance coverage
No Method	85	85	—	—

*Risk of unintended pregnancy during first year of use; data from Trussel J et al: In: Hatcher RA, Nelson AL, Trussell J, et al., eds. *Contraceptive Technology,* 21st ed. New York: Ayer Company Publishers; 2018.
STIs, Sexually transmitted infections; OTC, over the counter; N-9, Nonoxynol 9.
Adapted from Choice of contraceptives. *Med Lett* 2018;60(1557):161.

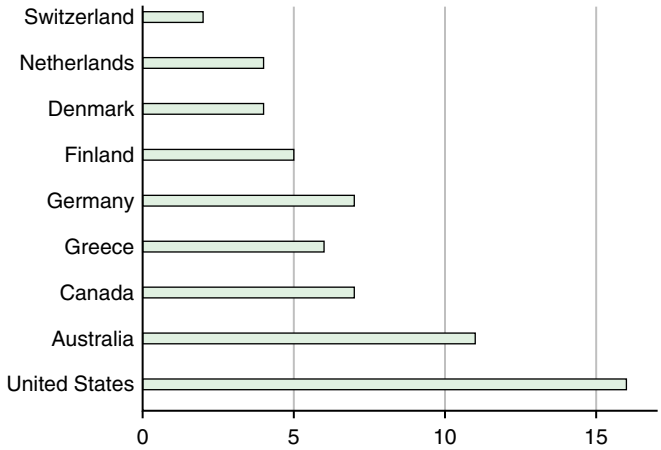

Fig. 160.2 Teen birthrates in high-income countries, 2020. Live births per 1,000 females age 15-19 yr. (*Data from The World Bank Group. United Nations Population Division, World Population Prospects.* https://data.worldbank.org/indicator/SP.ADO.TFRT.)

Although U.S. teens and European teens have similar levels of **sexual activity** and ages of **sexual debut**, U.S. teens are less likely to use contraception and less likely to use the most effective methods. Teen pregnancy rates have been declining worldwide—a result of delayed initiation of sexual activity and increased contraceptive use. Despite this decline, the United States still had the highest teen birthrate in the Western industrialized world as of 2020, with 16.7 live births per 1,000 females age 15-19 years (Fig. 160.2). This is 8 times higher than the teen birthrate in Switzerland, which has the lowest rate in Western Europe. As of 2020 the teenage pregnancy rate in the United States is 31 pregnancies per 1,000 women, with a rate of 13.6/1,000 in those 15-17 years and 56.9/1,000 in those 18-19 years. The majority of these pregnancies are unintended, and one in five births are a repeat birth, indicating an unmet need for reliable, effective contraception that teens will correctly and consistently use.

USE OF CONTRACEPTION AMONG TEENS

According to the 2017–2019 National Survey of Family Growth, 78% of females and 89% of males who had their first sexual intercourse before age 20 years used a contraceptive method at first intercourse. The method most used by teenage females is the condom, followed by withdrawal (both least effective methods) and then the pill (a moderately effective method). IUDs and implants, the most effective reversible methods, are used by 20% of females 15-19 years, with the implant being more commonly used (15%). Use of contraception at first sex has greatly increased over the last 50 years. Factors associated with contraceptive use at first sex include increasing age among teens up to age 17 years, time spent in college, and planning their sexual debut.

More than half of sexually experienced female teens are currently using the most effective reversible contraceptives or moderately effective contraceptive methods. U.S. teens' use of hormonal methods at last intercourse is less frequent compared with teens in other developed countries. A higher likelihood of female current contraceptive use is associated with older age at sexual initiation, aspirations for higher academic achievement, acceptance of one's own sexual activity, and a positive attitude toward contraception. Despite the importance of dual-method use to protect against both unwanted pregnancy and STIs, only 33% of sexually active female U.S. teens report using a barrier method (condoms) plus another method of contraception at last sexual activity.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

160.2 Contraceptive Counseling

Mary E. Romano and Elizabeth M. Alderman

The adolescent preventive health visit offers opportunities for confidential discussions with all adolescents and the opportunity to identify and discuss sexual practices that may be putting the adolescent at risk for STIs or unintended pregnancy. It is also a time to discuss safe sexual behaviors, including abstinence (see Chapter 151). It is important to ask specifically about adolescents' sexual behaviors to make sure your counseling is appropriate for their sexual activity. Adolescents with medical conditions, either chronic or acute, are particularly vulnerable to having sexual and reproductive health omitted from their visits, although they have similar sexual health and contraceptive needs (see Chapter 756). Their comorbidities or concurrent medication use may make STIs and unintended pregnancy an increased health risk and may affect contraceptive counseling/options. The **U.S. Medical Eligibility Criteria for Contraceptive Use** (MEC) outlines medical conditions associated with increased risk for adverse health events with pregnancy and provides recommendations for who can safely use specific contraceptive methods.

The goals of adolescent contraceptive counseling are to (1) understand adolescent experiences, preferences, perceptions, and misperceptions about pregnancy and use of contraceptives; (2) help adolescents understand the risks of unprotected sexual intercourse, including STIs and unintended pregnancy; (3) educate adolescents about the various contraceptive methods available using information that is medically accurate, balanced, and provided in a nonjudgmental manner; and (4) engage in patient-centered counseling so the adolescent feels empowered to choose a safe and effective method that can either be

provided on site or be easily obtained through prescription or by referral. If adolescents are comfortable and willing to include their parents in this discussion, it is also always helpful to engage parents in the decision-making process and address any parental questions and concerns. Providers should be aware of state laws affecting confidentiality and an adolescent's ability to access confidential contraceptive services (see Chapter 151). Most states allow adolescents confidential access to contraceptive services, but given that many adolescents are under their parents' insurance plan, confidentiality may be unintentionally breached through billing and explanation of benefit statements, as well as through the open notes mandate. This should be discussed with adolescents, especially those who are very concerned about disclosing sexual health information to their parents or guardians.

Counseling should include a review of all contraceptive methods available that the adolescent can use safely (see U.S. MEC). **Long-acting reversible contraception** (LARC/IUDs and implants) is a safe and effective option for many adolescents, including those who have not been pregnant or given birth. The adolescent should be counseled about method effectiveness using typical-use failure rates. Although it is important to highlight the methods most effective at preventing pregnancy, it is also imperative to provide contraceptive counseling within the framework of reproductive justice and to avoid any coercion due to provider preference or bias. The focus of contraceptive counseling should be on the priorities of the adolescent, and the adolescent should be allowed to explore all options and determine which method is most appropriate for their contraceptive needs and priorities. It is important to ask about use of **withdrawal** and discuss its risks given that 60% of female teens have used it for contraception and it has a typical-use failure rate of 20%. **Abstinence** should also be discussed as an option even if teens have engaged in sexual intercourse in the past. Abstinence may be the best option if adolescents do not have another method available at a particular time.

Necessary concepts to address while discussing individual methods include how effective the method is, how long the method works, what behaviors are required for correct and consistent use, what side effects may be seen, any noncontraceptive benefits of the method (e.g., reduced menstrual bleeding, protection from STIs), and what signs or symptoms of complications should prompt a return visit. Reviewing common side effects allows teens to anticipate and cope with any changes with reassurance and may avoid method discontinuation. Weighing the possibility of certain side effects with the possibility of an unintended pregnancy may also help with the conversation. It is also important to address any specific misperceptions teens may have for certain contraceptives regarding side effects, effectiveness, or effect on future fertility.

Once an adolescent chooses a method, the provider and adolescent should discuss clear plans on correct and consistent use of the chosen method and strategies for appropriate follow-up (see Table 160.1). Providers should help the adolescent consider potential barriers to correct and consistent use (e.g., forgetting to take a pill daily) and develop strategies to deal with each barrier (e.g., use of reminder systems such as daily text messages or phone alarms). The provider should assess whether the teen understood the information discussed and may confirm by asking the teen to repeat back key concepts.

The U.S. Selected Practice Recommendations for Contraceptive Use provides guidance for providers regarding when to start contraception, how to be certain the woman is not pregnant at contraception initiation, and what examinations and tests are recommended before initiating contraception. Generally, women may start a contraceptive method other than an IUD at any time, and an IUD may be placed when a provider is reasonably certain that a woman is not pregnant. The Centers for Disease Control and Prevention (CDC) defines this as a patient who has no symptoms or signs of pregnancy, is ≤7 days after the start of normal menses, has not had sexual intercourse since the start of last normal menses, and has been correctly and consistently using a reliable method of contraception

Most women do not require any special exam or additional screening for STIs before initiating contraception if they have been recently screened according to the CDC's STI treatment guidelines. A blood pressure reading is advisable. A pelvic examination is only required for placement of an IUD, unless otherwise indicated. STI screening is appropriate at and/or before IUD placement, even if a patient does not report sexual activity, as some patients may choose to not disclose this information to their provider. Gonorrhea and chlamydia screening using a self- or provider-collected vaginal swab or urine sample is recommended unless symptoms require a pelvic exam. IUD placement should not be delayed to receive screening results. Cervical cancer screening is not recommended until age 21.

Providers should offer confidential services to adolescents and observe all relevant state laws and legal obligations (e.g., notification or reporting of sexual abuse). Chapter 151 discusses confidentiality and consent issues related to contraceptive management. Providers should also encourage adolescents to involve parents or guardians in their healthcare decisions, while giving parents clear information on their teen's right to confidentiality, privacy, and informed consent. All services should be provided in a youth-friendly manner, meaning that they are accessible, equitable, acceptable, appropriate, comprehensive, effective, and efficient. Resources are available that describe ways to ensure a **teen-friendly** reproductive health visit.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

160.3 Long-Acting Reversible Contraception

Mary E. Romano and Elizabeth M. Alderman

Long-acting reversible contraception **(LARC)** includes four **levonorgestrel (LNG)** IUDs, the **copper (Cu)** IUD, and the etonogestrel subdermal implant. LARC methods are the only Tier 1 methods that are reversible (see Fig. 160.1). Their efficacy is the result of the fact that LARC does not require frequent office or pharmacy visits and does not depend on user adherence for effectiveness. In the Contraceptive CHOICE Project in St. Louis, Missouri, >9,000 women were given the contraceptive method of their choice at no cost and were followed for 2-3 years. The failure rates among women of all ages, including adolescents who used oral contraceptive pills, transdermal patch, or vaginal ring, were >20 times higher than the failure rates for those using a LARC method. Acceptance, continuation, and satisfaction in this project were also higher among adolescents using LARC compared with adolescents using non-LARC methods. *ACOG and AAP support the use of LARC methods for adolescents.* The U.S. MEC supports safe use of both IUDs and implants for adolescents and nulliparous women. Implants are considered Category 1 for all ages, and IUDs are considered Category 2 for women <20 years old and for nulliparous women (Table 160.2).

INTRAUTERINE DEVICES

IUDs are small, flexible, plastic objects introduced into the uterine cavity through the cervix. They differ in size, shape, presence or absence of hormone, and dose of hormone delivered daily. In the United States, five IUDs are currently approved by the Food and Drug Administration (FDA): the CuT380A (Paragard) and four LNG IUDs (Liletta, Kyleena, Mirena, and Skyla).

The LNG IUDs also have various actions, from thickening of cervical mucus and inhibiting sperm survival to suppressing the endometrium. LNG IUDs are effective and approved for use from 3 to 8 years. The Cu IUD releases copper ions into the uterine cavity, which induces an inflammatory response within the endometrium. Copper also impairs sperm motility/migration, inhibits the acrosomal reaction, and impairs implantation. As with the other IUDs, the Cu IUD is reversible, safe for use in nulliparous women, and effective for at least 10 years. All IUDs have typical-use failure rates of <1% (see Fig. 160.1). All LARC methods are appropriate and safe to use in the postpartum period.

Mirena is FDA approved for the treatment of heavy menstrual bleeding, and studies in adults have demonstrated an 80% reduction in menstrual blood loss in Mirena users, with 50% of users reporting amenorrhea after 2 years of use. Among the other LNG IUDs,

Table 160.2 Categories of Medical Eligibility Criteria for Contraceptive Use

Category 1: A condition for which there is no restriction for the use of the contraceptive method
Category 2: A condition for which the advantages of using the method generally outweigh the theoretical or proven risks
Category 3: A condition for which the theoretical or proven risks usually outweigh the advantages of using the method
Category 4: A condition that represents an unacceptable health risk if the contraceptive method is used

Table 160.3 Conditions Classified as Category 3 and 4 for Combined Hormonal Contraceptive Use

Category 4 (a condition that represents an unacceptable health risk if the contraceptive method is used)
Complicated valvular heart disease
Current breast cancer
Severe decompensated cirrhosis
Deep venous thrombosis/pulmonary embolism (acute; history, not on anticoagulation or on established therapy for at least 3 mo with higher risk recurrence; major surgery with prolonged immobilization)
Complicated diabetes with nephropathy, retinopathy, neuropathy, or other vascular disease or duration of diabetes >20 yr
Migraine with aura
Poorly controlled hypertension (blood pressure >160/100 mm Hg) or hypertension with vascular disease
Ischemic heart disease (history of or current)
Hepatocellular adenoma
Malignant liver tumor
Peripartum cardiomyopathy (diagnosed <6 mo before or with moderately or severely impaired cardiac function)
Postpartum <21 days
History of cerebrovascular accident
Systemic lupus erythematosus with positive antiphospholipid antibodies
Thrombogenic pathogenic variants
Viral hepatitis (acute or flare)
Category 3 (a condition for which the theoretical or proven risks usually outweigh the advantages of using the method)
Past breast cancer with no evidence of disease for 5 yr
Breastfeeding and <1 mo postpartum
Deep venous thrombosis/pulmonary embolism (history of DVT/PE with lower risk recurrence)
Gallbladder disease (current, medically treated)
History of malabsorptive bariatric surgery
History of cholestasis and past combined oral contraceptive–related
Hypertension (adequately controlled or blood pressure <160/100 mm Hg)
Peripartum cardiomyopathy with mild impairment or >6 mo
Postpartum 21-42 days with other risk factors for venous thromboembolism
Drug interactions (ritonavir-boosted protease inhibitors; certain anticonvulsants; rifampin or rifabutin)
First-degree family member with a history of a blood clot/clotting disorder/thromboembolic event

From Curtis KM, Tepper NK, Jatlaoui TC, et al. U.S. medical eligibility criteria for contraceptive use, 2016, *MMWR Recomm Rep* 2016;65(RR-3):1–104.

amenorrhea at 2 years is reported at 26% for Liletta users, and Kyleena and Skyla report prolonged and irregular bleeding at 1 year in 5–20% of users. Heavier bleeding patterns and increased dysmenorrhea are reported in users of the Cu-IUD. Patients should be counseled on bleeding patterns and expected changes to their menstrual bleeding after IUD insertion (Table 160.3).

Common misconceptions of IUDs among healthcare providers are that IUDs can cause or increase the risks of infections, cause infertility, and generally are not safe or tolerated by teens or nulliparous women; these misconceptions can be a barrier for teens desiring an IUD to access these highly effective and safe methods. IUDs do not increase risk of infertility and may be inserted safely in teenagers regardless of parity (Category 2; see Table 160.2).

Although early studies suggested an increased risk for upper genital tract infection, because of the passing of a foreign body through the cervix, new studies have refuted these concerns. Therefore clinicians are encouraged to consider the use of IUDs in adolescents despite relatively high prevalence rates of STIs in this population. Teens should be screened for gonorrhea and chlamydia at and/or before IUD placement, although placement should not be delayed if results have not returned and there are no signs of current infection (e.g., purulent discharge, erythematous cervix). If STI testing is positive with an IUD in place, the patient may be treated without removing the IUD if she wants to continue the method.

There has been evidence that rates of IUD expulsion are higher in adolescents as compared to older women. The data are limited, but the risk seems to be higher with Cu-IUD vs hormonal IUD, previous IUD expulsion, and concomitant use of the menstrual cup. A paracervical block with lidocaine may reduce patient discomfort during placement and, along with other medications (e.g., NSAIDs, anxiolytics), may be considered on an individual patient basis, but these are not routinely recommended.

IMPLANTS

One contraceptive implant is available in the United States. The single rod that releases 60 µg/day of **etonogestrel** has been updated to a radiopaque rod with a new inserter. This **progestin-only method** keeps etonogestrel at steady serum levels for at least 3 years and primarily works to inhibit ovulation. Similar to the levonorgestrel IUD, the progestin acts on the uterus to cause an atrophic endometrium and thicken cervical mucus to block sperm penetration; its typical-use failure rate is also <1% (see Fig. 160.1). Unlike the IUD, no pelvic exam is required for insertion. A trained provider can quickly place or remove the implant in the upper arm under local anesthesia. The most common side effect of the contraceptive implant is irregular and unscheduled/unpredictable bleeding. This can include irregular or infrequent bleeding, amenorrhea, and less often, prolonged or frequent bleeding. Although the continuation rates are favorable and comparable to the IUD, the most common reason for discontinuation is dissatisfaction with bleeding patterns. It is important that adolescents be appropriately counseled on the potential for changes to their bleeding pattern before insertion of the implant. Adolescents who present with troublesome bleeding should be evaluated for any underlying gynecologic abnormalities, bleeding or blotting disorders, and the presence of an STI. If these are not present and adolescents desire treatment, they can be treated with a short course of NSAIDs (5-7 days) or low-dose combined oral contraceptives (COCs) if no contraindications to estrogen exist (10-20 days). Any and all adolescents desiring implant removal because of side effects should be offered prompt removal as indicated.

One potential unique complication of this method relates to localized infection and other side effects after implantation, such as bleeding, hematoma, or scarring, and if inserted too deeply into the muscle, neural damage or migration; however, these events are rare, occurring in <1% of patients. Minor side effects, such as bruising or skin irritation, are more common but most often resolve without treatment.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

160.4 Other Progestin-Only Methods

Mary E. Romano and Elizabeth M. Alderman

Several progestin-only contraceptive methods are available and include the LNG IUDs and implant (see Chapter 160.3), as well as an injectable and progestin-only pills. These methods do not contain estrogen and may be useful for teens with contraindications to estrogen use or in

Table 160.4 Hormonal Intrauterine Devices

	MIRENA	KYLEENA	LILETTA	SKYLA
Duration of use	FDA approved 8 yr	FDA approved 5 yr	FDA approved 8 yr	FDA approved 3 yr
Daily hormone delivery over time	20 mcg LNG/day → 9 mcg/day (52 mcg total)	17.5 mcg LNG/day → 7.4 mcg/day (19.5 mcg total)	19.5 mcg LNG/day → 9.8 mcg/day (52 mcg total)	14 mcg LNG/day → 5 mcg/day (13.5 mcg total)
Device size	32 mm × 32 mm	28 mm × 30 mm	32 mm × 32 mm	28 mm × 30 mm
Diameter of insertion rod	4.4 mm	3.8 mm diameter	4.4 mm diameter	3.8 mm diameter

FDA, Food and Drug Administration; LNG, levonorgestrel.

patients who prefer a method without estrogen such as gender-diverse adolescents and young adults (Table 160.4). They are considered safe for use in teens (Category 1 or 2; see Table 160.2). Progestins thicken cervical mucus to block sperm entry into the uterine cavity and induce an atrophic endometrium leading to either amenorrhea or less menstrual blood loss; the implant and injectable also suppress ovulation, whereas the progestin-only pills and LNG IUDs may affect the frequency of ovulation but do not suppress it completely. Teens should be provided anticipatory counseling regarding bleeding irregularities that may normally occur in the first 3-6 months of any hormonal contraception use.

DEPO-PROVERA

An *injectable progestin,* depot **medroxyprogesterone acetate** (**DMPA**, Depo-Provera) is a Tier 2 contraceptive method available as a deep intramuscular (IM) injection (150 mg) or as a subcutaneous (SC) injection (104 mg) with typical-use failure rates of 4% (see Table 160.1). Both preparations must be readministered every 3 months (13 weeks). When appropriate, DMPA can be given up to 3 weeks before or 7 days after the 13 weeks scheduled interval without any effect on contraceptive efficacy. DMPA works by inhibiting ovulation and thickening cervical mucus. DMPA may be preferred by patients or parents who are caring for a child with intellectual disabilities. Common concerns with DMPA include bleeding changes, bone effects, and weight gain. After 1 year of use, 50% of DMPA users develop amenorrhea, which may be an added advantage for teens with heavy menstrual bleeding, dysmenorrhea, anemias, or blood dyscrasias. It may also be advantageous for those desiring menstrual suppression because of physical or developmental disabilities that make hygiene difficult or those in whom menstruation causes gender dysphoria. Studies have demonstrated bone mineral density (BMD) loss in adolescents with DMPA use, but this has not been shown to directly increase fracture risk. It is unclear how this decrease in BMD affects the risk for osteoporosis later in life. Other studies have found that BMD is recovered after discontinuation of this method, and it is thus considered safe for use in this population with appropriate counseling and consideration of other risk factors for bone health. Healthcare providers should speak at length with teens and parents, when appropriate, who are already at high risk for low BMD, such as those receiving chronic corticosteroid therapy or those with eating disorders (see Chapter 749). They should discuss and decide together if DMPA is an appropriate contraceptive choice. Patients and providers need to balance the potential bone effects of DMPA with the bone effects that can occur with a teenage pregnancy. Although the FDA issued a black box warning in 2004 because of Depo's BMD effects, the AAP and ACOG do not recommend limiting duration of DMPA use and do not recommend routine BMD screening for females using it. Early weight gain may be predictive of progressive gain over time; thus those teens gaining weight in the first 3-6 months after the initiation of DMPA should be monitored and continue to engage in discussions about healthy eating and exercise habits.

PROGESTIN-ONLY PILLS

Progestin-only oral contraceptive pills **(POPs)** are available and safe for use in adolescents. POPs **(mini pills)** are quickly effective after 2 days of initiation in thickening cervical mucus, but do not reliably inhibit ovulation. Prior to 2019, the only progestin pill available in the United States contained 0.35 mg of norethindrone. Norethindrone has a short half-life, and it is important that this pill is taken at the same time every day, which can make adherence difficult. If a pill is >3 hours late from normal time, an unintended pregnancy may occur. POPs have a typical-use failure rate of 7% (see Table 160.1). Norethindrone POPs are taken continuously, and as a result, the bleeding pattern is variable—ranging from amenorrhea to irregular and unpredictable breakthrough bleeding. Acceptance by adolescents is limited by the necessity of taking the pill at the same time daily, and bleeding irregularities

In 2019 the FDA approved a new POP—Slynd—which contains 4 mg of drospirenone. This is higher than the dose found in COCs. Drospirenone is an analog of spironolactone with a longer half-life of ~25-30 hours, which allows for more flexibility with timing of pills. It also has some antimineralocorticoid activity and therefore should be used with caution in those who may take other medications or have medical comorbidities that can put them at risk for hyperkalemia. Slynd comes in a 28-day pill pack with four inactive pills intended to cause a scheduled withdrawal bleed. Slynd primarily suppresses ovulation. Studies have demonstrated its safety and efficacy along with high rates of satisfaction among users (85%). There may still be unscheduled bleeding, but it seems to be more favorable than what is experienced with norethindrone use.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

160.5 Combined Hormonal Contraceptives

Mary E. Romano and Elizabeth M. Alderman

Combined hormonal contraceptives **(CHCs)** are methods that include an estrogen in combination with a progestin that has progestational, estrogenic, and androgenic properties. Methods available in the United States include several formulations of **COCs**, a transdermal patch, and a vaginal ring. The major mechanism of action of the **estrogen-progestin** combination is to prevent the surge of luteinizing hormone and thereby inhibit ovulation. Additional effects to the reproductive tract include thickening of the cervical mucus, which prevents sperm penetration, and thinning of the endometrial lining, which may decrease menstrual blood loss. Typical-use failure rates for all CHCs are the same at 7%.

The COCs, patch, and vaginal ring are classified together as CHCs in the U.S. MEC for Contraceptive Use, and recommendations mostly consider estrogen exposure for a given condition or characteristic (see Tables 160.3 and 160.4). Thromboembolic events such as venous thromboembolism (VTE), pulmonary embolism, or stroke are some of the more serious potential complications of exogenous estrogen use. These serious adverse events are exceedingly rare in adolescents who do not have other risk factors for thromboembolic events. Although the risk of blood clots is increased in those who smoke cigarettes, the likelihood of its occurrence is very small in adolescents, and thus clinically insignificant, compared to the risk of morbidity and mortality from other pregnancy-related complications, including blood clots

associated with the high estrogen levels that occur during pregnancy and in the postpartum period.

COMBINED ORAL CONTRACEPTIVES

Oral contraceptive pills (OCs) can be either COCs or POPs and are commonly referred to as "the pill." The pill is one of the most common contraceptive methods used among women of all ages. To decrease risk of pregnancy and increase continuation, providers are encouraged to provide OCs at the time of patient presentation to start immediately rather than waiting for next menses, as long as the provider is reasonably sure that the patient is not pregnant. Providers are also encouraged to provide up to 13 pill packs at a time, based on evidence that more pill packs provided is associated with higher continuation rates. However, it is important to see an adolescent in follow-up once starting contraception to discuss adherence and satisfaction with the method selected. Advanced provision of emergency contraceptive pills is also recommended should patients miss pills and have unprotected sex. The effectiveness of COCs depends on adherence, and it can be difficult for any patient to remember to take a pill each day. Figures 160.3 and 160.4 list the rules for missed pills or after vomiting or diarrhea.

COCs contain between 50 μg and 10 μg of an estrogenic substance, typically **ethinyl estradiol**, and as many as 10 progestins are available in the United States for combined pills. Multiple preparations are available to help select the formulation that satisfies an individual patient, with minimal side effects. Studies looking at the effects of estrogen dosing on bone health have found lower rates of bone accrual in those taking COCs containing 20 mcg as compared with nonusers. It is recommended that adolescents start on a COC containing 30-35 μg of an estrogenic substance.

COCs can be packaged as 28-day *monophasic* pills, which contain the same dose of active pills for 21 or 24 days, followed by 7 or 4 days of placebo pills, respectively. Monophasic formulations are also available for extended cycles of 91 days or 1 year so that withdrawal bleeding does not occur each month, but at the end of each extended cycle. **Extended cycling** of monophasic COCs for adolescents has some anticipated benefits associated with increased ovarian activity suppression and may decrease failure rates. Other advantages include menstrual suppression in those patients in whom that is a priority and diminished frequency of hormonal withdrawal (premenstrual) effects, including headaches and migraines, mood changes, and heavy monthly bleeding. The most common side effect of extended-cycle OCs is intermenstrual bleeding and/or spotting, with the total days of bleeding over the first year of treatment being similar for extended-cycle users and users following a 28-day-cycle regimen. The unscheduled bleeding pattern diminishes over time. *Multiphasic* pill packs contain various levels of estrogen and progestin for 21 active pills and contain 7 placebo pills. Multiphasic formulations are not available for extended-cycle use. Providers can refer to the U.S. Selected Practice Recommendations for Contraceptive Use to counsel patients on how to manage late or missed COCs.

The short-term adverse effects of COCs, such as nausea and weight gain, often interfere with compliance in adolescent patients. These effects are usually transient and may be overlooked by the beneficial effects of a shortened menses and the relief of dysmenorrhea. The inhibition of ovulation or the suppressant effect of estrogens on prostaglandin production by the endometrium makes COCs effective in preventing dysmenorrhea (see Chapter 159). Acne is typically improved by COCs, as estrogen can reduce the effects of circulating androgens. There is no evidence that one particular COC is superior to

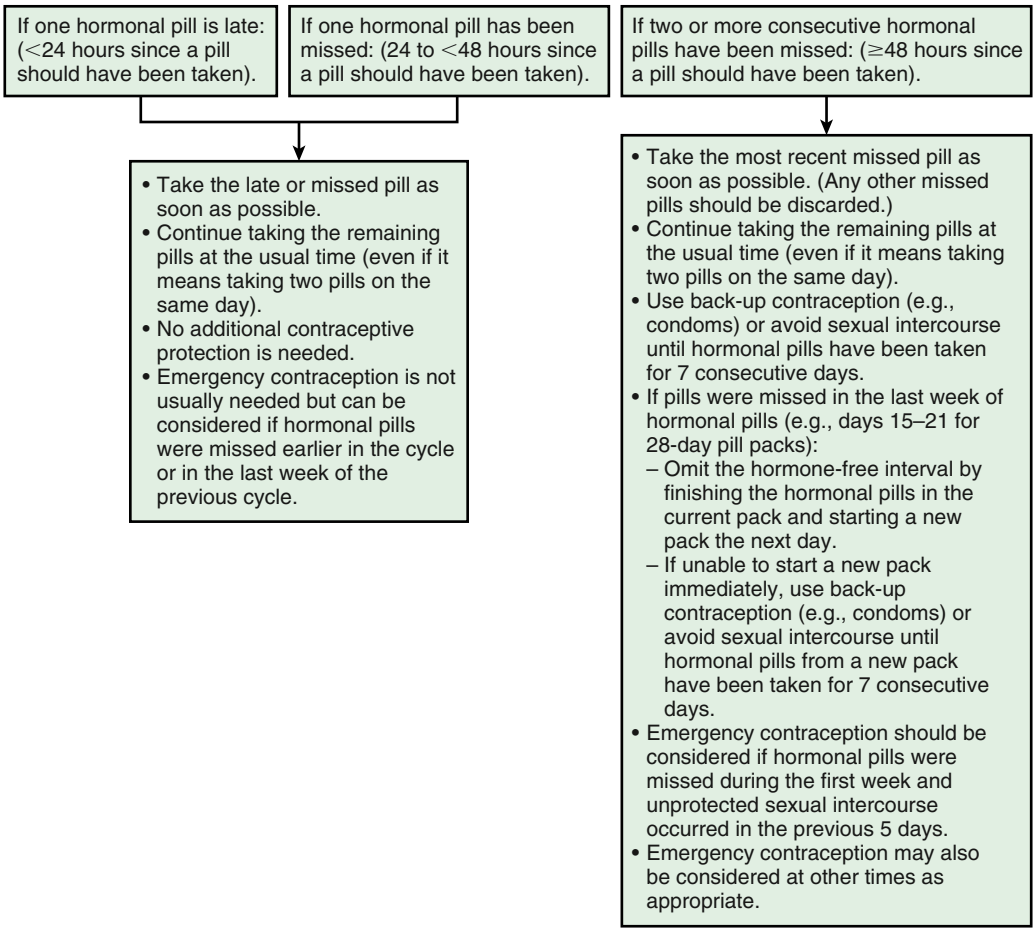

Fig. 160.3 Algorithm showing recommended actions after late or missed combined oral contraceptives. (*From Curtis KM, Jatlaoui TC, Tepper NK, et al. U.S. selected practice recommendations for contraceptive use, 2016. MMWR Recomm Rep 2016;65[RR-4]:1–66, Fig. 2, p. 28.*)

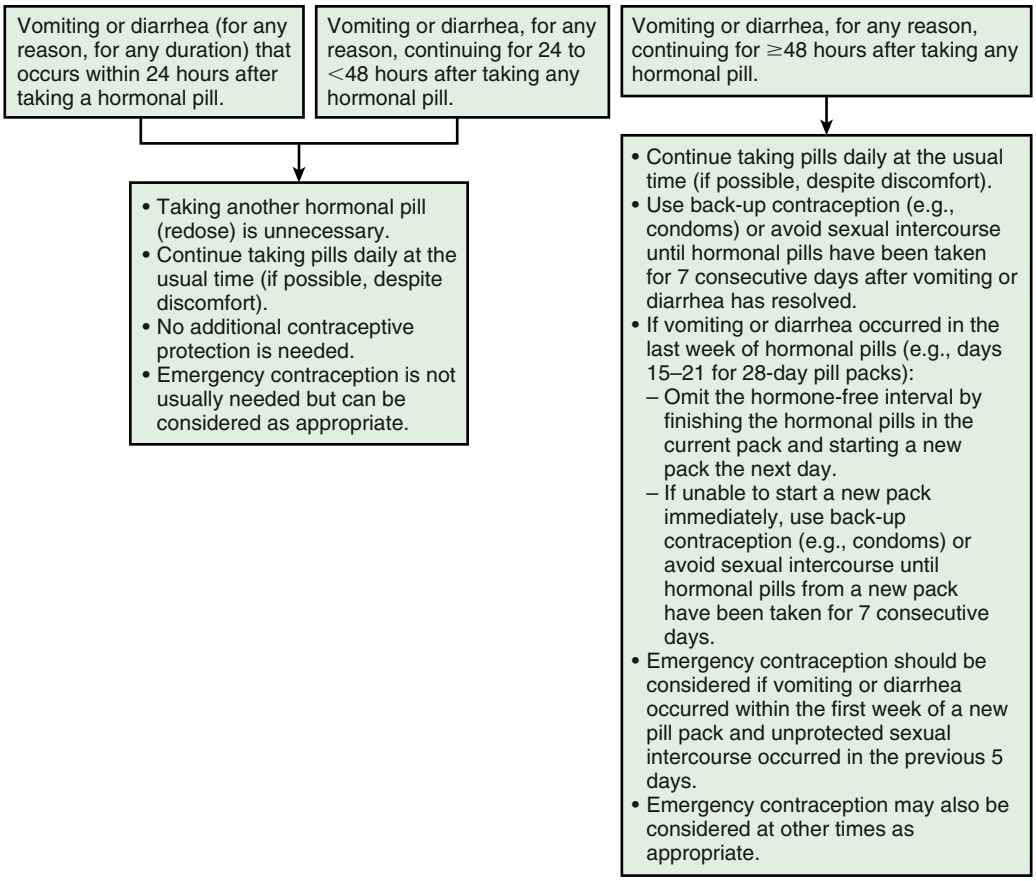

Fig. 160.4 Algorithm showing recommended steps after vomiting or diarrhea while using combined oral contraceptives. (*From Curtis KM, Jatlaoui TC, Tepper NK, et al. U.S. selected practice recommendations for contraceptive use, 2016. MMWR Recomm Rep 2016;65[RR-4]:1–66, Fig. 5, p. 30.*)

another in targeting acne, but theoretically it would be better to use a pill with nonandrogenic progestins (see Chapter 710). **Drospirenone**, a progestin with antimineralocorticoid activity, has been shown to reduce premenstrual symptomatology, but the potential for hyperkalemia as a side effect eliminates patients with renal, liver, or adrenal diseases and patients taking certain medications.

The FDA has concluded that drospirenone-containing OCs may be associated with a higher risk of VTE than other progestin-containing pills. Although no studies have provided consistent estimates of the comparative risk of VTE between OCs that contain drospirenone and those that do not, or accounted for patient characteristics that may affect VTE risk, there has been a threefold increased risk of VTE reported for drospirenone-containing pills as compared with products containing levonorgestrel or other progestins. As a result, the FDA requires that labeling be revised for the OCs marketed under the Beyaz, Safyral, Yasmin, and Yaz brands. This clot risk has not been established for Slynd, which contains 4 mg of drospirenone and no estrogenic component. Despite the risk of VTE with all OCs, the absolute risk remains lower than the risk of developing VTE during pregnancy or the postpartum period.

TRANSDERMAL PATCH

The transdermal patch releases a combination of ethinyl estradiol and a progestin daily. It is applied to the lower abdomen, buttocks, or upper body, excluding the breasts. It is worn continuously for 1 week and changed weekly for a total of 3 weeks, then no patch is worn for the fourth week, at which time bleeding occurs (see Table 160.1). Limited studies in adolescents suggest higher rates of partial or full detachment compared with adults, with high patient satisfaction and 50–83% continuation rates from 3 to 18 months of use (Fig. 160.5). As with other combined hormonal methods, the patch is a Tier 2 contraceptive. Providers can refer to the U.S. Selected Practice Recommendations to counsel patients on how to manage delayed application or detachment of the patch.

The first patch available was Ortho Evra, now available only in a generic version called Xulane. It releases 35 μg ethinyl estradiol and 150 μg norelgestromin daily. Compared with the pharmacokinetics of COCs, the area under the curve for the patch is about 55% higher for patch users. This caused concerns about increased risk of clots with higher estrogen exposure, although there have been no data to confirm this risk. Studies to date have had conflicting data on the risk of VTE in patients using nonoral combined hormonal contraception. There is also concern for efficacy of the patch in those whose weight was >90 kg, and this should be discussed with patients in consideration of use. The Xulane patch can be used to extend cycles similar to COC extended-cycle pills. Patients may choose to wear patches consecutively without any "patch-free week" but should be aware that this can carry a risk of breakthrough bleeding, as occurs with extended-cycle COC use.

In 2020 Twirla was developed to address the need for a lower-dose product to reduce the cumulative estrogen exposure from patch use. Twirla releases 30 μg ethinyl estradiol (EE) and 120 μg levonorgestrel (LNG) daily, and the maximum steady-state concentrations were 60% (EE) and 18% (LNG) as compared with Xulane. Initial studies did not demonstrate a significantly decreased clot risk as compared to other methods of combined hormonal contraception, but as with Xulane, efficacy seemed to be affected by body mass index (BMI), in particular in those who were categorized by BMI as obese. Twirla was not studied for extended use.

VAGINAL RING

The vaginal contraceptive ring is a flexible, transparent, colorless vaginal ring that is inserted into the vagina by the patient. It releases a daily dose of ethinyl estradiol and a progestin. It remains in place for 3 weeks, during which time these hormones are absorbed. It is then typically

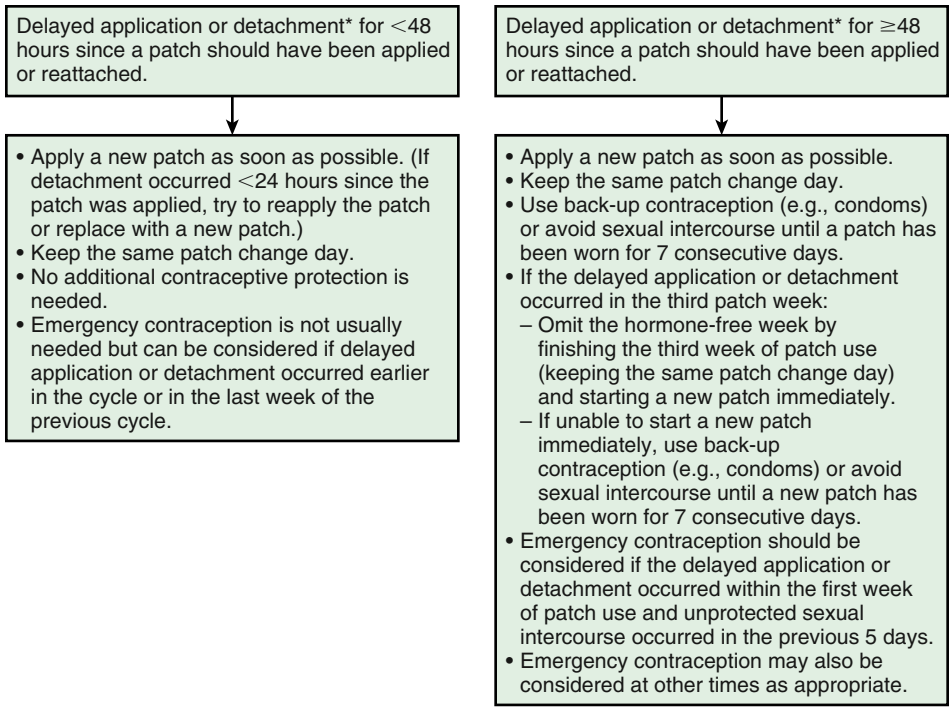

Fig. 160.5 Algorithm showing recommended actions after delayed application or detachment with combined hormonal patch. (*From Curtis KM, Jatlaoui TC, Tepper NK, et al. U.S. Selected practice recommendations for contraceptive use, 2016. MMWR Recomm Rep 2016;65[RR-4]:1–66, Fig. 3, p. 28.*)

removed for 7 days during which time a withdrawal bleed should occur. If the ring is accidentally expelled or removed for intercourse, it should be reinserted; however, if it is out of place ≥48 hours or the ring is not replaced within 7 days after removal, a backup method of contraception should be used (Fig. 160.6). The vaginal ring is a Tier 2 contraceptive. Providers can refer to the U.S. Selected Practice Recommendations to counsel patients on how to manage delayed insertion or reinsertion with the vaginal ring.

The first contraceptive ring available was NuvaRing, which measures about 2.1 inches in diameter and releases 1 μg ethinyl estradiol and 120 μg etonogestrel daily. Users use one ring per 4-week cycle with 3 weeks in and 1 week out and a scheduled withdrawal bleed. It should be noted that although it is labeled for 28 days of use, it contains enough hormones to be used for up to 35 days and can be replaced once every calendar month. The ring can be used to extend cycles similar to COC extended-cycle pills. Patients may choose to use the Nuva Ring consecutively without any "ring-free week" but should be aware that this can carry a risk of breakthrough bleeding, as occurs with extended-cycle COC use. Annovera is FDA approved and offers a single ring, which can be reused for 13 consecutive cycles and does not require refrigeration when not in use. Annovera has a diameter of about 2.2 inches and releases 13 μg of EE and 150 μg of segesterone acetate daily. It has not been studied for extended use, and initial studies did not include those with a BMI >29 kg/m^2.

CONTRAINDICATIONS

Contraceptive counseling should include a discussion and assessment for any absolute or relative contraindications to estrogen use. Contraindications to the use of estrogen-containing methods include those conditions for which CHCs pose an unacceptable health risk (Category 4) in the U.S. MEC for Contraceptive Use (see Table 160.3); current breast cancer; severe cirrhosis, acute deep venous thrombosis/pulmonary embolism (DVT/PE) or history of DVT/PE with higher risk for recurrence, major surgery with prolonged immobilization, diabetes with nephropathy, retinopathy, or neuropathy, migraines with focal neurologic aura, stage II hypertension, vascular disease, ischemic heart disease, hepatocellular adenoma or malignant liver tumors, multiple risk factors for cardiovascular disease, peripartum cardiomyopathy, postpartum <21 day, complicated solid-organ transplantation, history of cerebrovascular accident, systemic lupus erythematosus with positive antiphospholipid antibodies, thrombogenic pathogenic variants, and complicated valvular heart disease. The initial history taken before prescribing CHCs should specifically address these risks. The U.S. MEC provides contraceptive safety guidance with >1,800 recommendations for >120 medical conditions or characteristics. According to the MEC, obesity is not a contraindication to estrogen or contraceptive use, and these adolescents would be considered at high risk for pregnancy complications. Therefore adolescents with obesity should be counseled on and offered contraception when indicated and if desired by the patient.

Other things to discuss and consider when evaluating an adolescent for COC use are a family history of blood clots or clotting disorders and any medications that might interact with COCs. If a patient has a first-degree relative with history of VTE, evaluation for a familial thrombophilia is advisable. There are few medication interactions for progestin-only methods, but there are medications that may be affected by or affect levels of COCs. This includes certain anticonvulsants and psychotropic medications as well as herbal supplements, which may affect COC levels. The CDC has a resource for antiretrovirals and their potential for interactions with hormonal contraception. Lexicomp and UpToDate provide additional information on interactions with COCs.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

160.6 Emergency Contraception

Mary E. Romano and Elizabeth M. Alderman

Unprotected intercourse at mid-cycle carries a pregnancy risk of 20–30%. At other times during the cycle, the risk is 2–4%. Emergency

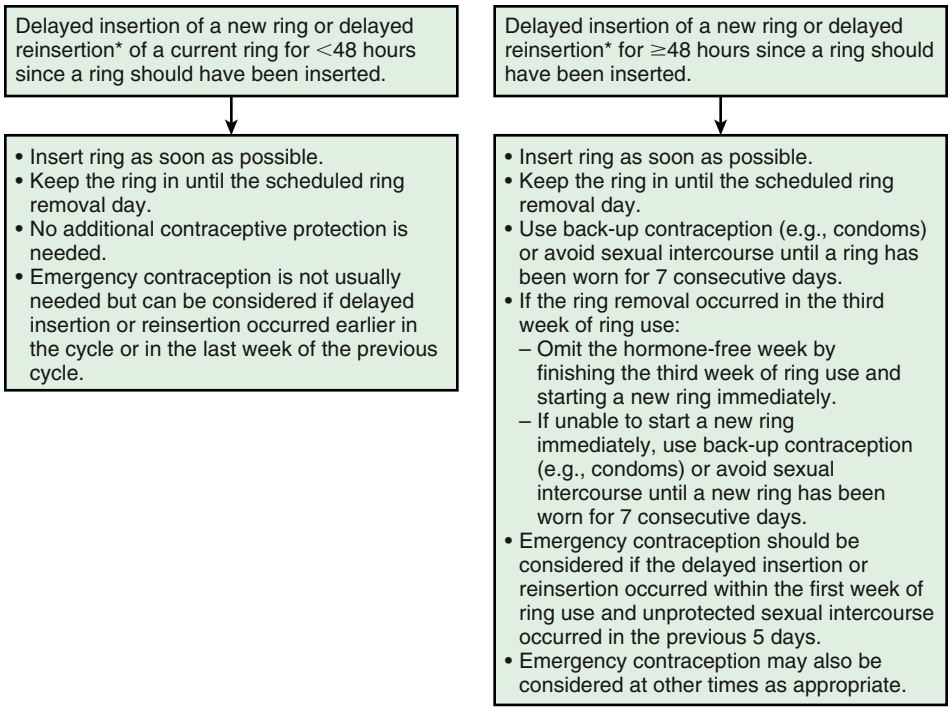

Fig. 160.6 Algorithm showing recommended actions after delayed insertion or reinsertion with combined vaginal ring. (*From Curtis KM, Jatlaoui TC, Tepper NK, et al. U.S. selected practice recommendations for contraceptive use, 2016. MMWR Recomm Rep 2016;65[RR-4]:1–66, Fig. 4, p. 29.*)

Table 160.5 Possible Indications for Emergency Contraception

SEXUAL ASSAULT
HIGH-RISK SEXUAL ACTIVITY
No contraception during intercourse
Intoxication (alcohol, drugs)
Coitus interruptus
CONTRACEPTION FAILURES
Condom breaking, spillage, leaks, intentional removal
Dislodgement and/or breaking of diaphragm, female condom, cervical cap
Expulsion of IUD
Spermicide failure to melt before coitus
DELAYED OR MISSED CONTRACEPTION
2 consecutive missed days of combined oral contraceptive
1 missed day of progestin-only oral contraceptives
>2-wk late injection of depot medroxyprogesterone
≥2 days late start of vaginal ring or patch cycle
Incorrect timing of spermicide/gel before sexual activity
OTHER
Exposure to teratogens in the absence of contraception

IUD, Intrauterine device.

contraception (EC) refers to methods of contraception that are used after sexual intercourse to reduce the risk of pregnancy but do not interrupt an existing pregnancy. EC may be used up to 120 hours after unprotected intercourse or contraceptive failure. Table 160.5 lists the indications for use of EC. EC methods include the Cu IUD, LNG 52-mg IUD, and emergency contraceptive pills, which include ulipristal acetate, LNG, and COCs following the Yuzpe method. Although the mechanism of action of the IUD as EC is unclear, all emergency contraceptive pills work to delay ovulation and are effective only for intercourse that occurs before administration. Initiation of a regular contraceptive method is necessary to prevent pregnancy for any intercourse that occurs for the remainder of the cycle and for future cycles. If pregnancy has already occurred, emergency contraceptive pills will not terminate an existing pregnancy or have teratogenic effects on the fetus.

Teens can access EC information through a hotline at 888-NOT-2-LATE to obtain EC pills over the counter (OTC). The Guttmacher Institute maintains an up-to-date listing on EC. The ACOG and AAP recommend advance provision of EC pills for at-risk adolescents to remove barriers to access and increase awareness of the utility of EC. No examination or testing is required before use of EC, but a follow-up appointment is recommended to determine the effectiveness of treatment and to diagnose a possible early pregnancy. The visit also provides an opportunity to counsel the adolescent, explore the situation leading up to the unprotected intercourse or contraceptive failure, test for STIs, offer HIV testing, and engage in a discussion about contraception when appropriate. It is also important to engage adolescent males in discussions about the availability and use of EC if they have engaged in unprotected intercourse, especially when and how to access Plan B, which is available OTC.

COPPER IUD

The CuT380A (Paragard) is not FDA approved for EC, but it has been shown to be >99% effective if used within 5 days (120 hours) after unprotected sex. The additional benefit of using the Cu IUD for EC is that it also provides long-term reversible contraception. Efficacy of the Cu-IUD is not affected by BMI.

LNG 52-mg IUD

The Mirena IUD is not FDA approved for EC, but studies have shown it is as effective/noninferior to the Cu-IUD for EC if used within 5 days (120 hours) after unprotected sex. Similar to the Cu-IUD, it also provides long-term reversible contraception and efficacy is not affected by BMI.

ULIPRISTAL ACETATE

Ulipristal acetate (UPA) is available for EC and is FDA approved for use up to 120 hours after unprotected sex. UPA is available only by prescription regardless of age. A few studies have shown it to be more effective than LNG at and beyond 72 hours. If starting OC pills after taking UPA, it is recommended to start or resume pills no sooner than 5 days after taking UPA to avoid decreased efficacy of contraceptive pills as a result of its antiestrogenic effect. Studies have shown an increased risk of ovulation if COC pills are started immediately after UPA use. Studies have not looked at UPA efficacy when Depo or a progestin-containing LARC is initiated immediately after UPA use. If starting a method requires an extra visit (e.g., IUDs, implant, Depo-Provera), starting the method at the time of ulipristal use may be considered, weighing the risk of decreasing the effectiveness of ulipristal with the risk of not starting a contraceptive method. Patients should be encouraged to take a pregnancy test within 3 weeks after UPA use either in the office or on their own. Studies have suggested UPA is less effective in overweight and obese women (BMI >25). This should be discussed with patients, and all attempts should be made to provide UPA as soon as possible after unprotected sexual activity.

LEVONORGESTREL

In 2013 the FDA approved the emergency contraceptive drug **Plan B** One-Step as an OTC option for all persons of childbearing potential. Experience with adolescents has demonstrated more effective use of EC with advance provision, and this is not associated with more frequent unprotected intercourse or less condom and/or pill use. Nausea and vomiting are uncommon side effects, and LNG has been shown to be more effective at preventing pregnancy than the Yuzpe method. However, LNG has been shown to be less effective than UPA when taken ≥72 hours and in women who are obese and overweight (BMI >25). This should be discussed with women in deciding with EC method is most appropriate for use. Patients should be encouraged to take a pregnancy test within 3 weeks after EC use either in the office or on their own.

Yuzpe Method

The **Yuzpe method** has been replaced by the more effective methods of EC, but may be useful for women who do not have access to other methods and/or already have COCs at home and desire EC. It is most effective when taken up to 72 hours after unprotected intercourse. For EC, COC pills with 200 µg ethinyl estradiol and 2 mg norgestrel or 1 mg levonorgestrel should be taken in two doses, 12 hours apart. This method is effective in reducing the risk of pregnancy by 75%. The most common side effects are nausea (50%) and vomiting (20%), prompting some clinicians to prescribe or recommend antiemetics along with the COCs.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

160.7 Condoms

Mary E. Romano and Elizabeth M. Alderman

The use of condoms is the only contraceptive method that protects against pregnancy and STIs, including HIV. Condoms, also referred to as *barrier contraception,* prevent sperm from being deposited in the vagina. The use of condoms in conjunction with hormonal contraception (or Cu IUD) is always recommended to reduce the risk of pregnancy and protect against STIs. This is sometimes referred to as *dual protection.* Although correct and consistent condom use with every act of sexual intercourse theoretically protects against pregnancy and STIs, providers should encourage adolescents to use condoms for STI/HIV protection along with a more effective method for pregnancy protection.

No major medical side effects are associated with condom use, and condoms are available for use by males and females. Nonlatex condoms are available for those with a latex allergy, and these include lambskin and synthetic polyurethane condoms. Lambskin condoms do not protect against HIV and other viral infections, although they do work to prevent pregnancy. Although condom use at last sexual intercourse had steadily increased from the early 1990s to the mid-2000s, the percentage of students reporting condom use at last intercourse has remained stable, with 54% of adolescents reporting condom use at last intercourse. Earlier increases in condom use were thought to be the result of increased awareness of HIV risks. Only 9% of high school students reported using dual methods of contraception (condom plus something else) at last intercourse. The main advantages of condoms are their low price, availability without prescription, male involvement in the responsibility for contraception, and effectiveness in preventing transmission of STIs, including HIV and human papillomavirus (HPV). The typical-use failure rate for male condoms is 18% for all users and is thought to be higher in adolescents. For the most effective dual protection, male latex condoms are recommended as protection against STIs and should be used in conjunction with another method of contraception. According to the National Survey of Family Growth, only 21.3% of females used another contraceptive method along with a condom at last sex during the past 12 months.

There is only one female condom available in the United States. It is available OTC or can be ordered online. It is nonlatex. It can be harder to use properly and has a higher typical-use failure rate (21%) than the male condoms. There are no human studies demonstrating its effectiveness against STIs. Adolescents intending to use this method should be provided education on proper use and hands-on practice to ensure effective use.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

160.8 Other Barrier Methods

Mary E. Romano and Elizabeth M. Alderman

Although these methods are not widely available or used, they are important to know about for patients who wish to use nonhormonal contraception at the time of intercourse.

DIAPHRAGM, CERVICAL CAP, AND SPONGE

These methods have few side effects but are much less likely to be used by teenagers. Typical-use failure rates exceed 14%. The sponge has limited OTC availability in the United States, and the cervical cap and diaphragm require a visit with a healthcare provider for fitting. The **cervical cap** and **sponge** have lower failure rates in nulliparous women, whereas the **diaphragm** has similar rates among nulliparous and parous women. The sponge is used with water, whereas the cervical cap and diaphragm are used with spermicide before being placed over the cervix. Adolescents may feel less comfortable and be less likely to use these methods because of the messiness of the jelly or the need for insertion and removal interrupting the spontaneity of sex (to be inserted before sex and left in for several hours afterward). Spermicide must be reapplied before every act of intercourse. Adolescents may also be less comfortable touching their genitals.

160.9 Other Contraceptive Methods

Mary E. Romano and Elizabeth M. Alderman

The only OTC spermicide available in the United States is Nonoxynol-9 (N-9). It is available as a foam, film, gel, cream, suppository, and tablet. It must be placed in the vagina no more than 1 hour before intercourse and again before each act of intercourse/ejaculation. Side effects, although rare, include local irritation or contact vaginitis. There have been concerns about the vaginal and cervical mucosal damage observed with N-9 and its impact on HIV transmission. Results thus far have been inconclusive. There were some studies that suggested that N-9 is gonococcicidal and spirocheticidal, but this has not been substantiated in randomized clinical trials. Spermicides should be used in combination with barrier methods because their typical-use failure rate alone is 21%

Phexxi is a prescription vaginal gel that is FDA approved. It is nonhormonal and user controlled. It can be used alone or in conjunction with other methods, although it is not recommended for use with the intravaginal ring. It is prepackaged in a single-dose applicator and must be inserted intravaginally up to 1 hour before vaginal intercourse. It works to maintain vaginal pH in an acidic range (~3.5 to 4.5) despite the presence of alkaline semen/sperm, which limits motility and incapacitates sperm. When compared with other OTC spermicidal gels, Phexxi has a higher viscosity, which minimizes vaginal leakage of the product and is thought to further affect sperm motility and provide an additional barrier to cervical penetration. Data also suggest Phexxi may have microbicidal effects in that by maintaining an acidic vaginal pH, Phexxi may enhance the vagina's natural microbicidal mechanisms. This effect seems more consistent and reliable than what has been found with the use of N-9. As with N-9, the most commonly reported side effect was vaginal discomfort and irritation. There has been no evidence that it affects HIV transmission. It should not be used in women with recurrent urinary tract infections (UTIs) or any urinary tract abnormalities.

WITHDRAWAL

The pregnancy risk with use of withdrawal as a contraceptive method is probably underestimated in adolescents, and a high typical-use failure rate of 20% should be specifically addressed with all adolescents, given that up to 60% of teens have reported using withdrawal for contraception.

FERTILITY AWARENESS–BASED METHODS

Fertility awareness methods require that one be aware of the fertile days of their menstrual cycle and either avoid intercourse during that time or use barrier contraception. Methods typically involve calculating the length of one's menstrual cycle, observing changes in body temperature and/or cervical secretions. Fertility awareness methods are based on regular ovulatory cycles, which are less common in teens, and therefore fertility awareness methods may be difficult for a teenager to use effectively. Methods include the Standard Days method, basal body temperature method, Billings method, and lactational amenorrhea. Be aware that the lactational amenorrhea method may be a highly effective, temporary contraceptive method if the following criteria are met: (1) no return of menses, (2) the infant is <6 months old, and (3) the woman is exclusively breastfeeding. There is an FDA-approved mobile application—Natural Cycles—that may be used to best predict fertility days to plan for abstinence or barrier contraceptive use. Other apps do exist, but they are not FDA approved.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

Chapter 161

Adolescent Pregnancy

Cora Collette Breuner

EPIDEMIOLOGY

There has been a trend of decreasing teen births and pregnancies since 1991 (Fig. 161.1). Teen birthrates in the United States are at a historic low secondary to increased use of contraception at first intercourse, use of dual methods of condoms and hormonal contraception among sexually active teenagers, and access to abortion (see Chapter 161.1). Despite these data, the United States continues to lead other industrialized countries in having high rates of adolescent pregnancy, with >700,000 pregnancies per year. Nonetheless, the National Survey of Family Growth (NSFG) 2006–2010 revealed that less than one third of 15- to 19-year-old females consistently used contraceptive methods at last intercourse.

The improvement in U.S. female teen birthrates is attributed to three factors: more teens are delaying the onset of sexual intercourse, are using some form of contraception when they begin to have sexual intercourse, and are using long-lasting contraceptive agents such as injections, implants, and intrauterine devices (IUDs).

Most pregnancies among U.S. adolescents are **unintended** (unwanted or mistimed); 88% of births to teenagers 15-17 years old were the result of unintended pregnancies. Birthrate statistics underestimate actual adolescent pregnancy rates because the birthrate numerator includes the number of actual births per 1,000 individuals in that age-group, but the pregnancy rate includes actual births, abortions, and best estimates of fetal loss per 1,000 adolescents in that age-group.

The *reported* **abortion** rate among adolescents in 2019 for those <15 years of age was 0.4 per 1,000 females (of the same age-group), and for those 15-19 years, it was 6.0 per 1,000; this compares to the most common age for having an abortion (20-29) of 18-19 per 1,000 females. It is unknown how many abortions go unreported (see Chapter 161.1).

ETIOLOGY

In industrialized countries with policies supporting access to protection against pregnancy and sexually transmitted infections **(STIs)**, older adolescents are more likely to use hormonal contraceptives and condoms, resulting in a lowered risk of unplanned pregnancy. Younger teenagers are likely to be less deliberate and logical about their sexual decisions, and their sexual activity is likely to be sporadic or even coercive, contributing to inconsistent contraceptive use and a greater risk of unplanned pregnancy. Better personal hopes for employment and higher educational goals are associated with lowered probability of childbearing in most groups. In nonindustrialized countries, laws permitting marriage of young and mid-teens, poverty, and limited female education are associated with increased adolescent pregnancy rates.

CLINICAL MANIFESTATIONS

Adolescents may experience the traditional symptoms of pregnancy: morning sickness (vomiting, nausea that may also occur *any* time of the day), swollen tender breasts, weight gain, and amenorrhea. Often the presentation is less classic; headache, fatigue, abdominal pain, dizziness, and scanty or irregular menses are common presenting complaints.

In the pediatric office, some teens are reluctant to divulge concerns of pregnancy. Denial of sexual activity and menstrual irregularity should not preclude the diagnosis in face of other clinical or historical information. An unanticipated request for a complete checkup or a visit for contraception may uncover a suspected pregnancy. *Pregnancy is still the most common diagnosis when adolescents present with secondary amenorrhea.*

DIAGNOSIS

Table 161.1 provides classic symptoms, laboratory tests, and physical changes in the diagnosis of pregnancy.

On physical examination, the findings of an enlarged uterus, cervical cyanosis **(Chadwick sign)**, a soft uterus **(Hegar sign)**, or a soft cervix **(Goodell sign)** are highly suggestive of an intrauterine pregnancy. A confirmatory pregnancy test is always recommended, either *qualitative* or *quantitative*. Modern **qualitative** urinary detection methods are efficient at detecting pregnancy, whether performed at home or in the office. These tests are based on detection of the beta subunit of human chorionic gonadotropin **(hCG)**. Although claims for nonprescription home pregnancy tests may indicate 98% detection on the day of the first missed menstrual period, sensitivity and accuracy vary considerably. Office or point-of-care tests have increased standardization and generally have increased sensitivity, with the possibility of detecting a pregnancy within 3-4 days after implantation. However, in any menstrual cycle, ovulation may be delayed, and in any pregnancy, the day of implantation may vary considerably, as may rate of production of hCG. This variability, along with variation of urinary concentration, may affect test sensitivity. *Consequently, each negative test should be*

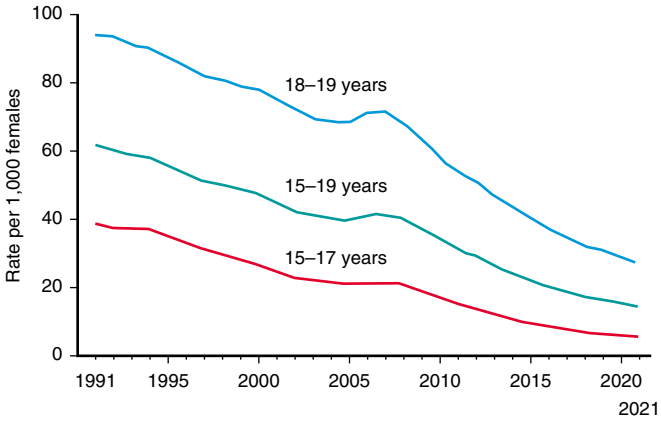

Fig. 161.1 Birth rates for teenagers by age of mother: United States, final 1991–2020 and provisional 2021. Source: National Center for Health Statistics, National Vital Statistics System, Natality. (*From Hamilton BE, Martin JA, Osterman JA, Division of Vital Statistics, National Center for Health Statistics. Births: provisional data for 2021. Nat Vital Stats Rapid Release. 2022;20, Fig. 2.*)

Table 161.1 Diagnosis of Pregnancy Dated from First Day of Last Menstrual Cycle

CLASSIC SYMPTOMS
Missed menses, breast tenderness, nipple sensitivity, nausea, vomiting, fatigue, abdominal and back pain, weight gain, urinary frequency.
Teens may present with unrelated symptoms that enable them to visit the doctor and maintain confidentiality.
LABORATORY DIAGNOSIS
Tests for human chorionic gonadotropin in urine or blood may be positive 7-10 days after fertilization, depending on sensitivity.
Irregular menses make ovulation/fertilization difficult to predict.
Home pregnancy tests have a high error rate.
PHYSICAL CHANGES
2-3 wk after implantation: cervical softening and cyanosis.
8 wk: uterus size of orange.
12 wk: uterus size of grapefruit and palpable suprapubically.
20 wk: uterus at umbilicus.
If physical findings are not consistent with dates, ultrasound will confirm.

repeated in 1-4 weeks if there is a heightened suspicion of pregnancy. The most sensitive pregnancy detection test is a serum **quantitative βhCG radioimmunoassay**, with reliable results within 7 days after fertilization. This more expensive test is used primarily during evaluations for ectopic pregnancy, to detect retained placenta after pregnancy termination, or in the management of a molar pregnancy. It is used when serial measurements are necessary in clinical management.

Although not used for primary diagnosis of pregnancy, pelvic or vaginal **ultrasound** can be helpful in detecting and dating a pregnancy. Pelvic ultrasound will detect a gestational sac at about 5-6 weeks (dated from last menstrual period) and vaginal ultrasound at 4.5-5 weeks. This tool may also be used to distinguish diagnostically between intrauterine and ectopic pregnancies.

PREGNANCY COUNSELING AND INITIAL MANAGEMENT

Once the diagnosis of pregnancy is made, it is important to begin addressing the psychosocial and the medical aspects of the pregnancy. The patient's response to the pregnancy should be assessed and her emotional issues addressed. It should not be assumed that the pregnancy was unintended. Discussion of the patient's options should be initiated. These options include (1) releasing the child to an adoptive family, (2) electively terminating the pregnancy, and (3) raising the child herself with the help of family, father of the baby, friends, and/or other social resources. Options should be presented in a supportive, informative, nonjudgmental fashion; for some young women, they may need to be discussed over several visits. Physicians who are uncomfortable in presenting options to their young patients should refer their patients to a provider who can provide this service expeditiously. Pregnancy terminations implemented early in the pregnancy are generally less risky and less expensive than those initiated later. These include the prescription use of mifepristone and misoprostol within 10 weeks (the World Health Organization [WHO] recommends 12 weeks) of the pregnancy (see Chapter 161.1).

Other issues that may need discussion are how to inform and involve the patient's parents and the father of the infant; implementing strategies for ensuring continuation of the young mother's education; discontinuation of tobacco, alcohol, and illicit drug use; discontinuance and avoidance of any medications that may be considered teratogenic; starting folic acid, calcium, and iron supplements; proper nutrition; and testing for STIs. Especially in younger adolescents, the possibility of **coercive sex** (see Chapter 162) must be considered and appropriate social work/legal referrals made if abuse has occurred, although most pregnancies are not a result of coercive sex. Patients who elect to continue their pregnancy should be referred as soon as possible to an adolescent-friendly obstetric provider.

Risk factors for teen pregnancy include growing up in poverty, having parents with low levels of education, growing up in a single-parent family, fewer opportunities in their community for positive youth involvement, neighborhood physical disorder, foster care (such teens are more than twice as likely to become pregnant than those not in foster care), and having poor performance in school (see "Psychosocial Outcomes/Risks for Mother and Child" later).

The Importance of Prevention

Teen pregnancy and childbearing bring substantial social and economic costs through immediate and long-term impacts on teen parents and their children. In 2010, teen pregnancy and childbirth accounted for at least $9.4 billion in costs for increased healthcare and foster care, increased incarceration rates among children of teen parents, and lost tax revenue because of lower educational attainment and income among teen mothers.

ADOLESCENT FATHERS

Those who become fathers as adolescents also have poorer educational achievement than their age-matched peers. They are more likely than other peers to have been involved with illegal activities and with the use of illegal substances. Adult men who father the children of teen mothers are poorer and educationally less advanced than their age-matched peers and tend to be 2-3 years older than the mother, but any combination of age differences may exist. Younger teen mothers are more likely to have a greater age difference between themselves and the father of their child, raising the issue of coercive sex or statutory rape (see Chapter 162).

Male partners have a significant influence on the young woman's decision/desire to become pregnant and to parent her child. Sensitively and appropriately including the male partner in discussions of family planning, contraception, and pregnancy options may be a useful strategy in improving outcomes for all. This can only be successful if the young female patient is willing to have her partner involved in such discussions.

MEDICAL COMPLICATIONS OF MOTHERS AND BABIES

Although pregnant teens are at higher-than-average risk for some complications of pregnancy, most teenagers have pregnancies that are without major medical complications, delivering healthy infants. The

miscarriage/stillbirth risk for adolescents is estimated at 15–20%. In the United States, elective pregnancy termination rates peaked from 1985 to 1988 at 41–46%, decreasing since then to approximately 30% in 2008. Teen mothers have low rates of age-related chronic disease (diabetes or hypertension) that might affect the outcomes of a pregnancy. They also have lower rates of twin pregnancies than older women. They tolerate childbirth well with few operative interventions. However, compared with 20- to 39-year-old mothers, teens have higher incidences of low birthweight infants, preterm infants, neonatal deaths, passage of moderate to heavy fetal meconium during parturition, and infant deaths within 1 year after birth. The highest rates of poor outcomes occur in the youngest and most economically disadvantaged mothers. *Gastroschisis,* although rare, has a much higher incidence in infants of teen mothers, for reasons that are unclear. Teen mothers also have higher rates of anemia, pregnancy-associated hypertension, and eclampsia, with the youngest teens having rates of pregnancy-associated hypertension higher than the rates of women in their 20s and 30s. The youngest teens also have a higher incidence of poor weight gain (<16 lb) during their pregnancy. This correlates with a decrease in the birthweights of their infants. Poor maternal weight gain also has correlated strongly with teens' late entrance into prenatal care and with inadequate use of prenatal care. Sexually active teens have higher rates of STIs than older sexually active women.

Globally, many young women who become pregnant have been exposed to violence or abuse in some form during their lives. There is some evidence that teenage women have the highest rates of **violence** during pregnancy of any group. Violence has been associated with injuries and death as well as preterm births, low birthweight, bleeding, substance abuse, and late entrance into prenatal care. An analysis of the Pregnancy Mortality Surveillance System indicates that in the United States 1991–1999, homicide was the second leading cause of injury-related deaths in pregnant and postpartum women. Women age 19 years and younger had the highest pregnancy-related homicide rate (see Chapter 156).

Ectopic pregnancy occurs in 1–2% of conceptions and is more common in women with a previous history of an ectopic pregnancy, pelvic inflammatory disease, prior appendicitis, infertility, in utero exposure to diethylstilbestrol, and possibly an IUD. Most ectopic pregnancies are in the fallopian tube (tubal pregnancy). Manifestations include vaginal spotting after a missed menstrual period that may progress to more intense vaginal bleeding (suggestive of spontaneous abortion); vaginal bleeding is absent in 10–20%. Abdominal pain is associated with distention of the fallopian tube; tubal rupture results in more intense pain, hemorrhagic shock, and peritonitis. Some women have nonspecific abdominal complaints and are misdiagnosed with gastroenteritis. Cervical motion and adnexal tenderness (and adnexal mass) may be present. **Transvaginal sonography** (not transabdominal) is the diagnostic test of choice to detect an ectopic pregnancy and reveals an adnexal mass and no uterine pregnancy. Nonetheless, some women will have pregnancy of unknown location by transvaginal sonography; approximately 20% of these will have an ectopic pregnancy. Measurement of sensitive quantitative serum βhCG levels together with transvaginal sonography has value in diagnosing an ectopic pregnancy. If the initial βhCG is above the *discriminatory zone* (level at which one expects an intrauterine pregnancy) but on transvaginal sonography there is no intrauterine pregnancy, there may be an ectopic pregnancy or an abnormal uterine pregnancy. In addition, if the βhCG is below the discriminatory level (usually <3,000 mIU/mL) with no definitive diagnosis by sonography, serial βhCG testing should be performed every 48 hours. In a normal uterine pregnancy, βhCG levels should increase approximately 50% every 48 hours; declining levels may suggest a miscarriage or an ectopic pregnancy. Some would perform a dilation and curettage and check for products of conception or follow serial βhCG levels. If there are no products of conception or if βhCG levels plateau or increase, an ectopic pregnancy is present. Treatment of unstable or advanced patients is usually by laparoscopic surgery or by laparotomy. Because of early detection, many patients remain stable *(unruptured).* Stable patients with an unruptured ectopic pregnancy may be treated with single-dose, or more often, multidose methotrexate to induce abortion. Contraindications to methotrexate in a stable patient include size of the ectopic mass (>3.5 cm) and embryonic cardiac motion.

Prematurity and low birthweight increase the perinatal morbidity and mortality for infants of teen mothers. These infants also have higher-than-average rates of sudden infant death syndrome (see Chapter 423), possibly because of less use of the supine sleep position or cosleeping, and are at higher risk of both intentional and unintentional injury (see Chapter 17). One study showed that the risk of homicide is 9-10 times higher if a child born to a teen mother is not the mother's firstborn compared with the risk to a firstborn of a woman age 25 years or older. The perpetrator is often the father, stepfather, or boyfriend of the mother.

After childbirth, **depressive symptoms** may occur in as many as 50% of teen mothers. Depression seems to be greater with additional social stressors and with decreased social supports. Support from the infant's father and the teen's mother seems to be especially important in preventing depression. Pediatricians who care for parenting teens should be sensitive to the possibility of depression, as well as to inflicted injury to mother or child; appropriate diagnosis, treatment, and referral to mental health or social agencies should be offered and facilitated.

PSYCHOSOCIAL OUTCOMES/RISKS FOR MOTHER AND CHILD

Educational Issues

Pregnancy and birth are significant contributors to high school dropout rates among girls. Only about 50% of teen mothers receive a high school diploma by age 22, whereas approximately 90% of women who do not give birth during adolescence graduate from high school. Mothers who have given birth as teens generally remain 2 years behind their age-matched peers in formal educational attainment at least through their third decade. Maternal lack of education limits the income of many of these young families (see Chapter 1).

The children of teenage mothers are more likely to have lower school achievement and to drop out of high school, have more health problems, and face unemployment as a young adult.

Substance Use

See also Chapter 157.

Teenagers who abuse drugs, alcohol, and tobacco have higher pregnancy rates than their peers. Most substance-abusing mothers appear to decrease or stop their substance use while pregnant. Use begins to increase again about 6 months postpartum, complicating the parenting process and the mother's return to school.

Repeat Pregnancy

In the United States, approximately 20% of all births to adolescent mothers (age 15-19) are second order or higher. Prenatal care is begun even later with a second pregnancy, and the second infant is at higher risk of poor outcome than the first birth. Mothers at risk of early repeat pregnancy (<2 years) include those who do not initiate long-acting contraceptives after the index birth, those who do not return to school within 6 months of the index birth, those with mood disorders, those receiving major childcare assistance from the adolescent's mother, those who are married or living with the infant's father, those having peers who were adolescent parents, and those who are no longer involved with the baby's father and who meet a new boyfriend who wants to have a child. To reduce repeat pregnancy rates in these teens, programs must be tailored for this population, preferably offering comprehensive healthcare for both the young mother and her child. Healthcare providers should remember to provide positive reinforcement for teen parenting successes (i.e., compliment teen parents when they are doing a good job).

Children Born to Teen Mothers

Many children born to teen mothers have behavioral problems that may be seen as early as the preschool period. Many drop out of school early (33%), become adolescent parents (25%), or, if male, are incarcerated (16%). Explanations for these poor outcomes include poverty, parental learning difficulties, negative parenting styles of teen parents,

maternal depression, parental immaturity, poor parental modeling, social stress, exposure to surrounding violence, and conflicts with grandparents, especially grandmothers. Continued positive paternal involvement throughout the child's life may be somewhat protective against negative outcomes. Many of these poor outcomes appear to be attributable to the socioeconomic/demographic situation in which the teen pregnancy has occurred, not solely to maternal age. Even when socioeconomic status and demographics are controlled, infants of teen mothers have lower achievement scores, lower high school graduation rates, increased risk of teen births themselves, and, at least in Illinois (where records include age of birth mother), a higher probability of abuse and neglect.

Comprehensive programs focused on supporting adolescent mothers and infants using life skills training, medical care, and psychosocial support demonstrate higher employment rates, higher income, and less welfare dependency in participating adolescents.

PREVENTION OF TEEN PREGNANCIES

Adolescent pregnancy is a multifaceted problem that requires multifactorial solutions. The provision of contraception and education about fertility risk from the primary care physician is important but insufficient to address the problem fully. Family and community involvement are essential elements for teen pregnancy prevention. Strategies for primary prevention (preventing first birth) are different from the strategies needed for secondary prevention (preventing second or more births). Over the past 30 years, many models of teen pregnancy prevention programs have been implemented and evaluated. Table 161.2 lists the common components of successful evidence-based programs.

Abstinence-only sexual education aims to teach adolescents to wait until marriage to initiate sexual activity but, unfortunately, does not mention contraception. Abstinence education is sometimes coupled with "virginity pledges" in which teenagers pledge to remain abstinent until they marry. Other educational programs emphasize HIV and STI prevention and in the process prevent pregnancy, whereas others include both abstinence and contraception in their curricula. Sex education and teaching about contraception do not lead to an increase in sexual activity. Teenagers who participate in programs with **comprehensive** sex education components generally have lower rates of pregnancy than those exposed solely to abstinence-only programs or no sex education at all.

In many U.S. communities, programs that engage youth in community service and that combine sex education and youth development are also successful in deterring pregnancy. Programs vary in their sites of service from schools to social agencies, health clinics, youth organizations, and churches. Programs must be tailored to the cultural background, ethnicity, age-group, and gender of the group being targeted for the prevention services.

Table 161.2 Common Components of Most Successful Evidence-Based Programs to Prevent Teen Pregnancy

- Information is provided about the benefits of abstinence.
- Information is provided about contraception for those who are already sexually active.
- Information is provided about the signs and symptoms of STIs and how to prevent STIs.
- Interactive sessions on peer pressure are presented.
- Teenagers are taught communication skills.
- Programs are tailored to meet the needs of specific groups of young people (e.g., young men or young women, cultural groups, younger or older teens).

STI, Sexually transmitted infection.
Adapted from Suellentrop K. *What Works 2011–2012: Curriculum-Based Programs That Help Prevent Teen Pregnancy*. Washington, DC: National Campaign to Prevent Teen and Unplanned Pregnancy, http://www.c-hubonline.org/sites/default/files/resources/main/What_Works_0.pdf.

Secondary prevention programs are fewer in number. In the United States, some communities have tried to "pay" young mothers not to become pregnant again, but these efforts have not always been fruitful. **Home visiting** by nurses has been successful in some areas, and many communities have developed "Teen Tot" clinics that provide a "one-stop shopping model" for healthcare for both the teen mother and the baby in the same site at the same time. Both programs have reported some successes.

In the practice setting, the identification of the sexually active adolescent through a confidential clinical interview is a first step in pregnancy prevention. The primary care physician should provide the teenager with factual information in a nonjudgmental manner and then guide the teenager in the decision-making process of choosing a contraceptive (see Chapter 160). The practice setting is an ideal setting to support the teenager who chooses to remain abstinent. When a teenager does become pregnant and requires prenatal care services, healthcare providers should remember that the pregnant teenager is an adolescent who has become pregnant, not a pregnant woman who happens to be an adolescent.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

161.1 Abortion

Alison S. Kliegman and Robert M. Kliegman

Abortion is a safe, common, and essential reproductive healthcare evidence–based intervention. Worldwide ~30% of all pregnancies and ~60% of all unintended pregnancies are voluntarily terminated. In the past by age 45 ~25% of U.S. pregnant persons had an abortion. The WHO defines abortion as the termination of pregnancy before 20 weeks' gestation. Abortions can be voluntary or spontaneous (miscarriages). Access to reproductive care, including abortion care, is considered by all health organizations as a basic human right. The American Academy of Pediatrics supports a young person's right of "access to comprehensive, evidence-based reproductive healthcare services, including abortion." Abortion should be available to any person requesting it without a specific indication. The most common indication is unintended (unplanned) pregnancy, which includes not being able to afford a child, poorly timed pregnancy, and not having a suitable partner; additional indications include being subjected to coercive sexual encounters, as well as medical conditions that place the pregnant person at risk and certain fatal fetal conditions.

EPIDEMIOLOGY

Most abortions occur in patients between 20 and 30 years of age (Table 161.3). In addition, the majority of abortions occur in the first trimester (Fig. 161.2). The highest ratio of abortion (number of abortions per 1,000 live births) is noted in persons <15 years (Fig. 161.3). Among 15- to 19-year-olds, the United States has one of the highest rates of adolescent pregnancy but among one of the lowest rates of adolescent pregnancies ending in abortion when compared to other developed countries (Fig. 161.4). Seventy-five percent of adolescent pregnancies in the United States are unplanned, while ~30% end with an abortion (among those 15-17 years).

Abortion Care

The WHO 2022 report recommends that:

- Abortions must be decriminalized
- Be made available at request
- Be made available by telemedicine
- Be made available for self-management, not just in clinic
- Have a wide range of eligible providers
- Provide an enabling environment (Fig. 161.5)

The National Academies of Sciences, Engineering and Medicine provides an outline for continuum of abortion care; preabortion, pregnancy termination, and post-abortion care (Fig. 161.6).

Table 161.3 Characteristics of Persons Who Had an Abortion in an Outpatient Setting in 2014, by Percent

CHARACTERISTIC	PERCENT
Age*	
<15-17	3.6
18-19	8.2
20-24	33.6
25-29	26.3
30-34	16.0
35+	12.2
Prior Pregnancies*	
No prior pregnancies	29.2
Prior birth only	26.0
Prior abortion only	11.7
Prior birth and abortion	33.1
Education*	
Not a high school graduate	12.2
High school graduate or GED	29.0
Some college or associate's degree	39.2
College graduate	19.7
Family Income as a Percentage of Federal Poverty Level†	
<100	49.3
100-199	25.7
≥200	25.0

Note: Percentages may not sum to 100 because of rounding.
Sources: *Jones RK, Jerman J. Characteristics and circumstances of U.S. women who obtain very early and second trimester abortions. *PLoS One.* 2017b;12:e0169969 (n = 8,098); †Jerman J, Jones RK, Onda T. Characteristics of U.S. abortion patients in 2014 and changes since 2008. 2016. [October 17, 2016]. https://www.guttmacher.org/sites/default/files/report_pdf/characteristics-us-abortion-patients-2014.pdf (n = 8,380).
Modified from National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Health Care Services; Board on Population Health and Public Health Practice; Committee on Reproductive Health Services. *Assessing the Safety and Quality of Abortion Care in the U.S.* Washington, DC: National Academies Press; 2018: Table 1-2.

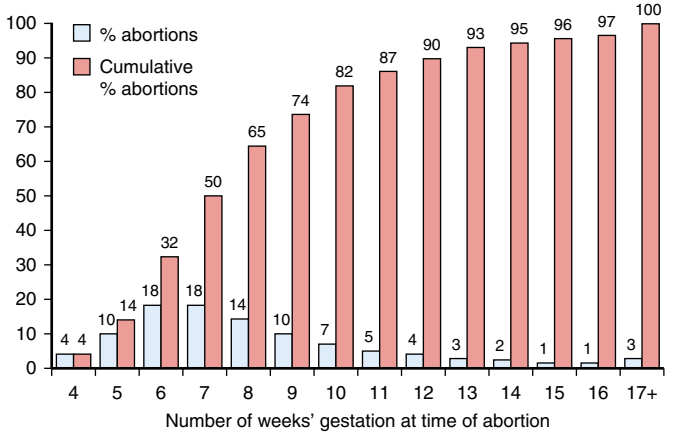

Fig. 161.2 Percentage and cumulative percentage of outpatient abortions by weeks' gestation, 2014–2015. (*From Jones RK, Jerman J. Characteristics and circumstances of US women who obtain very early and second trimester abortions. PLoS One 2017; 12(1):e0169969.*)

Methods

Abortion methods vary depending on gestational age, location (in clinic vs self-managed), and procedure (medical vs surgical). Medically managed abortion ("abortion pill") is FDA approved up to 10 weeks, although the WHO suggests up to 12 weeks and has also been used "off label" at later gestational ages. It consists of mifepristone

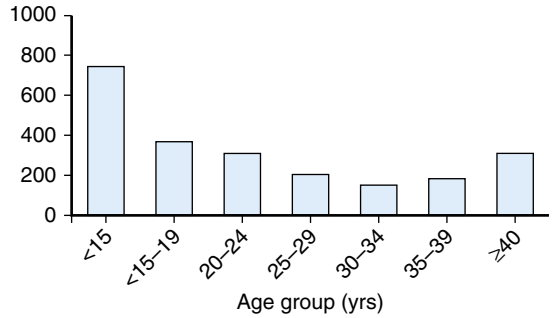

Fig. 161.3 Abortion ratio by age-group of persons who obtained a legal abortion in selected states of the United States in 2001. Abortion ratio refers to number of abortions per 1,000 live births. (*From Strauss LT, Herndon J, Chang J, et al. Abortion surveillance–United States, 2001. MMWR Surveill Summ. 2004;53:1–32.*)

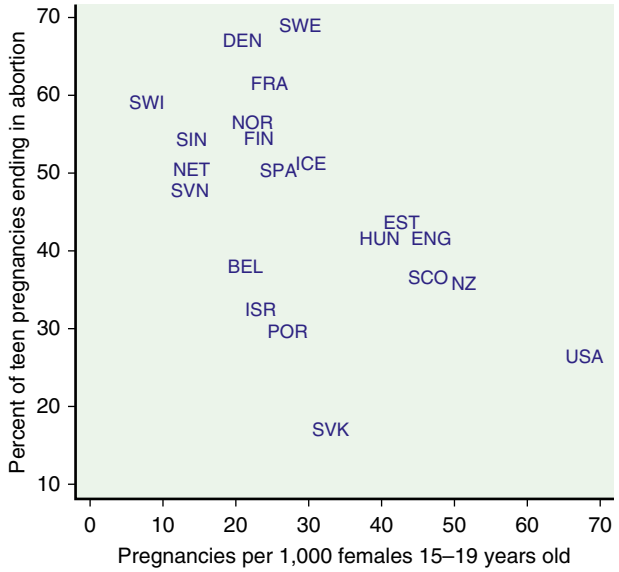

Fig. 161.4 Percentage of teen pregnancies ending in abortion is inversely correlated with teen pregnancy rate. BEL, Belgium; DEN, Denmark; ENG, England and Wales; EST, Estonia; FIN, Finland; FRA, France; HUN, Hungary; ICE, Iceland; ISR, Israel; NET, The Netherlands; NOR, Norway; NZ, New Zealand; POR, Portugal; SCO, Scotland; SIN, Singapore; SPA, Spain; SVK, Slovakia; SVN, Slovenia; SWE, Sweden; SWI, Switzerland; USA, United States. (*From Sedgh G, Finer LB, Bankole A, et al. Adolescent pregnancy, birth, and abortion rates across countries: levels and recent trends. J Adolesc Med. 2010;56:223–230, Fig. 1.*)

(a potent progesterone antagonist) 200 mg PO × one dose, followed within 24-48 hours by misoprostol 800 µg (a prostaglandin to induce uterine contractions) by buccal, sublingual, or vaginal routes. Medical abortion represents ~50% of abortions in the United States (Fig. 161.7). This treatment is available in clinic but also via telehealth, where a prescriber then mails the medication to be taken at home (self-managed medical abortion). This latter mail order availability is FDA-approved. Self-managed medical abortion is safe and ~96% effective; complications are rare (~1%) and include hemorrhage or infection; no deaths have been reported from self-managed medical abortion. Contraindications include porphyria, a bleeding disorder, taking anticoagulants, adrenal insufficiency, long-term systemic steroid use, ectopic pregnancy, and the presence of an IUD.

Acute side effects during a self-managed abortion are to be expected and include nausea and vomiting, headaches, diarrhea, and flulike symptoms and, once the abortion starts, cramping and bleeding. Excessive bleeding (two or more pads per hour for >2 hours), fever (>100°F), or severe abdominal pain requires medical attention. After

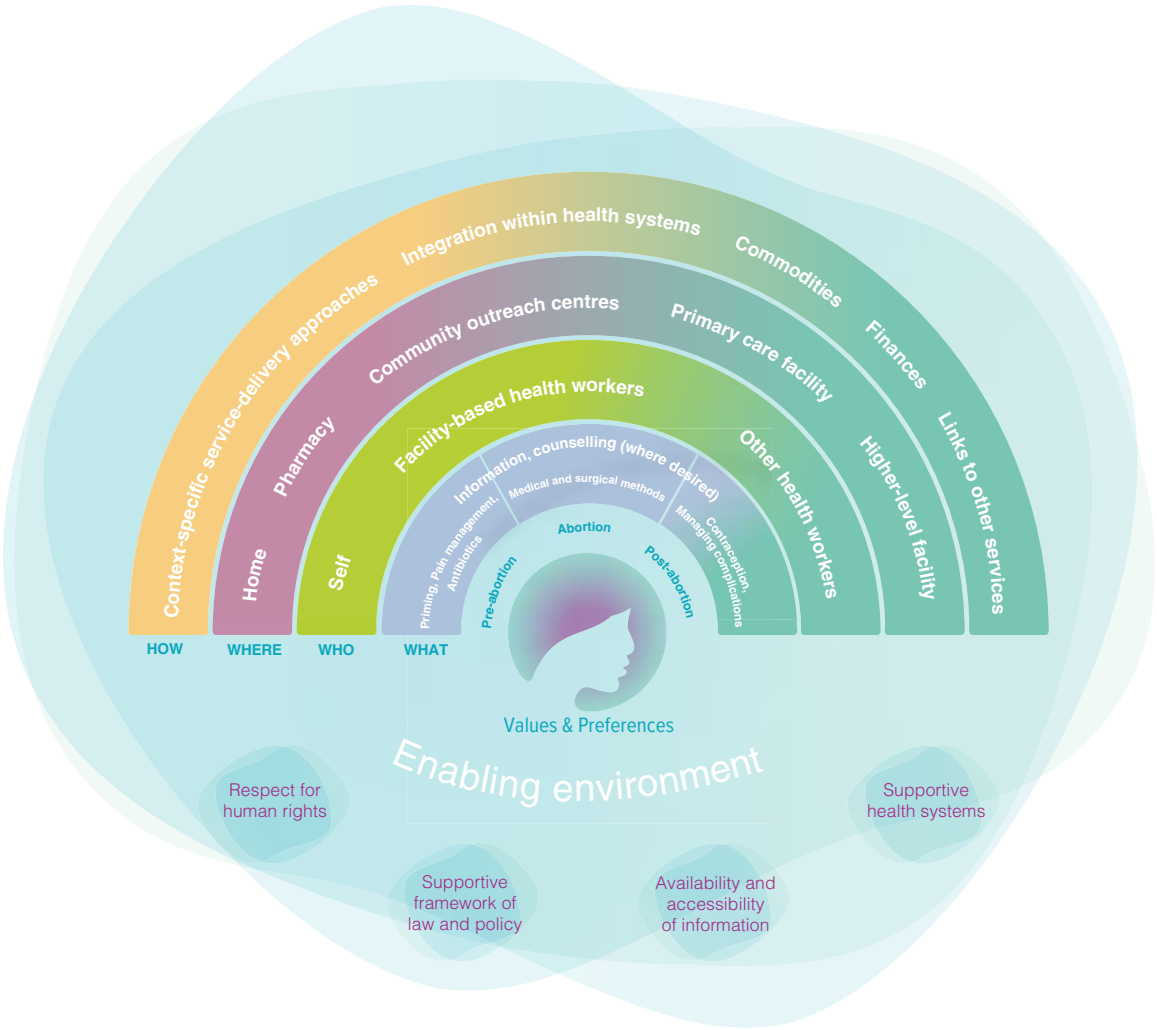

Fig. 161.5 Conceptual framework of the WHO abortion care guidelines. (*From World Health Organization. Abortion Care Guideline. Geneva: World Health Organization; 2022. License: CC BY-NC-SA 3.0 IGO. Fig.1* https://www.who.int/publications/i/item/9789240039483.)

the abortion, do not use tampons for ~5 days and get a pregnancy test ~3 weeks later to ensure a complete abortion. After that, a contraceptive should be started in sexually active individuals (may not be indicated in cases of rape or incest). Medical abortion has an exceptional safety record; long-term studies demonstrate no adverse effect on fertility, premature birth, breast cancer, or mental health issues.

The medications can be available by online consultation from Aid Access (aidaccess.org); pills will be mailed directly from Aid Access to persons in all states permitting self-managed abortion. "Shield laws" protect telemedicine providers serving patients in states where abortion is illegal.

Surgical methods for abortion require in-clinic presence and a skilled provider. These include suction curettage (aspiration method) used between ~6 and 16 weeks' gestation, dilation, and evacuation (~12-24 weeks); induction of labor; and, if necessary, rarely a hysterotomy (C-section) at >24 weeks. Anesthesia (local or general) is needed for these procedures.

Restricting access to or banning legal abortions will not reduce the total number of abortions but increases the risk of criminalization and potentially the number of unsafe procedures. On a global basis, unsafe abortions represent ~45% of all abortions. Unsafe abortion increases the risk of incomplete abortion (retained products of conception), hemorrhage, infection, uterine perforation, other organ injury, and infertility. Restricting access to abortion with resultant pregnancy will have adverse economic and educational consequences for the pregnant adolescent (see Chapter 161). In addition, the United States has one of the highest maternal mortality rates (23.8 deaths per 100,000 live births in 2020) of developed countries. The risk of death from pregnancy is much higher than from any form of legal abortion.

Challenges and Barriers

There are multiple logistic and legal challenges to obtaining an abortion. Some are generalizable to all ages, whereas others are specific to adolescent patients.

Some states have a complete ban against abortions, necessitating travel to another state or country. In other states, there is a limit to gestational age (usually first trimester). Many are limiting abortion to 6 weeks or when fetal heart beats are detected. The majority of states require a physician to perform an abortion. Some states restrict the use of public funding, and others restrict private insurance use for abortions. In one study, ~45% of fees were paid by the pregnant person; in states that ban Medicaid funding for abortion, the patient pays the full cost. States vary in the requirement for preabortion "counseling" and a waiting period. If "counseling" is needed, it should be from an abortion provider, not a state mandated program, which may be biased against abortion.

The criminalization of abortion (the pregnant person, the provider, others involved) has created a climate of enhanced surveillance and added barriers. Laws have been proposed to require abortion providers to register all patients requesting an abortion. These reporting mandates will compromise patient-provider confidentiality and possibly violate Health Insurance Portability and Accountability Act (HIPAA) regulations. Nonetheless HIPAA may not be applicable if legal action is filed against a patient and/or provider. Other laws will

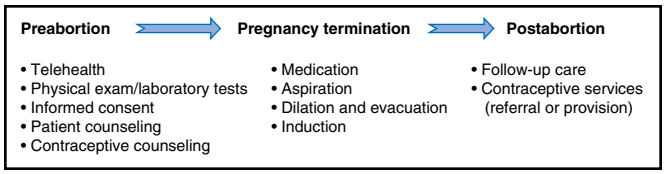

Fig. 161.6 Continuum of abortion care. (*Modified from National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Health Care Services; Board on Population Health and Public Health Practice; Committee on Reproductive Health Services. Assessing the Safety and Quality of Abortion Care in the U.S. Washington, DC: National Academies Press; 2018: Fig.1-1.*)

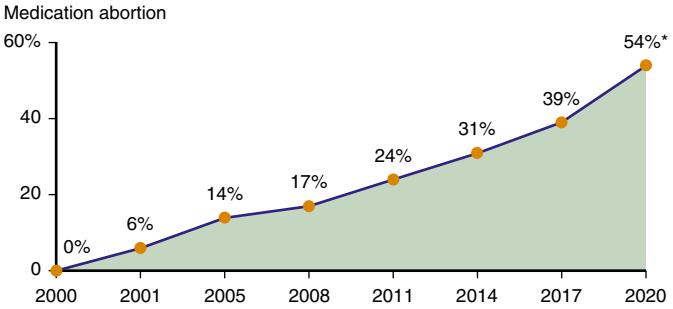

Fig. 161.7 As of 2020, medication abortions account for the majority of all U.S. abortions. *Based on preliminary data. (*From Guttmacher Institute. Medication abortion now accounts for more than half of all US abortions, 2022. https://www.guttmacher.org/print/article/2022/02/medication-abortion-now-accounts-more-half-all-us-abortions.*)

permit private citizens to sue pregnant persons having an abortion or those who help (even those transporting the pregnant person to another state). With these legal obstacles in place, patients seeking an abortion must be vigilant in keeping abortion-seeking behaviors private and unavailable to litigious prosecution. This should include internet browsing and searches, text messages, period tracking apps, payments, and travel plans, all of which may be used as evidence. Although a self-managed medically induced abortion is clinically indistinguishable from a spontaneous miscarriage, a prosecutor may use electronic information as evidence to identify an induced abortion.

The concept of fetal personhood and laws defining this as starting at conception add another legal concern. Fetal personhood proponents suggest that the unborn fetus has rights similar to a child after birth and that any action thought to harm the fetus will be considered illegal. Pregnant persons can thus be detained or arrested for actions perceived as harmful to the fetus (beginning in the first trimester). Most of the cases have been related to a pregnant person's use of drugs; such patients have been accused of child abuse or even distributing drugs to a minor. In addition to the effects that the concept of fetal personhood will have on abortions, it may have implications for persons with an IUD, those using emergency contraception, embryos created for IVF, and those experiencing an ectopic pregnancy.

In addition to challenges experienced by all persons seeking an abortion, adolescents who are minors have age-specific barriers. Minors may not be able to travel to locations providing abortion (finances, driver's license, purchase airline ticket) and in most states, they are required to have some form of parental (grandparent or other adult relative in some states) involvement by notification or actual consent (PNA). PNA can be avoided by using a judicial bypass after appealing to a judge. In this case, the judge will determine if the adolescent requesting an abortion is "mature and informed." States with legal access to abortion may eliminate PNA altogether (e.g., Illinois).

Various organizations have facilitated access to self-managed abortions or to provide referrals to the nearest abortion provider. Aid Access (http://www.aidaccess.org) is an online international abortion consult service that will make mifepristone/misoprostol available by mail (including minors). Another site (http://www.ineedana.com) helps locate the nearest abortion provider, and http://www.elevatedaccess.org helps arrange flights to legal abortion sites.

Other resources include Women on Web http://www.womenonweb.org/en/ and Planned Parenthood as a patient navigator or provider of abortions.

To get help with funding: National Network of Abortion Funds https://abortionfunds.org/ or https://prochoice.org/

Locating Plan C pills: https://www.plancpills.org/?gclid=CjwKCAjw_b6WBhAQEiwAp4HyIKGkcL2gncj28MXzfN1eONGC4a3p_I9FLRxf_4I_v8NZ5HqDD04JwxoC6LQQAvD_BwE

Help with a self-managed abortion: https://www.mahotline.org/

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

Chapter 162

Adolescent Sexual Assault

Allison M. Jackson, Adrianne R. Artis, and Norrell K. Atkinson

Rape is an act of violence, not an act of sex. Rape is historically defined as coercive sexual intercourse involving physical force or psychologic manipulation of a female or a male. Recognizing that sexual intercourse is not a requirement for the definition, the U.S. Department of Justice (DOJ) defines rape as "the penetration, no matter how slight, of the vagina or anus with any body part or object, or oral penetration by a sex organ of another person, without the consent of the victim." Though definitions may vary by state, **sexual assault** is a more inclusive term that according to the U.S. DOJ "means any nonconsensual sexual act proscribed by Federal, tribal, or State law, including when the victim lacks capacity to consent."

EPIDEMIOLOGY

Exact figures on the incidence of rape are unavailable because sexual assault is underreported. In the 2019 National Crime Victimization Survey, only 0.56 per 1,000 persons over 12 years of age reported sexual assault to police. According to the National Intimate Partner and Sexual Violence Survey of 2015 (NISVS 2015), over 43% women and nearly 25% of men experienced some form of **sexual violence** in their lifetime. Females exceed males as reported rape victims, but male rape may be more underreported than female rape.

Adolescence is a high-risk age-group for sexual assault, with 43.2% of females and 51.3% of males experiencing their first sexual assault before the age of 18 years, and 81.3% of females and 70.8% males experiencing their first sexual assault before the age of 25 years (NISVS 2015). Between 1995 and 2013 the rate of rape and sexual assault was highest for adolescent females between ages 18 and 24 years. The National Survey of Children's Exposure to Violence (NatSCEV 2014) revealed that 12.9% of 14- to 17-year-olds experienced any sexual victimization in the past year, 21.7% had experienced any sexual victimization in their lifetime, 4.2% experienced sexual assault in the past year, and 10.2% in their lifetime. This survey also demonstrated how other experiences with violence compound the risk for sexual victimization. Youth with a history of maltreatment by a caregiver were four times more likely to experience sexual victimization and more than four times more likely to experience sexual victimization if they were a witness to violence. Among older adolescents age 18-24 years, the rate of rape and sexual

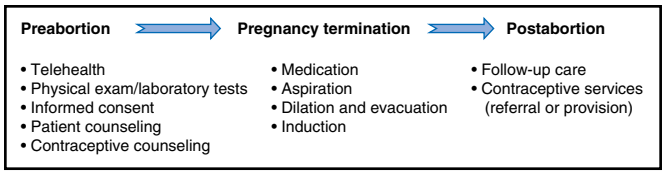

Fig. 161.6 Continuum of abortion care. (*Modified from National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Health Care Services; Board on Population Health and Public Health Practice; Committee on Reproductive Health Services. Assessing the Safety and Quality of Abortion Care in the U.S. Washington, DC: National Academies Press; 2018: Fig.1-1.*)

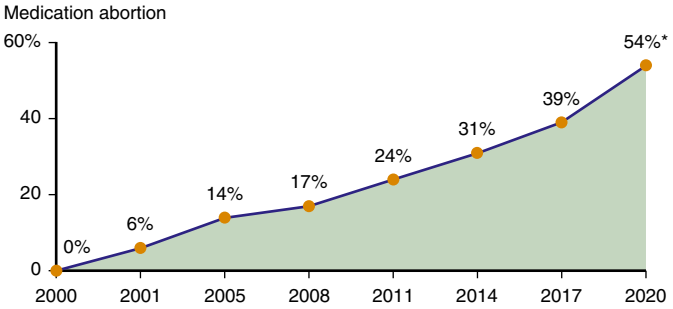

Fig. 161.7 As of 2020, medication abortions account for the majority of all U.S. abortions. *Based on preliminary data. (*From Guttmacher Institute. Medication abortion now accounts for more than half of all US abortions, 2022. https://www.guttmacher.org/print/article/2022/02/medication-abortion-now-accounts-more-half-all-us-abortions.*)

permit private citizens to sue pregnant persons having an abortion or those who help (even those transporting the pregnant person to another state). With these legal obstacles in place, patients seeking an abortion must be vigilant in keeping abortion-seeking behaviors private and unavailable to litigious prosecution. This should include internet browsing and searches, text messages, period tracking apps, payments, and travel plans, all of which may be used as evidence. Although a self-managed medically induced abortion is clinically indistinguishable from a spontaneous miscarriage, a prosecutor may use electronic information as evidence to identify an induced abortion.

The concept of fetal personhood and laws defining this as starting at conception add another legal concern. Fetal personhood proponents suggest that the unborn fetus has rights similar to a child after birth and that any action thought to harm the fetus will be considered illegal. Pregnant persons can thus be detained or arrested for actions perceived as harmful to the fetus (beginning in the first trimester). Most of the cases have been related to a pregnant person's use of drugs; such patients have been accused of child abuse or even distributing drugs to a minor. In addition to the effects that the concept of fetal personhood will have on abortions, it may have implications for persons with an IUD, those using emergency contraception, embryos created for IVF, and those experiencing an ectopic pregnancy.

In addition to challenges experienced by all persons seeking an abortion, adolescents who are minors have age-specific barriers. Minors may not be able to travel to locations providing abortion (finances, driver's license, purchase airline ticket) and in most states, they are required to have some form of parental (grandparent or other adult relative in some states) involvement by notification or actual consent (PNA). PNA can be avoided by using a judicial bypass after appealing to a judge. In this case, the judge will determine if the adolescent requesting an abortion is "mature and informed." States with legal access to abortion may eliminate PNA altogether (e.g., Illinois).

Various organizations have facilitated access to self-managed abortions or to provide referrals to the nearest abortion provider. Aid Access (http://www.aidaccess.org) is an online international abortion consult service that will make mifepristone/misoprostol available by mail (including minors). Another site (http://www.ineedana.com) helps locate the nearest abortion provider, and http://www.elevatedaccess.org helps arrange flights to legal abortion sites.

Other resources include Women on Web http://www.womenonweb.org/en/ and Planned Parenthood as a patient navigator or provider of abortions.

To get help with funding: National Network of Abortion Funds https://abortionfunds.org/ or https://prochoice.org/

Locating Plan C pills: https://www.plancpills.org/?gclid=CjwKCAjw_b6WBhAQEiwAp4HyIKGkcL2gncj28MXzfN1eONGC4a3p_I9FLRxf_4I_v8NZ5HqDD04JwxoC6LQQAvD_BwE

Help with a self-managed abortion: https://www.mahotline.org/

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

Chapter 162

Adolescent Sexual Assault

Allison M. Jackson, Adrianne R. Artis, and Norrell K. Atkinson

Rape is an act of violence, not an act of sex. Rape is historically defined as coercive sexual intercourse involving physical force or psychologic manipulation of a female or a male. Recognizing that sexual intercourse is not a requirement for the definition, the U.S. Department of Justice (DOJ) defines rape as "the penetration, no matter how slight, of the vagina or anus with any body part or object, or oral penetration by a sex organ of another person, without the consent of the victim." Though definitions may vary by state, **sexual assault** is a more inclusive term that according to the U.S. DOJ "means any nonconsensual sexual act proscribed by Federal, tribal, or State law, including when the victim lacks capacity to consent."

EPIDEMIOLOGY

Exact figures on the incidence of rape are unavailable because sexual assault is underreported. In the 2019 National Crime Victimization Survey, only 0.56 per 1,000 persons over 12 years of age reported sexual assault to police. According to the National Intimate Partner and Sexual Violence Survey of 2015 (NISVS 2015), over 43% women and nearly 25% of men experienced some form of **sexual violence** in their lifetime. Females exceed males as reported rape victims, but male rape may be more underreported than female rape.

Adolescence is a high-risk age-group for sexual assault, with 43.2% of females and 51.3% of males experiencing their first sexual assault before the age of 18 years, and 81.3% of females and 70.8% males experiencing their first sexual assault before the age of 25 years (NISVS 2015). Between 1995 and 2013 the rate of rape and sexual assault was highest for adolescent females between ages 18 and 24 years. The National Survey of Children's Exposure to Violence (NatSCEV 2014) revealed that 12.9% of 14- to 17-year-olds experienced any sexual victimization in the past year, 21.7% had experienced any sexual victimization in their lifetime, 4.2% experienced sexual assault in the past year, and 10.2% in their lifetime. This survey also demonstrated how other experiences with violence compound the risk for sexual victimization. Youth with a history of maltreatment by a caregiver were four times more likely to experience sexual victimization and more than four times more likely to experience sexual victimization if they were a witness to violence. Among older adolescents age 18-24 years, the rate of rape and sexual

assault was 1.2 times higher for those not enrolled in college than those in college. Further, several studies of youth in the juvenile justice system demonstrate a particularly high prevalence of prior sexual victimization of young females in that setting. Rape occurs worldwide and is especially prevalent in war and armed conflicts. The World Health Organization estimates that rape and domestic violence are responsible for 5–16% of healthy years of life lost by females of reproductive age.

Female adolescents and young adults have the highest rates of rape compared to any other age-group. The normal developmental growth tasks of adolescence may contribute to this vulnerability in the following ways: (1) the emergence of independence from parents and the establishment of relationships outside the family may expose adolescents to environments with which they are unfamiliar and situations that they are unprepared to handle; (2) dating and becoming comfortable with one's sexuality may result in activities that are unwanted, but the adolescent is too inexperienced to avoid the unwanted actions; and (3) young adolescents may be naïve and more trusting than they should be (see Chapter 150). Many teens are technologically competent, which gives sexual perpetrators access to unsuspecting vulnerable populations who were previously beyond their reach. Social media and online dating sites represent a major risk for adolescents, as they facilitate correspondence with individuals unknown to them or protective family members, while simultaneously providing a false sense of security because of remote electronic communications. A determined perpetrator can obtain specific information to identify the adolescent and arrange for a meeting that is primed for sexual victimization.

Some adolescents are at higher risk of being victims of rape than others (Table 162.1).

TERMINOLOGY

Sexual violence is a term that broadly encompasses criminal acts including **sexual assault**, **rape** and **sexual abuse**, and which disproportionately affects adolescents and young adults. Because of the prevalence of sexual violence in the adolescent population, it is important for healthcare providers to have a general understanding of the types of sexual violence that may affect children and adolescents. Providers should also be aware that every state carries their own legal definition of these crimes. These definitions dictate if or how a crime is prosecuted, which could affect survivors who have disclosed sexual violence.

Delayed disclosures of sexual violence are common. The circumstances and relationship of the assailant to the survivor can often affect if, when, and how a child or youth discloses an assault. Sexual violence is typically perpetrated by someone who knows their victim; less frequently the assailant is a stranger. The gender of the survivor may also affect the disclosure process. Males are less likely to disclose sexual violence compared with females. Individuals who are transgender, gender nonconforming, nonbinary, or other noncisgender identities are less likely to disclose sexual assault than those who identify as cisgender.

Table 162.1 Adolescents at High Risk of Rape Victimization

MALE, FEMALE, NONBINARY ADOLESCENTS
Drug and alcohol users
Runaways
Those with intellectual disability or developmental delay
Street youths
Transgender youth
Youths with a history of sexual abuse
PRIMARILY FEMALES
Survivors of prior sexual assault
Newcomers to a town or college
PRIMARILY MALES
Those in institutionalized settings (detention centers, prison)
Gay males

In any scenario where rape is facilitated by threats, coercion, physical force, or illicit and/or legal substances, the disclosure process for a survivor of sexual assault can be impacted.

TYPES OF SEXUAL VIOLENCE

Sexual assault is defined as sexual contact or behavior that occurs without explicit consent of the victim. It can include things such as attempted rape, rape, fondling, or forcing a person to perform sexual acts. It is important to remember that force is not always physical, but it can also be intimidation or coercive control of the person. Force may also include threatening to hurt the person or those close to them.

Rape is a form of sexual assault involving penetration. Not all sexual assaults are rape. Rape can further be defined as **stranger rape** vs **acquaintance rape**. **Intimate partner sexual violence** is a form of acquaintance rape. An intimate partner is defined as a person with which the survivor has had a close personal or sexual relationship; thus this form of sexual violence can be prevalent among adolescents. Intimate partner sexual violence can often start with controlling or emotionally abusive behaviors, which then escalate to assault.

Rape can frequently involve illicit and/or legal substances to facilitate the assault. Drug-facilitated rape involves perpetrators administering substances such as γ-hydroxybutyric acid (GHB), flunitrazepam (Rohypnol), and ketamine hydrochloride to their victim. More commonly, substances such as alcohol, tetrahydrocannabinoids (THC), benzodiazepines, stimulants, barbiturates, opioids, or other drugs are used during the course of an assault. Detection of these drugs requires a high index of suspicion, and a medical evaluation within 8-12 hours is necessary for prompt detection of these substances, Specific testing is used that is more sensitive than routine toxicology screens, which are often insufficient.

Sexual abuse is a type of child abuse (see Chapter 17). The American Academy of Pediatrics defines child sexual abuse as a child or adolescent who engages in sexual activities that they cannot comprehend, for which they are developmentally unprepared and unable to give informed consent, and/or when there is a violation of the legal or social taboos of society. It includes many things ranging from oral, genital, or anal contact and fondling by or of the child, to noncontact abuses, such as exhibitionism, voyeurism, or various forms of child exploitations such as pornography.

The **commercial sexual exploitation of children (CSEC)**, also known as **sex trafficking**, is a more complex form of sexual violence and is considered a form of child abuse (see Chapter 16). Sex trafficking is federally defined as the recruiting, harboring, transporting, providing, obtaining, patronizing, or soliciting of an individual through the means of force, fraud, or coercion for commercial sex. Although a pimp often personally recruits victims, they may use others to recruit. These youth may experience physical and sexual assault by the pimp as well as the "johns." Many of these youth have a history of child maltreatment, increasing their vulnerability to this form of abuse. Fear of the consequences of disclosure and the survival skills acquired often yield a very guarded presentation in the healthcare setting.

Survivors of sexual violence often experience long-term symptoms related to the trauma they have sustained. Untreated trauma can negatively affect the physical and emotional health of an adolescent into adulthood. Engagement in trauma-focused therapy, combined with a supportive environment for the adolescent to grow, can help to mitigate the effects of the trauma that they have sustained. Providers should be knowledgeable of trauma-focused therapists in their community where adolescent survivors of sexual violence can receive care.

CLINICAL MANIFESTATIONS

The adolescent's acute presentation after a rape may vary considerably, from histrionics to near-mute withdrawal. Even if they do not appear afraid, most victims are extremely fearful and very anxious about the incident, the rape report, the examination, and the entire process, including potential repercussions. Because adolescents are between the developmental lines of childhood and adulthood, their responses to rape may have elements of both child and adult behaviors. Many teens,

particularly young adolescents, may experience some level of cognitive disorganization.

Adolescents may be reluctant to report rape for a variety of reasons, including self-blame, fear, embarrassment, or in the circumstances of drug-facilitated rape, uncertainty of event details. Adolescent victims, unlike child victims who elicit sympathy and support, often face intense scrutiny regarding their credibility and inappropriately misplaced societal blame for the assault. This view is baseless and should not be used during an evaluation of any teenage victim of sexual violence. When adolescents do not report a rape, they may present at a future date with concerns for pregnancy; symptoms of or concerns for a sexually transmitted infection (STI); and symptoms of posttraumatic stress disorder (see Chapter 38), such as sleep disturbances, nightmares, mood swings, and flashbacks. Other teens may present with psychosomatic complaints or difficulties with schoolwork. All adolescents should be screened for possible sexual victimization at health examination visits.

INTERVIEW AND PHYSICAL EXAMINATION

The purpose of the adolescent medical evaluation after a sexual assault is to provide medical care for the teen and to collect and document evidence of the assault when applicable. Although many teens delay seeking medical care, others present to a medical facility within 72 hours (or up to 96 hours depending on the protocol used) of the rape, at which time forensic evidence collection should be offered to the patient. Whether presenting acutely or more remotely, a comprehensive physical exam is recommended to the extent that the patient allows. Experienced clinicians with training and knowledge of forensic evidence collection and medical-legal procedures should complete the rape evaluation or supervise the evaluation when possible.

The clinician's responsibilities are to provide support, obtain the history in a nonjudgmental and noncoercive manner, conduct a complete examination without retraumatizing the victim, and collect forensic evidence. The clinician must complete laboratory testing, administer prophylaxis treatment for STIs and emergency contraception, arrange for counseling services, and file a report to appropriate authorities in accordance with the law. In some jurisdictions, healthcare professionals are required to report all sexual assaults of minors regardless of the relationship of the victim to the perpetrator. Although healthcare professionals are legally mandated to report sexual abuse, when the perpetrator is an acquaintance or stranger, some jurisdictions leave the decision of reporting up to the victim, requiring the victim to report the sexual assault. It is not the clinician's responsibility to decide whether a sexual assault has occurred; the legal system will make that determination. Furthermore, absence of injury does not exclude the possibility that sexual assault occurred.

Ideally, a clinician trained in forensic interviewing should obtain the history. In all cases, the history should be obtained by asking *only* open-ended questions to obtain information about (1) what happened, (2) where it happened, (3) when it happened, and (4) who did it. After obtaining a concise history, including details of the type of physical contact that occurred between the victim and the assailant, the clinician should conduct a thorough and complete physical examination and document all injuries (nongenital and genital). Clinicians should provide sensitive, nonjudgmental support during the entire evaluation, as the adolescent victim has experienced a major trauma and is susceptible to retraumatization during this process. Each component of the evaluation should be explained in detail to the victim, allowing the adolescent as much control as possible, including refusal to complete any part or all of the forensic evidence collection process. For sensitive examinations like these, a chaperone should be offered. Additionally, it is often useful to permit a trusted supportive person, such as a family member, friend, or rape crisis advocate, to be present during the evaluation if that is the adolescent's wish.

The examining clinician should be familiar with **forensic evidence collection** and the physical evidence recovery kit (PERK) before initiating the examination. In the United States, each state's PERK is different, but most include some or all of the following components: swabs of suspected semen deposits, swabs of bite mark impressions to collect genetic markers (DNA, ABO group); swabs of any penetrated orifice or body surface where saliva may be present; and documentation of acute cutaneous injuries using body diagram charts and photographs with visible standard measurements. Areas of restraint should be carefully inspected for injuries; these areas include the extremities and neck. Inspection of the skin may also reveal suction injuries or bite impressions. Inspection of the mouth, with particular attention to the oral frenula and palate, may reveal mucosal injury. Although use of alternative light sources, such as the Wood lamp or blue light, enhance detection of semen and saliva, other common substances such as urine and lotion also fluoresce with alternative light sources. Swabs of sites that fluoresce under such light should be obtained for further forensic analysis.

The genital examination of a female rape victim should be undertaken with the patient in the lithotomy position. The prone knee-chest position may be used as an exam-clarifying technique, specifically to evaluate the posterior rim of the hymen and perianal area. The genital exam of a male rape victim should be undertaken with the patient in the supine position. The clinician's exam should include careful inspection of the entire pelvic, genital, and perianal areas. The clinician should document any acute injuries such as edema, erythema, petechiae, bruising, hemorrhage, or tearing. Aqueous solution of toluidine blue (1%), which adheres to nucleated cells, may be used during the acute examination to improve visualization of microtrauma in the perianal area. Any disruption to the superficial epidermis will allow for dye uptake and thus cannot differentiate between disruption of the skin from trauma, irritation, or infection. Additionally, a colposcope may be used to provide magnification and photo documentation of injuries.

LABORATORY DATA

When adolescents present for medical care within 72-120 hours of a sexual assault, a forensic evidence collection kit should be offered to the patient. The time frames of eligibility for forensic evidence collection vary according to jurisdiction, so it is important to know the criteria of the jurisdiction investigating the assault. Regardless of an adolescent's decision to have evidence collection completed, medical care, including physical examination, laboratory testing (Table 162.2), and prophylactic therapies, should be offered to the patient. Follow-up evaluations should be scheduled to repeat these laboratory studies.

TREATMENT

Treatment includes **prophylactic antimicrobials** for STIs (see Chapter 163) and emergency contraception (see Chapter 160.6). The Centers for Disease Control and Prevention (CDC) reports that trichomoniasis, bacterial vaginosis, gonorrhea, and chlamydia are the most frequently diagnosed infections among women who have been sexually assaulted. Antimicrobial prophylaxis is recommended for adolescent rape victims because of the risk of acquiring an STI and the risk of pelvic inflammatory disease (Table 162.3). HIV **postexposure prophylaxis (PEP)** must be considered and an infectious disease specialist consulted if higher transmission risk factors are identified (e.g., knowing that the perpetrator is HIV-positive, significant mucosal injury of the victim) to prescribe a triple-antiretroviral regimen (Fig. 162.1). Hepatitis B infection can be prevented with immunoglobulin and/or vaccination depending on the victim's immunization status and the perpetrators status; thus similar considerations should be made for possible exposure

Table 162.2 Laboratory Evaluation of Sexual Assault

Within 8-12 hr (if Indicated by History)
- Urine and blood for date rape drugs (GHB, Rohypnol, and ketamine)

Within 24 hr (if Indicated by History)
- Blood for comprehensive toxicology screen (for other classes of drugs)

Within 72 hr (or up to 96 hr Depending on Protocol Used)
- Forensic evidence kit
- Pregnancy test
- Hepatitis B screen (hepatitis B surface antigen, surface antibody, and core antibody)
- Syphilis (rapid plasma reagin [RPR] or Venereal Disease Research Laboratory [VDRL])
- HIV (HIV 1/2 Ag/Ab immunoassay, point-of-care testing can be useful in persons unlikely to follow up with a provider)
- Bacterial vaginosis (BV) and candidiasis: point-of-care testing and/or wet mount of vaginal secretions with measurement of pH and KOH application for whiff test
- Trichomonas vaginalis: nucleic acid amplification tests (NAATs) by urine or vaginal specimen or point-of-care testing (i.e., DNA probes) from vaginal specimen
- Chlamydia and *Neisseria gonorrhoeae*: NAATs at sites of penetration or attempted penetration:
  - *N. gonorrhoeae:* oropharynx (*), rectum (*), urine (**)
  - *Chlamydia*: rectum (*), urine (**)

*Men who have sex with men (MSM) should be offered screening of gonorrhea and chlamydia if they report receptive oral or anal sex during the preceding year even if there was not contact at these sites during the assault.
**NAAT can be obtained on a dirty urine sample as an alternative to a genital swab.
From Centers for Disease Control and Prevention. Sexually transmitted diseases: treatment guidelines 2015, *MMWR Recomm Rep*. 2015;64(RR-3):1–140; and Updated guidelines for antiretroviral postexposure prophylaxis after sexual, injection drug use, or other nonoccupational exposure to HIV—United States, 2016. *MMWR Morb Mortal Wkly Rep*. 2016;65:458.

to the hepatitis B virus in vaccinated/unvaccinated individuals. Human papilloma virus (HPV) vaccination is also recommended because persons who have been sexually assaulted are also at risk for infection, and the efficacy of the HPV vaccine is high. Clinicians should review the importance for the patient's compliance with medical treatment, psychologic treatment, and follow-up care. Counseling should be provided about the symptoms of STIs and the need for urgent follow-up if symptoms develop. Abstinence from sexual intercourse should be recommended until the completion of the STI prophylactic course.

At the time of presentation, the clinician should address the need for follow-up care, including psychologic counseling. Adolescent victims are at increased risk of posttraumatic stress disorder, depression, self-abusive behaviors, suicidal ideation, delinquency, substance abuse, eating disorders, and sexual revictimization. It is important for the adolescent victim and parents to understand the value of timely counseling services to decrease these potential long-term sequelae. Counseling services should be arranged during the initial evaluation, with follow-up arranged with the primary care physician to improve compliance.

FOLLOW-UP

Follow-up evaluation should be arranged within 1 week of the initial evaluation with a child abuse pediatrician or a Child Advocacy Center to provide an opportunity for prompt review of STI test results, to monitor for medication adherence and possible side effects, to ensure healing and documentation of injuries, and to evaluate for the resolution of symptoms initially present, the development of new physical symptoms, or emerging mental health concerns. If no STI prophylaxis was given, follow-up testing for gonorrhea, chlamydia, and trichomonas can be repeated in 1-2 weeks after the assault. If prophylaxis was provided, follow-up testing is not needed unless symptoms develop. If infection in the assailant cannot be ruled out, serologic testing for syphilis can be repeated in 4-6 weeks and 3 months, and for HIV in 6 weeks and 3 months.

Table 162.3 Postexposure Prophylaxis (PEP) for Acute Sexual Assault Victims

ROUTINE	
Recommended regimen for STI prophylaxis	• Ceftriaxone 500 mg IM once in a single dose* PLUS • Doxycycline 100 mg orally twice a day for 7 days (azithromycin 1 g orally in a single dose should be considered in persons at high risk for noncompliance) PLUS (for females) • Metronidazole 500 mg orally twice a day for 7 days (2 g orally in a single dose should be considered in persons at high risk for noncompliance)
Pregnancy prophylaxis	Levonorgestrel (Plan B) 1.5 mg orally in a single dose ***Ulipristal acetate (Ella) 30 mg is effective for up to 120 hr*
HPV	Assess HPV vaccination history; vaccine should be provided at initial evaluation if unimmunized or partially immunized • If unimmunized and >15 yr at the time of the initial exam, give first dose and, two follow-up doses at 1-2 mo and 6 mo • If <15 yr, a single follow-up dose at 6-12 mo • If partially immunized, a follow-up dose if >5 mo since the first dose or >12 wk since the second dose
AS INDICATED	
HIV†	*Preferred regimen* • Tenofovir 300 mg and fixed-dose combination emtricitabine 200 mg (Truvada) once daily PLUS • Raltegravir 400 mg orally twice a day OR • Dolutegravir 50 mg orally once a day All persons with a potential exposure within 72 hours should be offered PEP, which includes a 28-day course of a three-drug antiretroviral regimen.
Hepatitis B	*Alternative regimens available.* Specific indications for vaccine, immunoglobulin, and/or booster depend on assailant's status

*If ≥150 kg, give 1 g of ceftriaxone IM once.
**Provided for patients with negative urine pregnancy screen. In addition, an antiemetic (Compazine, Zofran) can be prescribed for patients receiving emergency contraception.
†HIV PEP is provided for patients with penetration and when the assailant is known to be HIV-positive or at high risk because of a history of incarceration, intravenous drug use, or multiple sexual partners. If provided, laboratory studies must be drawn before administration of medication (HIV, CBC, LFTs, BUN/Cr, amylase, lipase), and follow-up must be arranged.
Data from Workowski, KA, Bachmann, LH, Chan, PA Sexually Transmitted Infections Treatment Guidelines, 2021. *MMWR Recomm Rep* 2021;70:128-135.

PREVENTION

Primary prevention may be accomplished through education of preadolescents and adolescents on the issues of consent, rape, healthy

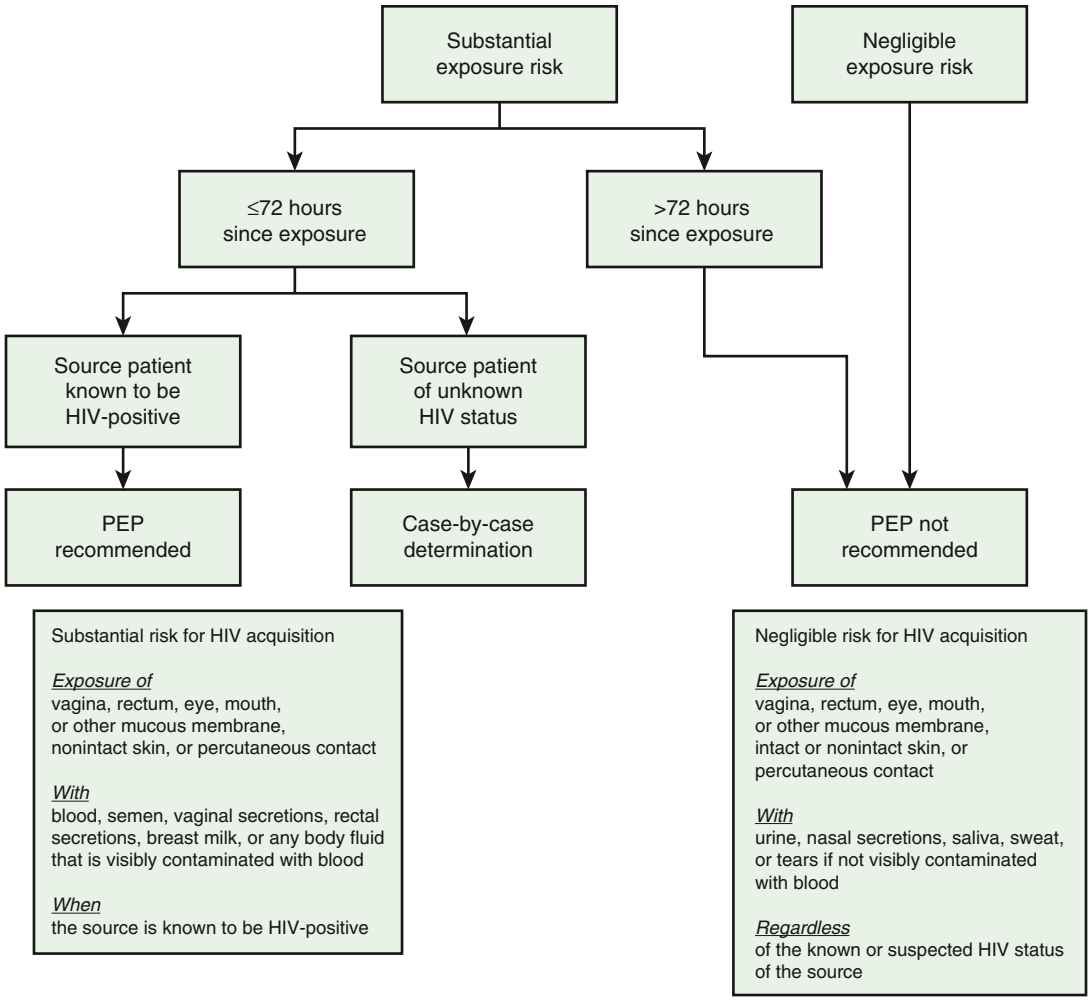

Fig. 162.1 Algorithm to evaluate the need for nonoccupational HIV postexposure prophylaxis among adult and adolescent survivors of sexual assault. *(From Workowski, KA, Bachmann, LH, Chan, PA. Sexually transmitted infections treatment guidelines, 2021. MMWR Recomm Rep. 2021;70:128–135; adapted from Announcement: updated guidelines for antiretroviral postexposure prophylaxis after sexual, injection-drug use, or other nonoccupational exposure to HIV—United States, 2016. MMWR Morb Mortal Wkly Rep. 2016;65:458.)*

relationships, internet dangers, and drug- and alcohol-facilitated rape. Prevention messages should be targeted at males, females, and nonbinary youth at high schools and colleges. Particular emphasis on prevention efforts during college orientation is highly recommended. High-risk situations that may increase the likelihood of a sexual assault should be discouraged, such as the use of drugs or alcohol, drinking from a container that has been left unattended, and accepting drinks from strangers. **Secondary prevention** includes informing adolescents of the benefits of timely medical evaluations when rape has occurred. Individual clinicians should ask adolescents about past experiences of forced and unwanted sexual behaviors and offer help in dealing with those experiences. The importance of prevention cannot be overstated because adolescents are disproportionately affected by sexual assault, and they are particularly vulnerable to long-term consequences.

Counseling services for family members of the victim may improve their ability to provide appropriate support to the adolescent victim. Caution parents not to use the assault as a validation of their parental guidance, as it will only serve to place blame inappropriately on the adolescent victim.

Visit Elsevier eBooks+ at eBooks.Health.Elsevier.com for Bibliography.

Chapter 163

Sexually Transmitted Infections

Tamera Coyne-Beasley, Nefertiti H. Durant, and Samantha V. Hill

Age-specific rates of many sexually transmitted infections **(STIs)** are highest among sexually experienced adolescents and young adults, after controlling for sexual activity. Although some STI pathogens present as STI syndromes with a specific constellation of symptoms, most are asymptomatic and only detected by a laboratory test. The approach to prevention and control of these infections lies in education, screening, and early diagnosis and treatment.

ETIOLOGY

Any adolescent who has had oral, vaginal, or anal sexual intercourse is behaviorally vulnerable to acquiring an STI. Not all adolescents are at equal risk; physical, behavioral, and social factors contribute to an adolescent's risk. Adolescents who initiate sex at a younger age; youth residing in detention facilities; youth attending STI clinics; youth involved in commercial sex exploitation or survival sex and exchange sex for drugs, money, food, or housing; young males having sex with males (YMSM); adolescent women and young adult women having sex with older men; transgender youth; youth with disabilities; and youth who are injection drug users are at higher risk for STIs. Risky behaviors, such as sex with multiple concurrent partners or multiple sequential partners of limited duration, failure to use barrier protection consistently and correctly, and increased biologic susceptibility to infection also contribute to risk (Table 163.1). Although all 50 states and the District of Columbia explicitly allow minors to consent for their own sexual health services (at varying ages), many adolescents encounter multiple obstacles to accessing this care, including poverty, insurance coverage, and fears of lack of confidentiality (see Table 163.1). Adolescents who are survivors of sexual assault need reassurance, protection, and appropriate intervention when these circumstances are uncovered (see Chapter 162).

Table 163.1 Circumstances Contributing to Adolescents' Susceptibility to Sexually Transmitted Infections

PHYSICAL
Younger age at puberty
Cervical ectopy
Smaller introitus leading to traumatic sex
Asymptomatic nature of sexually transmitted infection
Uncircumcised penis
BEHAVIOR INFLUENCED BY DEVELOPMENTAL STAGES
Early adolescence: Lack ability to think abstractly
Middle adolescence: Believe in uniqueness and lack of vulnerability
SOCIAL FACTORS
Poverty
Limited access to "adolescent-friendly" healthcare services
Adolescent health-seeking behaviors (forgoing care because of confidentiality concerns or denial of health problem)
Sexual abuse, trafficking, and violence
Lower levels of condom use
Mental health issues and substance use/abuse
Decreased access to confidential medical care leading complexity in seeking care
Homelessness
Young adolescent females with older partners
Young men having sex with men

Data from Wangu, G Burstein. Adolescent sexuality: updates to the Sexually Transmitted Infection Guidelines. *Ped Clin North Am.* 2017;64:389–341; and Spear LP. Adolescent neurodevelopment. *J Adolesc Health.* 2013;52:S7–S13.

EPIDEMIOLOGY

STI prevalence varies by age, gender, race, and ethnicity. In the United States, although adolescents and young adults ages 15-24 represent 25% of the sexually experienced population, this age-group accounts for almost 50% of all incident STIs each year.

Chlamydia is the most frequently reported infectious disease in the United States and is the second most common STI in U.S. adolescents and young adults after human papillomavirus (HPV). In 2019, young adult females ages 20-24 (3,797.8 cases per 100,000 females) followed by females ages 15-19 (2,697.0 cases per 100,000 females) had the highest rates of chlamydia in the United States (Fig. 163.1). Notably age-specific rates of reported cases of chlamydia among males, although substantially lower than rates among females, were still highest in young adult males 20-24 years (1,680.0 cases per 100,000 males). Chlamydia remains common among all races and ethnic groups. In 2021, a total of 1,644,416 cases of *Chlamydia trachomatis* infection were reported to the CDC, making it the most common notifiable sexually transmitted infection in the United States for that year. This case count corresponds to a rate of 495.5 cases per 100,000 population, an increase of 3.9% compared with the rate in 2020. During 2020 to 2021, rates of reported chlamydia increased among both males and females, in all regions of the United States, among most age groups, and among all race/Hispanic ethnicity groups. Rates of reported chlamydia are highest among adolescents and young adults. In 2021, almost two-thirds (58%) of all reported chlamydia cases were among persons aged 15–24 years.

Reported rates of other bacterial STIs are also high among adolescents and young adults. In 2021, gonorrhea rates among adolescents were 360.1/100,000 for males ages 15-19 compared to 587.8/100,000 for young women ages 15-19. Gonorrhea rates for young adult males ages 20-24 years old (844.2/100,000) were significantly higher than rates for males at any other age/sex group and slightly lower than for young women ages 20-24 (873.2/100,000).

Pelvic inflammatory disease (PID) is a clinical syndrome that results from the ascension of microorganisms from the cervix and vagina to the upper genital tract. PID is a serious complication of chlamydia and gonorrhea, two of the most common reportable infectious diseases and STIs in the United States. PID rates are highest among females ages 15-24 compared with older women.

Syphilis rates have increased at an alarming rate, especially among males, since 2000. In 2021, young adult males age 20-24 had the third highest rate of primary and secondary syphilis at 51.2 per 100,000. Rates among adolescent males ages 15-19 were lower at 12.0 per 100,000.

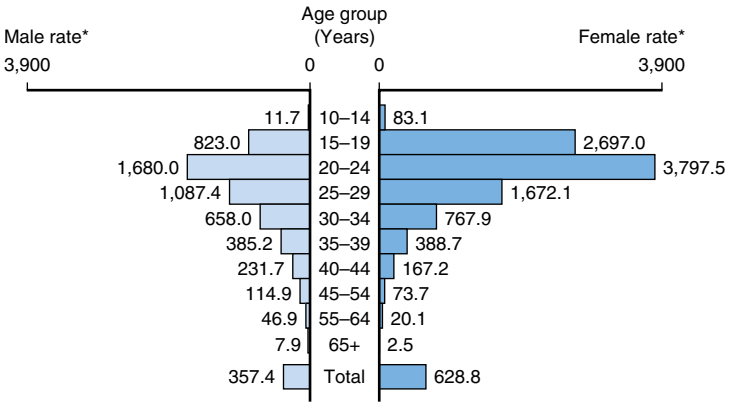

Fig. 163.1 Chlamydia: Rates of reported cases by age group and sex, United States, 2021. (*Data from the Centers for Disease Control and Prevention:* www.cdc.gov/std/statistics/2021/data.zip.)

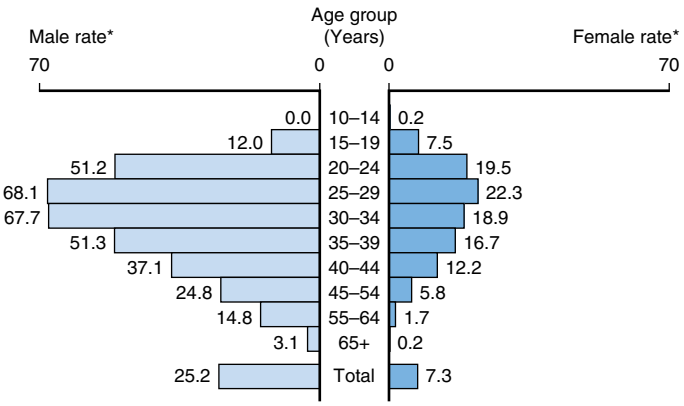

Fig. 163.2 Primary and secondary syphilis—Rates of reported cases by age group and sex, United States, 2021. (*Data from the Centers for Disease and Control and Prevention:* www.cdc.gov/std/statistics/2021/data.zip.)

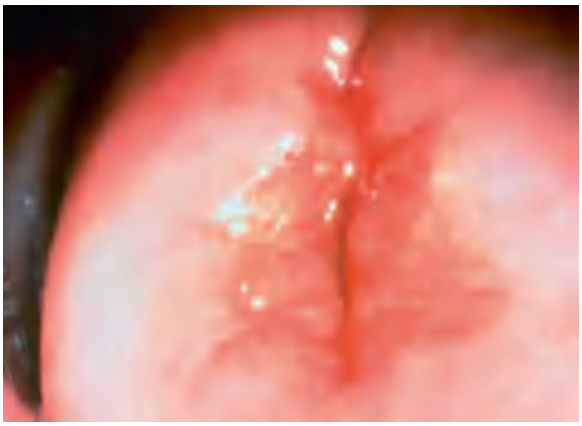

Fig. 163.3 Cervical ectopy. (*From Seattle STD/HIV Prevention Training Center, University of Washington, Claire E. Stevens.*)

Rates of female primary and secondary syphilis are much lower than male rates (7.5/100,000 among 15-19 year olds; 19.5/100,000 among 20-24 year olds).

Adolescents also carry a large burden of viral STIs. U.S. youth are at persistent risk for **HIV infection**. However, according to the 2021 Youth Risk Behavior Survey, only 6% of high school students have ever been tested for HIV. Adolescents (persons aged 13–19 years) and young adults (persons aged 20–24 years) accounted for 21% of the 36,801 diagnoses of HIV infection in 2019 in the United States and 6 dependent areas. They are the least likely of any age group to be aware of their HIV infection, retained in care, or have a suppressed viral load. From 2015 through 2019 in the United States and 6 dependent areas, the number of diagnoses of HIV infection among adolescents and young adults for males, females, and transgender MTF decreased. In 2019, diagnoses of HIV infection among adolescent and young adult males (85%) and females (12%) accounted for approximately 97% of HIV diagnoses. Transgender MTF adolescents and young adults accounted for 3% of annual diagnoses. From 2015 through 2019 in the United States, the rate of diagnosis of HIV infection for Asian, Black/African American, and multiracial adolescents decreased. The rates of diagnosis of HIV infection for Hispanic/Latino and White adolescents remained stable. In 2019, the highest rate was 23.5 for Black/African American adolescents, followed by 6.3 for Hispanic/Latino, and 4.2 for multiracial adolescents. Racial and ethnic disparities persist.

Human papillomavirus (HPV) is the most frequently acquired STI in the United States. According to the National Health and Nutrition Examination Survey (NHANES), prevalence of HPV vaccine types 6, 11, 16, and 18 **(4vHPV)** declined between the prevaccine (2003–2006) and vaccine (2009–2012) eras: from 11.5% to 4.3% among females ages 14-19 and from 18.5% to 12.1% among females ages 20-24. Within 6 years of introduction of the HPV vaccine, there was a 64% decrease in 4vHPV-type prevalence among female youth ages 14-19 and a 34% decrease among young adult women ages 20-24. Efforts are ongoing to improve vaccination among all youth.

Herpes simplex virus type 2 (HSV-2) is the most prevalent viral STI (see Chapter 299). According to NHANES data, prevalence of both HSV-1 and HSV-2 decreased from 1999–2000 to 2015–2016 (from 59.4% to 48.1% and from 18.0% to 12.1%, respectively). According to Centers for Disease Control and Prevention (CDC) data, seroprevalence for HSV-2 for adolescents ages 14-19 was low, at 0.8. It is important to note that among young adults ages 20-29, HSV-2 prevalence is higher, at 7.6%. Prevalence of HSV-1 among 14- to 19-year-olds was 27% compared to 41% among those ages 20-29. There are notable ethnic, racial, and gender disparities in HSV prevalence. Prevalence of HSV-1 was highest among Mexican American persons and lowest among non-Hispanic White persons. HSV-2 prevalence was highest among Hispanic Black persons and lowest among non-Hispanic Asian persons. Both HSV-1 and HSV-2 were higher among females than males.

PATHOGENESIS

During puberty, increasing levels of estrogen cause the vaginal epithelium to thicken and cornify and the cellular glycogen content to rise, with the latter causing the vaginal pH to fall. These changes increase the resistance of the vaginal epithelium to penetration by certain organisms (including *Neisseria gonorrhoeae*) and increase the susceptibility to others (*Candida albicans* and *Trichomonas*; see Chapter 330). The transformation of the vaginal cells leaves columnar cells on the ectocervix, forming a border of the two cell types on the ectocervix known as the *squamocolumnar junction*. The appearance is referred to as *ectopy* (Fig. 163.3). With maturation, this tissue involutes. Before involution, it represents a unique vulnerability to infection for adolescent females. The association of early sexual debut and younger gynecologic age with increased risk of STIs supports this explanation of the pathogenesis of infection in young adolescents.

SCREENING

Early detection and treatment are primary *STI control strategies*. Some of the most common STIs in adolescents, including HPV, HSV, chlamydia, and gonorrhea, are usually asymptomatic and, if undetected, can be spread inadvertently by the infected host. **Screening** initiatives for chlamydial infections have demonstrated reductions in PID cases by up to 40%. Federal and professional medical organizations recommend annual chlamydia and gonorrhea screening for sexually active females <25 years old (Table 163.2). The lack of a dialog about STIs or the provision of STI services at annual preventive service visits to sexually experienced adolescents is a missed opportunity for screening and education. Comprehensive, confidential, reproductive health services, including STI screening, should be offered to all sexually experienced adolescents (see Table 163.2).

COMMON INFECTIONS AND CLINICAL MANIFESTATIONS

STI syndromes are generally characterized by the location of the manifestation (vaginitis, enteritis) or the type of lesion (genital ulcer). Certain constellations of presenting symptoms suggest the inclusion of a possible STI in the differential diagnosis.

Urethritis

Urethritis is an STI syndrome characterized by inflammation of the urethra, usually caused by an infectious etiology. Urethritis may present with urethral discharge, dysuria, urethral irritation, or meatal pruritus. Urgency, frequency of urination, erythema of the urethral meatus, and urethral pain or burning are less common clinical presentations. Approximately 30–50% of males are asymptomatic but may have signs of discharge on diagnosis. On examination, the classic finding is mucoid or purulent discharge from the urethral meatus (Fig. 163.4). If no discharge is evident on exam, providers may attempt to

Table 163.2 Routine Laboratory Screening Recommendations for Sexually Transmitted Infections in Sexually Active Adolescents and Young Adults

CHLAMYDIA TRACHOMATIS AND *NEISSERIA GONORRHOEAE*

- Routine screening for *C. trachomatis* and *N. gonorrhoeae* of all sexually active females age <25 yr is recommended annually.
- Extragenital chlamydia and gonorrhea screening (pharyngeal or rectal) can be considered on the basis of reported sexual behaviors and exposure, through shared clinical decision-making between the patient and the provider.
- Routinely screen sexually active adolescent and young adult MSM at sites of contact for chlamydia (urethra, rectum) and gonorrhea (urethra, rectum, pharynx) at least annually regardless of condom use. NAAT is preferred for provider or self-collected specimens. More frequent screening (i.e., at 3- to 6-mo intervals) is indicated for MSM, including those taking PrEP and those with HIV infection, if risk behaviors persist or if they or their sex partners have multiple partners or anonymous partners or have sex with illicit drug use.
- Consider screening for *C. trachomatis* of sexually active adolescent and young adult males annually who have a history of multiple partners in clinical settings with high prevalence rates, such as jails or juvenile correction facilities, national job training programs, STD clinics, high school clinics, or adolescent clinics.

HUMAN IMMUNODEFICIENCY VIRUS (HIV)

The following recommendations apply to testing for HIV:

- HIV testing is recommended for all adolescents and young adults seeking STI evaluation and/or treatment who are not already known to have HIV infection. Testing should be routine at the time of the STI evaluation, regardless of whether the patient reports any specific behavioral risks for HIV.
- The CDC and USPSTF recommend HIV screening at least once for all persons age 13-64 yr or 15-65, respectively.
- Persons at higher risk for HIV acquisition, including sexually active gay, bisexual, and other MSM, should be screened for HIV at least annually. Providers can consider the benefits of offering more frequent screening (e.g., every 3-6 months) among MSM at increased behavioral risk for acquiring HIV.
- All pregnant adolescents should be tested for HIV during the first prenatal visit. A second test during the third trimester, preferably at <36 weeks' gestation, should be considered and is recommended for adolescents and young adults who are at high risk for acquiring infection.
- HIV screening should be voluntary and free from coercion. Patients should not be tested without their knowledge.
- Providers should use a laboratory-based antigen/antibody (Ag/Ab) combination assay as the first test for HIV, unless persons are unlikely to follow up with a provider to receive their HIV test results; in those cases screening with a rapid POC test can be useful.
- Providers should test for HIV RNA if initial testing according to the HIV testing algorithm recommended by the CDC is negative or indeterminate when concerned about acute HIV infection (https://stacks.cdc.gov/view/cdc/50872).
- HIV screening should be discussed and offered to all adolescents at least once by age 16-18 yr and throughout young adulthood in healthcare settings. HIV risk should be assessed annually for >13 yr and offered if HIV risk factors are identified.
- Routinely screen sexually active adolescent and young adult MSM at least annually regardless of condom use. More frequent screening (i.e., at 3- to 6-mo intervals) is indicated for MSM who have multiple or anonymous partners or who have sex with illicit drug use.

SYPHILIS

- Syphilis screening should be offered to sexually active adolescents reporting risk factors, including MSM.
- Routinely screen sexually active adolescent and young adult MSM at least annually regardless of condom use. More frequent screening (i.e., at 3- to 6-mo intervals) is indicated for MSM who have multiple or anonymous partners or who have sex with illicit drug use.
- Screen women at 1st prenatal visit, at 28 weeks, at delivery if at greater behavioral risk.
- Screen asymptomatic women who may have increased behavioral vulnerability (history of incarceration, transactional sex, higher rate in community).
- Providers should consult with their local health department regarding local syphilis prevalence and associated risk factors that are associated with syphilis acquisition.

HEPATITIS B VIRUS

- All MSM should be screened with HBsAg, HBV core antibody, and HBV surface antibody.
- Vaccination against both HAV and HBV is recommended for all MSM when a previous infection or vaccination cannot be documented.

HEPATITIS C VIRUS AND UNIVERSAL HEPATITIS C SCREENING

- The CDC recommends hepatitis C screening at least once in a lifetime for all adults age 18 yr and older, except in settings where the prevalence of HCV infection (HCV RNA positivity) is <0.1%.
- Hepatitis C screening for all pregnant women during each pregnancy, except in settings where the prevalence of HCV infection (HCV RNA positivity) is less than 0.1%.
- Screening adolescents younger than 18 yr old for HCV who report risk factors, that is, injection drug use, receipt of an unregulated tattoo, received blood products or organ donation before 1992, received clotting factor concentrates before 1987, or long-term hemodialysis.
- Given the high HCV prevalence among young injection drug users, screening should be strongly considered.
- All people living with HIV should be screened during the initial HIV evaluations and at least annually thereafter.
- Screening should be performed using HCV antibody assays followed by HCV RNA testing for those with a positive antibody test.
- Routine screening of adolescents and young adults who are asymptomatic for certain STIs (i.e., syphilis, trichomoniasis, BBV, HSV, HAV, and HB) is not typically recommended.

From Centers for Disease Control and Prevention: https://www.cdc.gov/std/treatment-guidelines/screening-recommendations.htm and https://www.cdc.gov/hepatitis/hcv/guidelinesc.htm.

express discharge by applying gentle pressure to the urethra from the base distally to the meatus 3-4 times. *Chlamydia trachomatis* and *N. gonorrhoeae* are the most commonly identified pathogens. *Mycoplasma genitalium* has been associated with urethritis, but data supporting *Ureaplasma urealyticum* have been inconsistent. *Trichomonas vaginalis* can cause nongonococcal urethritis (NGU), but the prevalence varies. HSV-1, HSV-2, and Epstein-Barr virus (EBV) are also potential urethritis pathogens in some cases. Sensitive diagnostic *C. trachomatis* and *N. gonorrhoeae* tests are available for the evaluation of urethritis. However, other pathogens can be considered when NGU is not responsive to treatment. Noninfectious causes of urethritis include urethral trauma or foreign body. Unlike in females, urinary tract infections (UTIs) are rare in males who have no genitourinary medical history. In the typical sexually active adolescent male, dysuria and urethral discharge suggest the presence of an STI unless proven otherwise.

Epididymitis

The inflammation of the epididymis in adolescent males is most often associated with an STI, most frequently *C. trachomatis* or *N. gonorrhoeae*. The presentation of unilateral scrotal swelling and tenderness, often accompanied by a hydrocele and palpable swelling of the epididymis, associated with the history of urethral discharge constitute the presumptive diagnosis of epididymitis. Males who practice insertive anal intercourse are also vulnerable to *Escherichia coli* infection. **Testicular torsion**, a surgical emergency usually presenting with sudden onset of severe testicular pain, should be considered in the differential

Fig. 163.4 Gonococcal urethral discharge. (*From Seattle STD/HIV Prevention Training Center, University of Washington, Connie Celum and Walter Stamm.*)

diagnosis (see Chapter 582). The evaluation for epididymitis should include obtaining evidence of urethral inflammation by physical exam, Gram stain of urethral secretions, urine leukocyte esterase test, or urine microscopy. A *C. trachomatis* and *N. gonorrhoeae* nucleic acid amplification test (NAAT) should be performed.

Vaginitis

Vaginitis is a superficial infection of the vaginal mucosa frequently presenting as vaginal discharge, with or without vulvar involvement (see Chapter 586). **Bacterial vaginosis**, **vulvovaginal candidiasis**, and **trichomoniasis** are the predominant infections associated with vaginal discharge. Bacterial vaginosis is caused by replacement of the normal hydrogen peroxide (H_2O_2)–producing *Lactobacillus* species vaginal flora by an overgrowth of anaerobic microorganisms, as well as *Gardnerella vaginalis, Ureaplasma,* and *Mycoplasma*. It is diagnosed based on an individual having at least three out of four of **Amsel's criteria**: (1) thin, gray, homogenous discharge, (2) vaginal pH >4.5, (3) fishy odor after the addition of potassium hydroxide (KOH) to discharge, and (4) at least 20% clue cells present on wet prep. It is important to note that research has shown there to be significant variability in providers' abilities to read wet preps; thus standardization of wet prep analysis via laboratories is recommended. BV NAATs are also available but should be used only by symptomatic women because accuracy has not been determined for asymptomatic women. Researchers do not know the cause of bacterial vaginosis or how some women acquire it. We do know the condition typically occurs in sexually active women. We also know that sexual activity is associated with increased frequency of bacterial vaginosis. Additionally, history of a diagnosis of bacterial vaginosis increases the risk of acquisition of other STIs. Vulvovaginal candidiasis, usually caused by *C. albicans,* can trigger vulvar pruritus, pain, swelling, redness, and dysuria. Findings on vaginal examination include vulvar edema, fissures, excoriations, or thick curdy vaginal discharge. Trichomoniasis is caused by the protozoan *T. vaginalis*. Infected females may present with symptoms characterized by a diffuse, malodorous, yellow-green vaginal discharge with vulvar irritation or may be diagnosed by screening an asymptomatic patient. Cervicitis can sometimes cause a vaginal discharge. Laboratory confirmation is recommended because clinical presentations may vary and patients may be infected with more than one pathogen.

Fig. 163.5 Mucopurulent cervical discharge positive swab test. (*From Seattle STD/HIV Prevention Training Center, University of Washington, Claire E. Stevens and Ronald E. Roddy.* http://www2a.cdc.gov/stdtraining/ready-to-use/pid.htm.)

Fig. 163.6 Inflamed cervix caused by gonococcal cervicitis. (*From Centers for Disease Control and Prevention: STD clinical slides.* http://www.cdc.gov/std/training/clinicalslides/slides-dl.htm.)

Cervicitis

The inflammatory process in cervicitis involves the deeper structures in the mucous membrane of the cervix uteri. Vaginal discharge can be a manifestation, but cervicitis is frequently asymptomatic. Patients also present with complaints of irregular or postcoital bleeding. Two major diagnostic signs characterize cervicitis: (1) a purulent or mucopurulent endocervical exudate visible in the endocervical canal or on an endocervical swab specimen (e.g., swab sign; Fig. 163.5), called **mucopurulent cervicitis** or cervicitis, and (2) sustained endocervical bleeding easily induced by gentle passage of a cotton swab through the cervical os, signifying friability. Cervical changes associated with cervicitis must be distinguished from cervical ectopy in the younger adolescent to avoid the overdiagnosis of inflammation (Fig. 163.6 and see Fig. 163.3). The pathogens identified most frequently with cervicitis are *C. trachomatis* and *N. gonorrhoeae,* although no pathogen is identified in most cases. HSV is a less common pathogen associated with ulcerative and necrotic lesions on the cervix.

Pelvic Inflammatory Disease

PID encompasses a spectrum of inflammatory disorders of the female upper genital tract, including **endometritis**, **salpingitis**, **tuboovarian abscess**, and **pelvic peritonitis**, usually in combination rather than as separate entities. *N. gonorrhoeae* and *C. trachomatis* predominate as the involved pathogenic organisms in younger adolescents (see Chapters 238 and 271), although PID should be approached as having

a multiorganism etiology, including pathogens such as anaerobes, *G. vaginalis, Haemophilus influenzae*, enteric gram-negative rods, and *Streptococcus agalactiae.* In addition, cytomegalovirus, *Mycoplasma hominis*, *U. urealyticum*, and *M. genitalium* may be associated with PID. PID (tuboovarian abscess) has rarely been reported in virgins and is usually caused by *E. coli* and associated in some patients with obesity and possible pooling of urine in the vagina.

PID is difficult to diagnose because of the wide variation in symptoms and signs. Many females with PID have subtle or mild symptoms, resulting in many unrecognized cases. Healthcare providers should consider the possibility of PID in young, sexually active females presenting with vaginal discharge or abdominal pain.

The clinical diagnosis of PID is based on the presence of at least one of the minimal criteria, either cervical motion tenderness, uterine tenderness, or adnexal tenderness, to increase the diagnostic sensitivity and reduce the likelihood of missed or delayed diagnosis. Providers should also consider that adolescents are the population in whom PID is typically diagnosed and thus should have a low threshold for initiating empirical treatment. In addition, the majority of females with PID have either mucopurulent cervical discharge or evidence of white blood cells (WBCs) on a microscopic evaluation of a vaginal fluid–saline preparation. If the cervical discharge appears normal and no WBCs are observed on the wet prep of vaginal fluid, the diagnosis of PID is unlikely, and alternative causes of pain should be investigated. Specific, but not always practical, criteria for PID include evidence of endometritis on biopsy, transvaginal sonography or MRI evidence of thickened, fluid-filled tubes, or Doppler evidence of tubal hyperemia or laparoscopic evidence of PID.

Enteritis

Among men who have sex with men (MSM), both *Chlamydia* and the gonococcus can cause enteric (colitis, proctitis) symptoms. In addition, infections with enteric pathogens (*Shigella, Campylobacter, Ameba)* have been noted.

Sepsis

Although there are rare urogenital tract cases of meningococcal infections with heterosexual intercourse (similar to gonococcus), men who have sex (particularly oral sex) with men are at increased risk for invasive meningococcal infections, which often occur as an outbreak. Meningococcus may colonize the pharyngeal, anal, or urethral mucosa. Meningococcemia must be distinguished from disseminated gonococcal infection (DGI), which will manifest with a gram-negative diplococci-positive blood culture along with tenosynovitis, septic arthritis, petechial/pustular rash, and less often, endocarditis.

Genital Ulcer Syndromes

An **ulcerative lesion** in a mucosal area exposed to sexual contact is the unifying characteristic of infections associated with genital ulcer syndromes. Genital ulcer lesions are most frequently seen on the penis and vulva, but also occur on oral and rectal mucosa, depending on the adolescent's sexual practices. HSV and *Treponema pallidum* (syphilis) are the most common organisms associated with genital ulcer syndromes. Table 163.3 presents the clinical characteristics differentiating the lesions of the most common infections associated with genital ulcers, along with the required laboratory diagnosis to identify the causative agent accurately.

Genital herpes, the most common ulcerative STI among adolescents, is a chronic, lifelong viral infection. Two sexually transmitted HSV types have been identified: HSV-1 and HSV-2. The majority of cases of recurrent genital herpes are caused by HSV-2. However, among young women and MSM, an increasing proportion of anogenital herpes has been HSV-1. Most HSV-2–infected persons are unaware of their diagnosis because they experience mild or unrecognized infections but continue to shed virus intermittently in the genital tract. Therefore most genital herpes infections are transmitted by asymptomatic persons who are unaware of their infection.

Although the initial herpetic lesion is a vesicle, by the time the patient presents clinically, the vesicle often has ruptured spontaneously, leaving a shallow, painful ulcer (Fig. 163.7A). Recurrences are generally less intense and painful (see Fig. 163.7B). Up to 50% of first genital herpes episodes are caused by HSV-1. However, recurrences and subclinical shedding are much more frequent for genital HSV-2 infection.

Syphilis is a less common cause of genital ulcers in adolescents than in adults. Syphilis is caused by *T. pallidum*. Primary syphilis presents as a single painless ulcer or chancre at the site of infection. However, it can also present with multiple atypical or painful lesions. Secondary syphilis manifestations include skin rash,

Table 163.3 Signs, Symptoms, and Presumptive and Definitive Diagnoses of Genital Ulcers

SIGNS/SYMPTOMS	HERPES SIMPLEX VIRUS	SYPHILIS (PRIMARY)	CHANCROID
Ulcers	Vesicles rupture to form shallow ulcers	Ulcer with well-demarcated, indurated borders and a clean base (chancre)	Nonindurated and undermined borders and a purulent base
Painful	Painful	Painless*	Painful
Number of lesions	Usually multiple	Usually single	Multiple
Inguinal lymphadenopathy	First-time infections may cause constitutional symptoms and lymphadenopathy	Usually mild and minimally tender	Unilateral or bilateral painful adenopathy in >50% Inguinal bubo formation and rupture may occur
Clinical suspicion	Typical lesions; positive HSV-2 type–specific virologic test from the lesion by NAAT or culture OR Type-specific serologic testing	A presumptive diagnosis requires two laboratory serologic tests, a nontreponemal test (i.e., VDRL or RPR), and a treponemal test (TP-PA] assay, various EIAs, chemiluminescence assays [CIA], and immunoblots or rapid treponemal assay)	If all four criteria are met: 1. ≥1 Painful genital ulcers 2. Typical ulcers and regional lymphadenopathy 3. No evidence of *T. pallidum* 4. HSV-1 or HSV-2 NAAT or HSV culture performed on the ulcer exudate or fluid are negative
Definitive diagnosis	Detection of HSV by culture or PCR from ulcer scraping or aspiration of vesicle fluid	Identification of *Treponema pallidum* from a chancre or lymph node aspirate on dark-field microscopy	Detection of *Haemophilus ducreyi* by culture

*Primary syphilitic ulcers may be painful if they become coinfected with bacteria or one of the other organisms responsible for genital ulcers.
EIA, Enzyme immunoassay; HSV, herpes simplex virus; PCR, polymerase chain reaction; RPR, rapid plasma reagin; VDRL, Venereal Disease Research Laboratories.
From https://www.cdc.gov/std/treatment-guidelines/default.htm

Fig. 163.7 A, Initial herpes infection showing multiple erosions with polycyclic outlines surrounded by an erythematous halo and associated with intense pain. B, Erosions surrounded by an erythematous halo. Clinical signs and symptoms of recurrences are usually less intense than those of initial infection. (*From Martín JM, Villalón G, Jordá E. Update on treatment of genital herpes. Actas Dermosifiliogr. 2009;100:22–32, Figs. 1 and 2.*)

mucocutaneous lesions, and lymphadenopathy in addition to other nonspecific symptoms (e.g., sore throat, malaise), gastrointestinal symptoms (e.g., hepatitis), and renal symptoms. Tertiary syphilis presents with cardiac involvement, gummatous lesions, tabes dorsalis, and general paresis. Latent syphilis lacks clinical manifestations and is detected by serologic testing. Latent syphilis acquired within the preceding year is referred to as *early latent syphilis*. Latent syphilis acquired at least 1 year prior is referred to as *late latent syphilis*. Infections of the central nervous system (CNS) (neurosyphilis), of the visual system (ocular syphilis), or auditory system (otosyphilis) can occur at any stage.

Lymphogranuloma venereum caused by *C. trachomatis* serovars L1-L3 is uncommon, although outbreaks do occur in MSM. In these circumstances, proctitis or proctocolitis is the usual manifestation. HIV is often present in affected men. Unusual infectious causes of genital, anal, or perianal ulcers in the United States and other industrialized countries include chancroid and donovanosis.

Monkeypox (see Chapter 767) has been reported after sexual contact, particularly among MSM.

The differential diagnosis of genital ulcers also includes Behçet disease (see Chapter 202), Crohn disease (see Chapter 382.2), aphthous ulceration, and acute genital ulcers caused by cytomegalovirus (see Chapter 302) or EBV (see Chapter 301). Acute genital ulcers often follow a flu or mononucleosis-like illness in an immunocompetent person and are unrelated to sexual activity. The lesions are 0.5-2.5 cm in size, bilateral, symmetric, multiple, painful, and necrotic and are associated with inguinal lymphadenopathy. This primary infection is also associated with fever and malaise. The diagnosis may require EBV titers or polymerase chain reaction (PCR) testing. Treatment is supportive care, including pain management.

Genital Lesions and Ectoparasites

Lesions that present as outgrowths on the surface of the epithelium and other limited epidermal lesions are included under this categorization of syndromes. HPV can cause genital warts and genital-cervical abnormalities that can lead to cancer (see Chapter 313). **Genital HPV** types are classified according to their association with cancer. Infections with low-risk types, such as **HPV types 6 and 11**, can cause benign or low-grade changes in cells of the cervix, genital warts, and recurrent respiratory papillomatosis. High-risk HPV types can cause cervical, anal, vulvar, vaginal, head, and neck cancers. **High-risk HPV types 16 and 18** are detected in approximately 70% of **cervical cancers**. Persistent infection increases the risk of cervical cancer. **Molluscum contagiosum** and **condyloma latum** associated with secondary syphilis complete the classification of genital lesion syndromes.

As a result of the close physical contact during sexual contact, common ectoparasitic infestations of the pubic area occur as **pediculosis pubis** or the papular lesions of **scabies** (see Chapter 709.2).

HIV, Hepatitis B, and Hepatitis C

HIV and hepatitis B virus (HBV) present as asymptomatic, unexpected occurrences in most infected adolescents. High vaccination coverage rates among infants and adolescents have resulted in substantial declines in acute HBV incidence among U.S.-born adolescents. Risk factors identified in the history or routine screening during prenatal care are much more likely to result in suspicion of infection, leading to the appropriate laboratory screening, than are clinical manifestations in this age-group (see Chapters 322 and 406). HIV incidence among adolescents has also declined, though disparities based on race, ethnicity, gender, and region persist. Young adults continue to be affected by HIV as well. The US Preventive Services Task Force (USPSTF) recommends all individuals between ages 15 and 65 be tested for HIV at least once in their life, and the CDC recommends HIV testing once between 13 and 64 and once a year based on behaviors. Hepatitis C virus (HCV) incidence continues to be on the rise not only among individuals known to be part of the "baby boomer" generation but also among young adults. Because of the rise in injection opioid use and HCV, the American Association for the Study of Liver Disease and Infectious Disease Society of America (AASLD–IDSA), and CDC recommend HCV screening among all individuals 18 years old and older. They also recommend screening based on risk behaviors among individuals younger than age 18 (see Table 163.2).

DIAGNOSIS

Most often, adolescents infected with bacterial and viral STI pathogens do not report symptoms suggestive of infection. With the use of very sensitive, noninvasive chlamydia and gonorrhea NAAT, providers are finding that most genital infections in females and many males are asymptomatic. A thorough sexual history is key to identifying adolescents who should be screened for STIs and for identifying those who require a laboratory diagnostic evaluation for an STI syndrome.

When eliciting a sexual health history, discussions should be appropriate for the patient's developmental level. In addition to questions regarding vaginal or urethral discharge, genital lesions, and lower abdominal pain among females, one should ask about prior treatment of any STI symptoms, including self-treatment using nonprescription medications. **Dyspareunia** is a consistent symptom in adolescents with **PID**. Providers must ask about oral or anal sexual activity to determine sites for specimen collection.

Urethritis should be objectively documented by evidence of inflammation or infectious etiology. Patient complaint without objective clinical or laboratory evidence does not fulfill diagnostic criteria. Inflammation can be documented by (1) observing urethral mucopurulent discharge, (2) ≥2 WBCs per high-power field on microscopic examination of Gram stain urethral secretions, (3) urine microscopic findings of ≥10 WBCs per high-power field of first-void urine specimen, or (4) a positive urine leukocyte esterase test of a first-void specimen. Laboratory evaluation is essential to identify the involved pathogens to determine treatment, partner notification, and disease control. *C. trachomatis* and *N. gonorrhoeae* NAATs of a urine specimen are recommended. The presence of gram-negative intracellular diplococci on microscopy obtained from a male urethral specimen confirms the diagnosis of gonococcal urethritis.

An essential component of the diagnostic evaluation of vaginal, cervical, or urethral discharge is a chlamydia and gonorrhea NAAT. NAATs are the most sensitive tests available in such cases and are licensed for use with urine, urethral, vaginal, and cervical specimens. Many of the chlamydia NAATs are approved by the U.S. Food and Drug Administration (FDA) to test patient-collected vaginal swabs in the clinical setting and liquid cytology specimens. Female vaginal swab specimens and male first-void urine are considered the optimal specimen types. Female urine remains an acceptable chlamydia and gonorrhea NAAT specimen, but it may have slightly reduced performance when compared with cervical or vaginal swab specimens. Urine is the recommended specimen for male urethral infection. Gonorrhea and chlamydia NAATs perform well on rectal and oropharyngeal specimens and can be performed by clinical laboratories that have completed the appropriate verification studies to obtain Clinical Laboratory Improvement Amendments (CLIA) approval.

Evaluation of adolescent females with **vaginitis** includes laboratory data. Traditionally, the cause of vaginal symptoms was determined by pH and microscopic examination of the discharge. However, CLIA-waived point-of-care vaginitis tests are available. Using pH paper, an elevated pH (i.e., >4.5) is common with bacterial vaginosis and trichomoniasis. Because pH testing is not highly specific, discharge should be further examined. For microscopic exam, a slide can be made with the discharge diluted in 1-2 drops of 0.9% normal saline solution and another slide with discharge diluted in 10% KOH solution. Examining the saline specimen slide under a microscope may reveal motile or dead *T. vaginalis* or clue cells (epithelial cells with borders obscured by small bacteria), which are characteristic of **bacterial vaginosis**. WBCs without evidence of trichomonads or yeast are usually suggestive of cervicitis. This evaluation has been consistently shown to be highly subjective, which is why there are more NAAT tests available for diagnosis. The yeast or pseudohyphae of ***Candida*** species are more easily identified in the KOH specimen (Fig. 163.8). The sensitivity of microscopy is approximately 50% and requires immediate evaluation of the slide for optimal results. Therefore lack of findings does not eliminate the possibility of infection. More sensitive point-of-care vaginitis tests include the OSOM Trichomonas Rapid Test (Sekisui Diagnostics, Lexington, MA), an immunochromatographic capillary flow dipstick technology with reported 83% sensitivity. The OSOM BVBLUE Test (Sekisui) detects

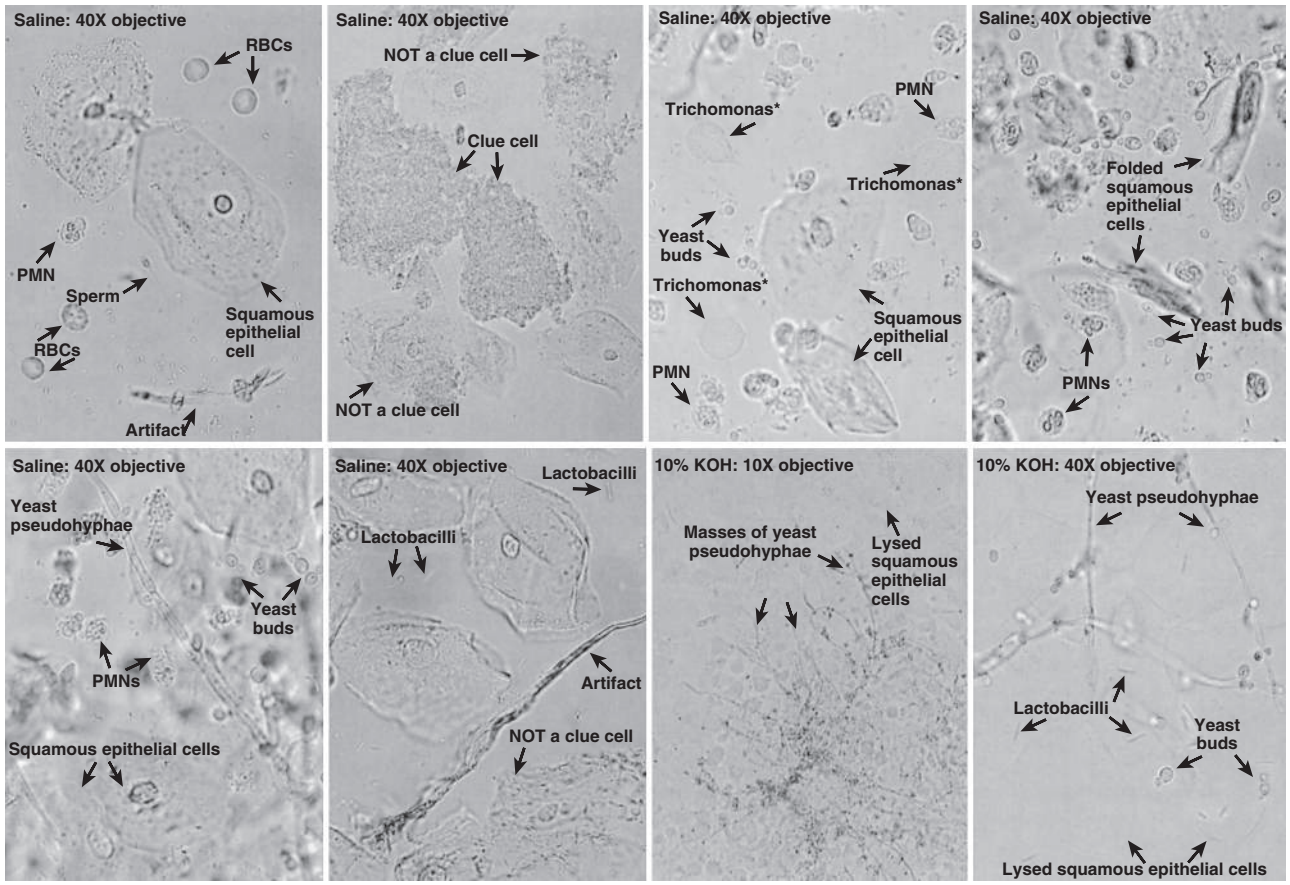

Fig. 163.8 Common normal and abnormal microscopic findings during examination of vaginal fluid. KOH, Potassium hydroxide solution; PMN, polymorphonuclear leukocyte; RBCs, red blood cells. (*From Adolescent Medicine: State of the Art Reviews, vol. 14, no. 2. Philadelphia: Hanley & Belfus; 2003:350–351.*)

Table 163.4 Pathologic Vaginal Discharge

INFECTIVE DISCHARGE	OTHER REASONS FOR DISCHARGE
COMMON CAUSES	COMMON CAUSES
Organisms	Retained tampon or condom
Candida albicans	Chemical irritation
Trichomonas vaginalis	Allergic responses
Chlamydia trachomatis	Ectropion
Neisseria gonorrhoeae	Endocervical polyp
Mycoplasma genitalium	Intrauterine device
Conditions	Atrophic changes
Bacterial vaginosis	LESS COMMON CAUSES
Acute pelvic inflammatory disease	Physical trauma
Postoperative pelvic infection	Vault granulation tissue
Postabortal sepsis	Vesicovaginal fistula
Puerperal sepsis	Rectovaginal fistula
LESS COMMON CAUSES	Neoplasia
Ureaplasma urealyticum	Cervicitis
Syphilis	
Escherichia coli	

From Mitchell H. Vaginal discharge—causes, diagnosis, and treatment. *BMJ.* 2004;328:1306–1308; and Sexually Transmitted Infections Treatment Guidelines, 2021: Vulvovaginal Itching, Burning, Irritation, Odor or Discharge: https://www.cdc.gov/std/treatment-guidelines/vaginal-discharge.htm.

Table 163.5 Evaluation for Pelvic Inflammatory Disease (PID)

2021 CDC DIAGNOSTIC CRITERIA

Minimal Criteria

- Cervical motion tenderness

or

- Uterine tenderness

or

- Adnexal tenderness

Additional Criteria to Enhance Specificity of the Minimal Criteria

- Oral temperature >38.3°C (101°F)
- Abnormal cervical or vaginal mucopurulent discharge*
- Presence of abundant numbers of WBCs on saline microscopy of vaginal secretions*
- Elevated ESR or C-reactive protein
- Laboratory documentation of cervical *Neisseria gonorrhoeae* or *Chlamydia trachomatis* infection

Most Specific Criteria to Enhance the Specificity of the Minimal Criteria

- Transvaginal sonography or MRI techniques showing thickened, fluid-filled tubes, with or without free pelvic fluid or tuboovarian complex, or Doppler studies suggesting pelvic infection (e.g., tubal hyperemia)
- Endometrial biopsy with histopathologic evidence of endometritis
- Laparoscopic abnormalities consistent with PID

Differential Diagnosis (Partial List)

- Gastrointestinal: appendicitis, constipation, diverticulitis, gastroenteritis, inflammatory bowel disease, irritable bowel syndrome
- Gynecologic: ovarian cyst (intact, ruptured, or torsed), endometriosis, dysmenorrhea, ectopic pregnancy, mittelschmerz, ruptured follicle, septic or threatened abortion, tuboovarian abscess
- Urinary tract: cystitis, pyelonephritis, urethritis, nephrolithiasis
- ESR, Erythrocyte sedimentation rate; WBCs, white blood cells

*If the cervical discharge appears normal and no WBCs are observed on the wet prep of vaginal fluid, the diagnosis of PID is unlikely and alternative causes of pain should be investigated.

Adapted from Centers for Disease Control and Prevention (CDC): https://www.cdc.gov/std/treatment-guidelines/pid.htm.

elevated vaginal fluid sialidase activity, an enzyme produced by bacterial pathogens associated with bacterial vaginosis, including *Gardnerella, Bacteroides, Prevotella,* and *Mobiluncus,* and has a reported 90% sensitivity. Both tests are CLIA waived, with results available in 10 minutes.

Clinical laboratory–based vaginitis tests are also available. The Affirm VPIII (Becton Dickenson) is a moderate-complexity nucleic acid probe test that evaluates for *T. vaginalis, G. vaginalis,* and *C. albicans* and has a sensitivity of 63% and specificity of >99.9%, with results available in 45 minutes. Some gonorrhea and chlamydia NAATs also offer an assay for *T. vaginalis* testing of female specimens tested for *N. gonorrhoeae* and *C. trachomatis,* considered the gold standard for *Trichomonas* testing.

Objective signs of vulvar inflammation in the absence of vaginal pathogens, along with a minimal amount of vaginal discharge, suggest the possibility of mechanical, chemical, allergic, or other noninfectious irritation of the vulva (Table 163.4).

The **definitive diagnosis of PID** is difficult based on clinical findings alone. Clinical diagnosis is imprecise, and no single historical, physical, or laboratory finding is both sensitive and specific for the diagnosis of acute PID. Clinical criteria have a positive predictive value of only 65–90% compared with laparoscopy. Although healthcare providers should maintain a low threshold for the diagnosis of PID, additional criteria to enhance the specificity of diagnosis, such as transvaginal ultrasonography, can be considered (Table 163.5).

Cell culture and PCR are the preferred **HSV tests**. Viral culture sensitivity is low, and intermittent viral shedding causes false-negative results. NAATs, including PCR assays for HSV DNA, are more sensitive and increasingly available for diagnosing genital HSV. The Tzanck test is insensitive and nonspecific and should not be considered reliable.

Accurate type-specific **HSV serologic assays** are based on the HSV-specific glycoproteins G2 (HSV-2) and G1 (HSV-1). Both laboratory-based point-of-care tests are available. Because almost all HSV-2 infections are sexually acquired, the presence of type-specific HSV-2 antibody implies anogenital infection. The presence of HSV-1 antibody alone is more difficult to interpret because of the frequency of oral HSV infection acquired during childhood. Type-specific HSV serologic assays might be useful in the following scenarios: (1) recurrent genital symptoms or atypical symptoms with negative HSV cultures; (2) a clinical diagnosis of genital herpes without laboratory confirmation; and (3) a patient with a partner with genital herpes, especially if considering suppressive antiviral therapy to prevent transmission.

For **syphilis testing**, nontreponemal tests, such as the rapid plasma reagin (RPR) or Venereal Disease Research Laboratories (VDRL), and treponemal testing, such as fluorescent treponemal antibody absorbed tests, the *T. pallidum* passive particle agglutination (TP-PA) assay, and various enzyme and chemiluminescence immunoassays (EIA/CIA), are recommended. However, many clinical laboratories have adopted a *reverse sequence* of screening in which a treponemal EIA/CIA is performed first, followed by testing of reactive sera with a nontreponemal test (e.g., RPR). Treponemal tests often remain positive for life, with only 15-25% becoming serologically nonreactive, if treated early in primary syphilis. A positive treponemal EIA or CIA test can identify both *previously treated and untreated or incompletely treated syphilis.* False-positive results can occur, particularly among populations with low syphilis prevalence. Persons with a positive treponemal screening test should have a standard nontreponemal test with titer (RPR or VDRL) to guide patient management decisions. If EIA/CIA and RPR/VDRL results are discordant, the laboratory should perform a different treponemal test to confirm the results of the initial test. Patients with discordant serologic results by EIA/CIA and RPR/VDRL testing whose sera are reactive by TP-PA testing are considered to have past or present syphilis; if sera is TP-PA nonreactive, syphilis is unlikely (Fig. 163.9).

Rapid HIV testing with third- and fourth-generation test results available in 10-20 minutes can be useful when the likelihood of adolescents returning for their results is low. Point-of-care CLIA-waived tests for whole blood finger stick (fourth generation) and oral fluid specimen (third generation) testing are available. Clinical studies have demonstrated that the rapid HIV test performance is comparable to those of EIAs. Because some reactive test results may be false positive, every reactive rapid test must be confirmed.

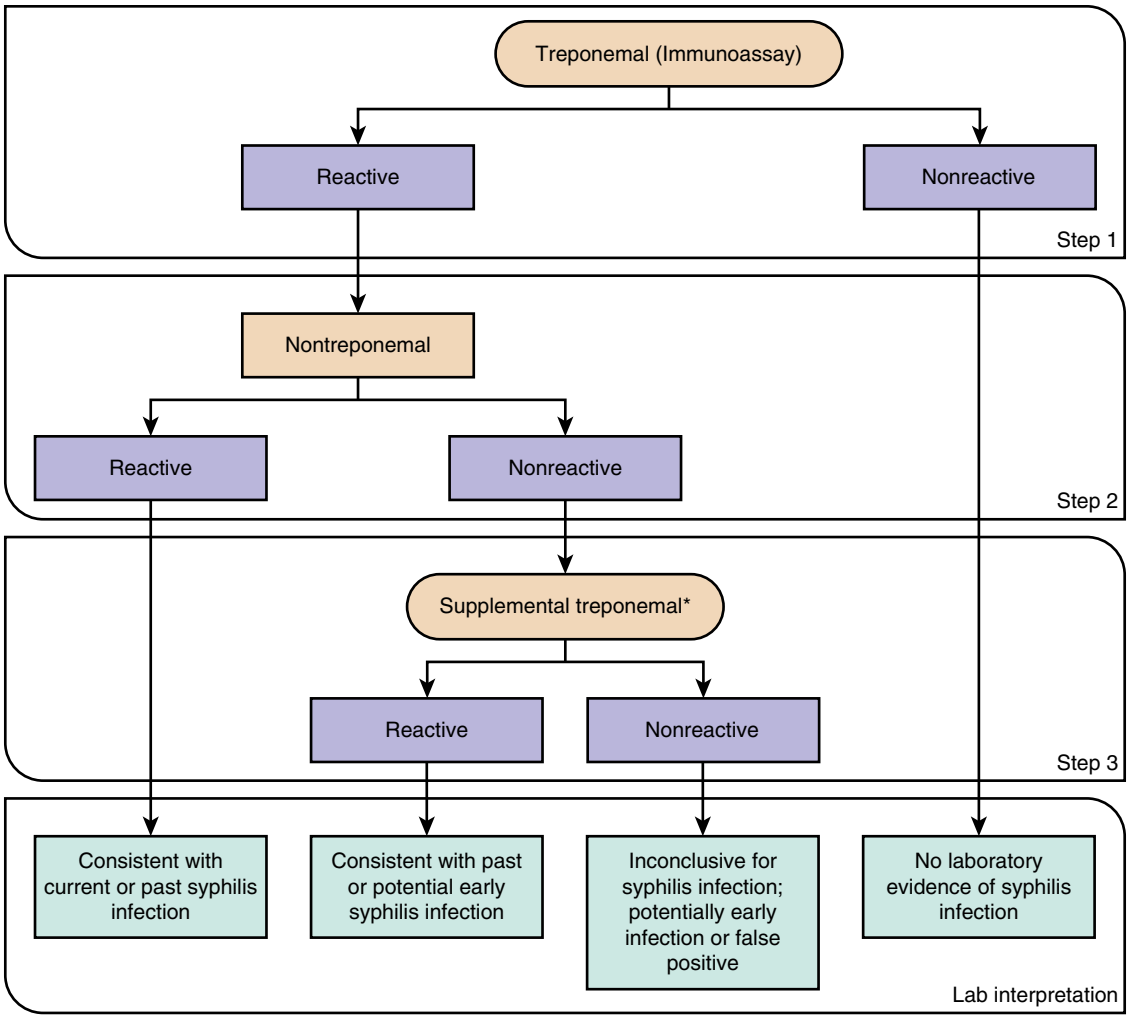

Fig. 163.9 Centers for Disease Control and Prevention (CDC)–recommended algorithm for reverse-sequence syphilis screening: Treponemal test screening followed by nontreponemal test confirmation. *The supplemental treponemal test should use a unique platform and/or antigen different from the first treponemal test. (*From Association of Public Health Laboratories. Suggested Reporting Language for Syphilis Serological Testing. Association of Public Health Laboratories August 2020* https://www.aphl.org/programs/infectious_disease/std/Documents/ID-2020Aug-Syphilis-Reporting-Language.pdf.)

Table 163.6 Management Guidelines for Uncomplicated Bacterial STIs in Adolescents and Adults

PATHOGEN	RECOMMENDED REGIMENS	ALTERNATIVE REGIMENS AND SPECIAL CONSIDERATIONS
Chlamydia trachomatis	Doxycycline 100 mg orally 2×/day for 7 days **For pregnancy:** Azithromycin 1 g orally in a single dose	Azithromycin 1 g orally in a single dose **OR** Levofloxacin 500 mg orally 1×/day for 7 days **For pregnancy:** Amoxicillin 500 mg orally 3×/day for 7 days
Neisseria gonorrhoeae (cervix, urethra, and rectum)	Ceftriaxone 500 mg IM in a single dose for persons weighing <150 kg If chlamydial infection has not been excluded, treat for chlamydia with doxycycline 100 mg orally 2×/day for 7 days For person weighing >150 kg, ceftriaxone 1g should be administered	**If cephalosporin allergy or unavailable:** Gentamicin 240 mg IM in a single dose **PLUS** Azithromycin 2 g orally in a single dose **OR** Cefixime 800 mg orally in a single dose
Neisseria gonorrhoeae (pharynx)	Ceftriaxone 500 mg IM in a single dose for person weighing <150 kg Ceftriaxone 1g IM for a person weighing ≥150 kg	
Treponema pallidum (primary and secondary syphilis or early latent syphilis, i.e., infection <12 mo)	Benzathine penicillin G 2.4 million units IM in a single dose	**Penicillin allergy:** Doxycycline 100 mg orally twice daily for 14 days or tetracycline 500 mg orally 4 times daily for 14 days; limited data suggest ceftriaxone 1-2 g daily either IM or IV for 10-14 days **OR** Azithromycin 2 g orally in a single dose has been effective, but treatment failures have been documented

Continued

Table 163.6 Management Guidelines for Uncomplicated Bacterial STIs in Adolescents and Adults—cont'd

PATHOGEN	RECOMMENDED REGIMENS	ALTERNATIVE REGIMENS AND SPECIAL CONSIDERATIONS
Treponema pallidum (late latent syphilis or syphilis of unknown duration)	Benzathine penicillin G 7.2 million units total, administered as three doses of 2.4 million units IM each at 1-wk intervals	**Penicillin allergy:** Doxycycline 100 mg orally twice daily for 28 days or tetracycline 500 mg orally 4 times daily for 28 days, with close serologic and clinical follow-up
Treponema pallidum (neurosyphilis, ocular syphilis, and otosyphilis)	Aqueous crystalline penicillin G 18-24 million units per day, administered as 3-4 million units by IV every 4 hr or continuous infusion, for 10-14 days	Procaine penicillin G 2.4 million units IM 1×/day for 10-14 days **PLUS** Probenecid 500 mg orally 4×/day for 10-14 days
Haemophilus ducreyi (chancroid: genital ulcers, lymphadenopathy)	Azithromycin 1 g orally in a single dose **OR** Ceftriaxone 250 mg IM in a single dose **OR** Ciprofloxacin 500 mg orally 2× daily for 3 days **OR** Erythromycin base 500 mg orally 3× daily for 7 days	
Chlamydia trachomatis serovars L1, L2, or L3 (lymphogranuloma venereum)	Doxycycline 100 mg orally 2× daily for 21 days	**Alternative:** Erythromycin base 500 mg orally 4× daily for 21 days **OR** Azithromycin 1 g orally once weekly for 3 wk

IM, Intramuscularly; IV, intravenously; NAAT, nucleic acid amplification test.
Adapted from Centers for Disease Control and Prevention. Sexually transmitted diseases: treatment guidelines, 2021. *MMWR Recomm Rep*. 2021;70:1–187, https://www.cdc.gov/std/treatment-guidelines/default.htm.

Table 163.7 Management Guidelines for Uncomplicated Miscellaneous Sexually Transmitted Infections in Adolescents and Adults

PATHOGEN	RECOMMENDED REGIMENS	ALTERNATIVE REGIMENS AND SPECIAL CONSIDERATIONS
Trichomoniasis	**Women:** Metronidazole 500 mg orally 2×/day for 7 days **Men:** Metronidazole 2 g orally in a single dose	For women and men: Tinidazole 2 g orally in a single dose
Phthirus pubis (pediculosis pubis, e.g., pubic lice)	Permethrin 1% cream rinse applied to affected areas and washed off after 10 min **OR** Pyrethrins with piperonyl butoxide applied to affected areas and washed off after 10 min Launder clothing and bedding	Malathion 0.5% lotion applied for 8-12 hr and washed off **OR** Ivermectin 250 μg/kg orally, repeat in 7-14 days
Sarcoptes scabiei (scabies)	Permethrin 5% cream applied to all areas of the body (from neck down), wash after 8-14 hr **OR** Ivermectin 200 μg/kg body weight orally, repeated in 14 days Launder clothing and bedding	Lindane (1%) 1 oz of lotion or 30 g of cream in thin layer to all areas of body from neck down; wash off after 8 hr

Adapted from Centers for Disease Control and Prevention. Sexually transmitted diseases: treatment guidelines. *MMWR*. 2021;64(RR-3); https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf.

TREATMENT

See Part XV for chapters on the treatment of specific microorganisms and Tables 163.6-163.8. Treatment regimens using nonprescription products for candidal vaginitis and pediculosis reduce financial and access barriers to rapid treatment for adolescents, but potential risks for inappropriate self-treatment and complications from untreated, more serious infections must be considered before using this approach. Minimizing noncompliance with treatment, notifying and treating the sexual partners, addressing prevention and contraceptive issues, offering available vaccines to prevent STIs, and making every effort to preserve fertility are additional physician responsibilities.

Chlamydia- and gonorrhea-infected males and females should be retested approximately 3 months after treatment, regardless of whether they believe that their sex partners were treated, or whenever persons next present for medical care in the 12 months after initial treatment. Adolescents who are pregnant with chlamydia and gonorrhea infections should be retested in approximately 1 month after treatment. Adolescents with oral gonorrhea should be retested in 7-14 days. Once an infection is diagnosed, partner evaluation, testing, and treatment are recommended for sexual contacts within 60 days of symptoms or diagnosis, or the most recent partner if sexual contact was >60 days, even if the partner is asymptomatic. Abstinence is recommended for at least 7 days

Table 163.8 Management Guidelines for Uncomplicated Genital Warts and Genital Herpes in Adolescents and Adults

PATHOGEN	RECOMMENDED REGIMENS	ALTERNATIVE REGIMENS AND SPECIAL CONSIDERATIONS
HUMAN PAPILLOMAVIRUS (HPV)		
External anogenital warts (penis, groin, scrotum, vulva, perineum, external anus, and perianus)	**Patient applied:** Imiquimod 3.75–5% cream self-applied to warts at bedtime nightly for up to 16 wk; wash off after 6-10 hr ***OR*** Podofilox 0.5% solution or gel self-applied to warts twice daily for 3 consecutive days each wk followed by 4 days of no therapy. May be repeated for up to four cycles. ***OR*** Sinecatechins 15% ointment self-applied 3 times daily for up to 16 wk. Do not wash off after use, and avoid genital, anal, and oral sexual contact while ointment is on skin. **Provider-administered:** Cryotherapy with liquid nitrogen or cryoprobe. Repeat applications every 1-2 wk. ***OR*** Surgical removal either by tangential scissor excision, electrocautery, tangential shave excision, curettage, laser or electrosurgery. ***OR*** Trichloroacetic acid (TCA) or bichloracetic acid (BCA) 80–90%; small amount applied only to warts and allowed to dry, when white "frosting" develops; can be repeated weekly.	**Provider administered:** Podophyllin resin 10–25% in a compound tincture of benzoin applied to each wart and then allowed to air-dry; thoroughly wash off after 1-4 hr; can be repeated weekly. Systemic toxicity has been reported when podophyllin resin was applied to large areas of friable tissue and was not washed off within 4 hr. Many persons with external anal warts also have **intraanal warts** and might benefit from inspection of anal canal by digital examination, standard anoscopy, or high-resolution anoscopy.
Cervical warts	Cryotherapy with liquid nitrogen ***OR*** Surgical removal ***OR*** TCA or BCA 80–90% solution Management should include consultation with a specialist.	
Vaginal warts	Cryotherapy with liquid nitrogen; avoid cryoprobe use because of risk for vaginal perforation and fistula formation. ***OR*** Surgical removal ***OR*** TCA or BCA 80–90%; small amount applied only to warts and allowed to dry, when white "frosting" develops; can be repeated weekly.	
Urethral meatal warts	Cryotherapy with liquid nitrogen ***OR*** Surgical removal	
Intraanal warts	Cryotherapy with liquid nitrogen ***OR*** Surgical removal ***OR*** TCA or BCA 80–90% applied to warts. A small amount should be applied only to warts and allowed to dry, at which time a white "frosting" develops. Can be repeated weekly.	Management of intraanal warts should include consultation with a specialist.
HERPES SIMPLEX VIRUS (HSV; GENITAL HERPES)		
First clinical episode	**Treat for 7-10 days with one of the following:** Acyclovir 400 mg orally 3× daily Valacyclovir 1 g orally 2× daily Famciclovir 250 mg orally 3× daily	Consider extending treatment if healing is incomplete after 10 days of therapy.
Episodic therapy for recurrences	**Treat with one of the following:** Acyclovir 800 mg orally 2× daily for 5 days Acyclovir 800 mg orally 3× daily for 2 days Valacyclovir 500 mg orally 2× daily for 3 days Valacyclovir 1,000 mg orally once daily for 5 days Famciclovir 1,000 mg orally 2× daily for 1 day Famciclovir 500 mg orally once, then 250 mg 2× daily for 2 days Famciclovir 125 mg orally twice daily for 5 days	Effective episodic treatment of recurrences requires initiation of therapy within 1 day of lesion onset or during the prodrome that precedes some outbreaks. The patient should be provided with a supply or a prescription for the medication with instructions to initiate treatment immediately when symptoms begin.
Suppressive therapy to reduce frequency of recurrences	**Treat with one of the following:** Acyclovir 400 mg orally 2× daily Valacyclovir 500 mg orally once daily* or 1 g orally once daily Famciclovir 250 mg orally 2× daily	All patients should be counseled regarding suppressive therapy availability, regardless of number of outbreaks per year. Because the frequency of recurrent outbreaks diminishes over time in many patients, providers should periodically discuss the need to continue therapy.

Continued

Table 163.8 Management Guidelines for Uncomplicated Genital Warts and Genital Herpes in Adolescents and Adults—cont'd

PATHOGEN	RECOMMENDED REGIMENS	ALTERNATIVE REGIMENS AND SPECIAL CONSIDERATIONS
Daily suppressive therapy in persons with HIV infection	Acyclovir 400-800 mg orally 2-3× daily ***OR*** Famciclovir 500 mg orally 2× daily ***OR*** Valacyclovir 500 mg orally 2× daily	If lesions persist or recur in a patient receiving antiviral treatment, acyclovir resistance should be suspected and a viral culture obtained for phenotypic sensitivity testing. Consultation with an infectious disease specialist is recommended.
Episodic infection in persons with HIV	Acyclovir 400 mg orally 3× daily for 7-10 days ***OR*** Famciclovir 250 mg orally 3×/day for 7-10 days ***OR*** Valacyclovir 1g orally 2× for 7-10 days	If lesions persist or recur in a patient receiving antiviral treatment, acyclovir resistance should be suspected and a viral culture obtained for phenotypic sensitivity testing. Consultation with an infectious disease specialist is recommended.
Daily suppressive therapy of recurrent genital herpes in pregnant women	**Treatment is recommended to start at 36 wk gestation:** Acyclovir 400 mg orally 3× daily ***OR*** Valacyclovir 500 mg orally 2× per day	

*Valacyclovir 500 mg once daily might be less effective than other valacyclovir or acyclovir dosing regimens in patients who have very frequent recurrences (i.e., ≥10 episodes per yr). Adapted from Centers for Disease Control and Prevention. Sexually transmitted diseases: treatment guidelines, *MMWR* 2021;64(RR-3): https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf.

Table 163.9 Option for Pre-Exposure Prophylaxis (PrEP) for HIV Prevention

GENERIC	DOSE	FREQUENCY	POPULATION
Tenofovir disproxil fumarate + emtricitabine (F/TDF)*	200 mg/300 mg	Daily pill	Any person weighing at least 35 kg
Tenofovir alafenamide +emtricitabine (F/TAF)	200 mg/25 mg	Daily pill	Individuals engaging in anal sex who are cis male, transwomen weighing at least 35 kg
Cabotegravir	200 mg/mL	Every 2 month injection	Any person weighing at least 35 kg

*F/TDF is also available by brand name and generic depending on insurance. It can also be used as intermittent dosing for cis-men and transwomen engaging in anal sex.

after both patient and partner have completed treatment. A test for pregnancy should be performed for all females with suspected PID because the test outcome will affect management. Repeat testing 3 months after treatment is also recommended for *Trichomonas* infection.

Diagnosis and therapy are often carried out within the context of a **confidential** relationship between the physician and the patient. Therefore the need to report certain STIs to health department authorities should be clarified at the outset. Health departments are Health Insurance Portability and Affordability Act (HIPAA) exempt and will not violate confidentiality. The health department's role is to ensure that treatment and case finding have been accomplished and that sexual partners have been notified of their STI exposure. **Expedited partner therapy (EPT)**, the clinical practice of treating sex partners of patients diagnosed with chlamydia or gonorrhea by providing prescriptions or medications to the patient to take to the partner without the healthcare provider first examining the partner, is a strategy to reduce further transmission of infection. In randomized trials, EPT has reduced the rates of persistent or recurrent gonorrhea and chlamydia infection. Serious adverse reactions are rare with recommended chlamydia and gonorrhea treatment regimens, such as doxycycline, azithromycin, and ceftriaxone. Transient gastrointestinal side effects are more common but rarely result in severe morbidity. Most states expressly permit EPT or may allow its practice. Resources for information regarding EPT and state laws are available at the CDC website.

PREVENTION

Healthcare providers should integrate comprehensive **sexuality education** into clinical practice with children from early childhood through adolescence. Providers should counsel adolescents regarding sexual behaviors associated with risk of STI acquisition and should educate using evidence-based prevention strategies, which include a discussion of abstinence and other risk reduction strategies, such as consistent and correct condom use, and distribution of educational materials for reinforcement. The USPSTF recommends **high-intensity behavioral counseling** to prevent STIs for all sexually active adolescents.

The following recommendations for the primary prevention of STIs through vaccination are based on published guidelines from the Advisory Committee on Immunization Practices:

- HPV vaccination is recommended through age 26 years for males and females not vaccinated previously at the routine age of 11 or 12 years. Vaccination can be started at age 9. Two doses of HPV vaccine are recommended for most persons starting the series before their 15th birthday; three doses are recommended at ≥ 15 years.
- The HBV vaccination series is recommended for all adolescents and young adults who have not previously received the universal HBV vaccine series during childhood.
- Mpox vaccination is recommended for gay, bisexual, transgender persons and if the patient has had sexual or intimate contact with someone who may have mpox. Mpox vaccination is a two-dose schedule separated by 4 weeks.

Preexposure prophylaxis (PrEP) offers another strategy to specifically prevent HIV infection (Table 163.9).

The CDC and USPSTF recommend offering HIV PrEP to adolescents weighing ≥35 kg and young adults who are HIV negative and