Adolescent Medicine

PART XIII

Chapter 110

Adolescent Development

See also Part XVI and Chapters 561 and 562.

110.1 Adolescent Physical and Social Development

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During the preteen, teenage, and young adult years, young people undergo not only dramatic changes in physical appearance, but also rapid changes in physiologic, psychological, 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 3 phases—early, middle, and late adolescence—each marked by a characteristic set of biologic, cognitive, and psychosocial milestones (Table 110-1). Although individual variations in the timing and pace of development undoubtedly exist, these changes follow a fairly predictable pattern of occurrence. Gender and culture profoundly affect the developmental course, as do physical, social, and environmental influences. Given the interaction of these domains, a biopsychosocial approach 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 of reproductive capacity. Adrenal production of androgen (chiefly **dehydroepiandrosterone sulfate [DHEAS]**) may occur as early as 6 yr of age, with development of underarm odor and faint genital hair (adrenarche). Maturation of the **gonadotropin-releasing hormone** pulse generator is among the earliest neuroendocrine changes associated with the onset of puberty. Under the influence of gonadotropin-releasing hormone, the pituitary gland secretes **luteinizing hormone** and **follicle-stimulating hormone**; initially this occurs in a pulsatile fashion primarily during sleep, but this diurnal variation diminishes throughout puberty. Luteinizing hormone and follicle-stimulating hormone stimulate corresponding increases in gonadal androgens and estrogens. The triggers for these changes are incompletely understood, but may involve the hormone leptin, high concentrations of which are associated with increased body fat and earlier onset of puberty.

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, preadolescence, to 5, sexual maturity)**, or **Tanner stages**. Figures 110-1 and 110-2 depict the physical findings of breast and pubic hair maturation at each SMR. Figures 110-3 and 110-4 depict the typical sequence of pubertal changes in males and females, respectively. The range of normal progress through sexual maturation is wide, and is affected by genetics, the psychosocial environment, nutrition, and overall health status. Environmental exposures may play a role as well.

In males, the first visible sign of puberty and the hallmark of SMR 2 is testicular enlargement, beginning as early as 9.5 yr, 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 luteinizing hormone and testosterone, the seminiferous tubules, epididymis, seminal vesicles, and prostate 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 2-3 as a consequence of a relative excess of estrogenic stimulation. This generally 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 8 and 12 yr 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 prior to menarche (physiologic leukorrhea). Menses typically begins 2.5 yr after the onset of puberty, during SMR 3-4 (average age: 12.5 yr; normal range: 9-15 yr) (see Fig. 110-4). The timing of menarche is determined largely by genetics; contributing factors likely include adiposity, chronic illness, nutritional status, and the psychosocial environment. Early menstrual cycles often are anovulatory, and therefore somewhat irregular, but typically occur every 21-45 days and include 3-7 days of bleeding.

The onset of puberty and menarche appear to be occurring at earlier ages than previously reported in the United States. Several studies from 1948-1981 identified the average age for the onset of breast development as ranging from 10.6-11.2 yr of age. Multiple reports since 1997 suggest a significantly earlier average age of onset, ranging from 8.9-9.5 yr in African-American females and 10.0-10.4 yr in white females. Nearly 25% of African-American females and 10% of white females initiate breast development by 7 yr of age. 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, a nationally representative, longitudinal survey in the United States, show a decline in the average age of menarche of 4.9 mo between the 1960s and 2002. Changes in the timing of menarche *within* ethnic groups, however, were significantly smaller. The larger change seen in the population as a whole may be partially explained by changes in the ethnic makeup of the sample. The reasons for the larger decrease in age for breast development have been postulated to include the epidemic of childhood obesity as well as exposure to estrogen-like environmental toxins (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 may 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 yr over the past several decades in many industrialized countries. An association of obesity with later onset of puberty in males has been theorized, but has not been consistently demonstrated.

Somatic Growth (See Also Fig. 13-1)

Linear growth acceleration begins in early adolescence for both genders, with 15-20% of adult height accrued during puberty. Females attain a peak height velocity (PHV) of 8-9 cm/yr at SMR 2-3, approximately 6 mo before menarche. Males typically begin their growth

Table 110-1 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 dependence/independence boundaries	• Conflicts over control and independence • Struggle for greater autonomy • Increased separation from the parents	• Emotional and physical separation from family • Increased autonomy • Reestablishment of "adult" relationship with parents
Peers	• Same-sex 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 • Questions of sexual orientation	• Consolidation of sexual identity • Focus on intimacy and formation of stable relationships • Planning for future and commitment

*See text and Figures 110-1 and 110-2.

acceleration at a later SMR stage, achieve a PHV of 9-10 cm/yr later in the course of puberty (SMR 3-4), and continue their linear growth for approximately 2-3 yr after females have stopped growing (Fig. 110-5). 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 composition changes as well, following the attainment of PHV. Males undergo an increase in lean body mass (sometimes referred to as the "strength spurt"), whereas females develop a higher proportion of body fat. Scoliosis, if present, may progress with rapid axial skeleton growth (see Chapter 679.1). One-half to ⅔ 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. Since skeletal growth precedes muscle 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 often results in myopia (see Chapter 620). Dental changes include jaw growth, loss of the final deciduous teeth, and eruption of the permanent cuspids, premolars, and finally, molars (see Chapter 307). 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 19).

NEUROLOGIC, COGNITIVE, AND MORAL DEVELOPMENT

Cognitive development correlates more closely with chronologic age than pubertal maturation. 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. Since adolescents' decision-making and subsequent behaviors are the largest determinants of their mortality and morbidity, understanding these cognitive processes is of critical importance.

The belief that major structural brain development is completed in childhood is outdated. It is now clear that neuromaturation continues into the third decade. This maturation is characterized by decreases in gray matter, increases in white matter, and an apparent increase in the efficiency of communication and connectivity between different brain regions. Gray matter volume peaks in the frontal lobes in preadolescence, then decreases. This decrease is a consequence of selective "pruning" of rarely used synaptic connections. Increased white matter volume is believed to reflect increasing myelination and subsequent

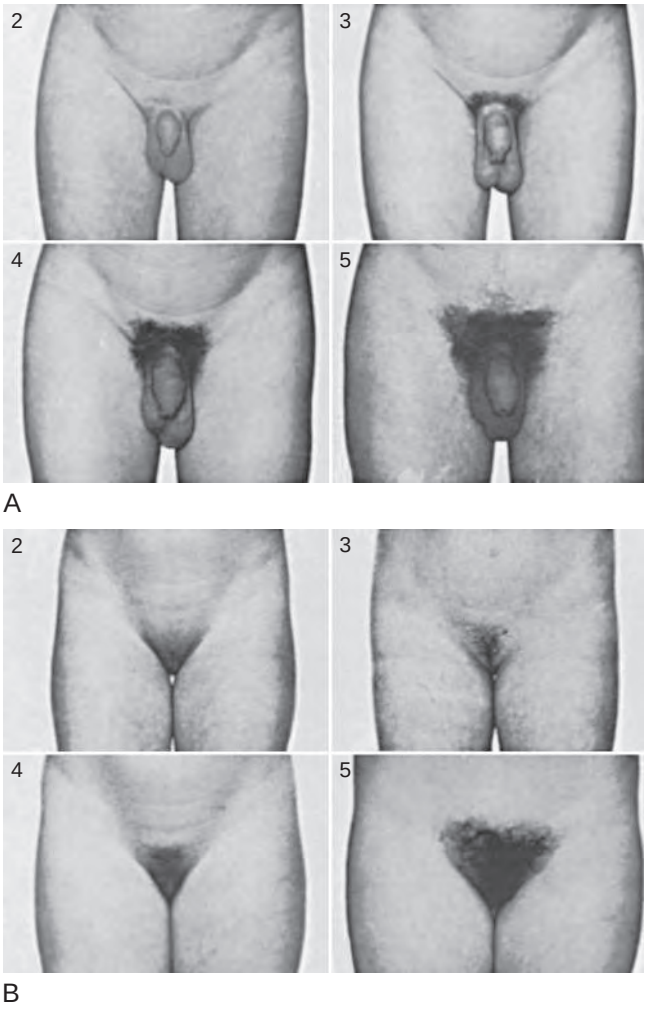


Figure 110-1 Sexual maturity ratings (2-5) of pubic hair changes in adolescent males *(A)* and females *(B)* (see Tables 110-2 and 110-3). *(Courtesy of J.M. Tanner, MD, Institute of Child Health, Department for Growth and Development, University of London, London, England.)*

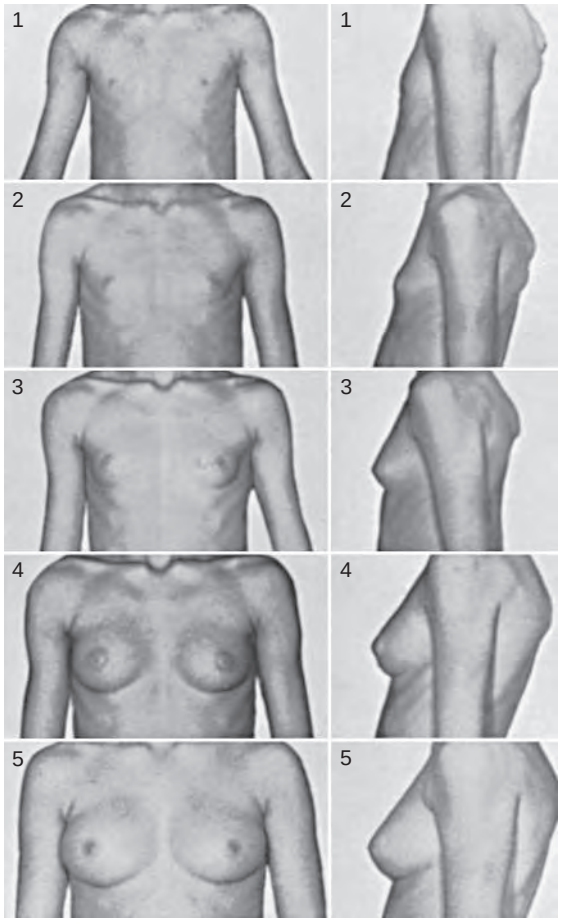


Figure 110-2 Sexual maturity ratings (1-5) of breast changes in adolescent females. *(Courtesy of J.M. Tanner, MD, Institute of Child Health, Department for Growth and Development, University of London, London, England.)*

facilitation of integrated brain activity and more efficient transmission of information between different regions of the brain. These changes are first seen in the posterior cortex (sensory and motor regions), and progress anteriorly (Fig. 110-6). The frontal lobes are among the last areas of the brain to mature, including the prefrontal cortex, the region of the brain associated with executive function: the coordination of complex cognitive processes including impulse control, working memory, the consideration of multiple options and their possible consequences, and the evaluation of risk and reward, among others. (see Chapter 7).

The behavioral correlates of these anatomical changes are speculative; adolescent behaviors may in part be biologically driven and reflect the relative immaturity of the prefrontal cortex and its communication with other regions of the brain. The earlier maturation of the amygdala and other limbic structures, which are involved in the experience of fear and emotion, relative to the frontal executive function systems, which facilitate the regulation and interpretation of those emotional experiences, could explain why adolescents are more likely to make poor decisions in highly emotionally charged situations, relative to mature adults. These so-called "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 2 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

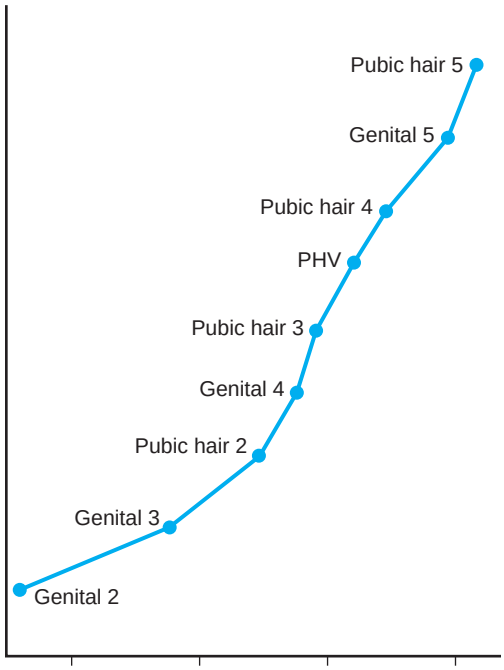


Figure 110-3 Sequence of pubertal events in males. PHV, peak height velocity. *(From Root AW: Endocrinology of puberty,* J Pediatr *83:1, 1973.)*

Table 110-2 Sexual Maturity Rating 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

SMR, sexual maturity rating.
From Tanner JM: Growth at adolescence, *ed 2, Oxford, England, 1962, Blackwell Scientific.*

Table 110-3 Sexual Maturity Rating Stages in Males

SMR STAGE	PUBIC HAIR	PENIS	TESTES
1	None	Preadolescent	Preadolescent
2	Scanty, 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

SMR, sexual maturity rating.
From Tanner JM: Growth at adolescence, *ed 2, Oxford, England, 1962, Blackwell Scientific.*

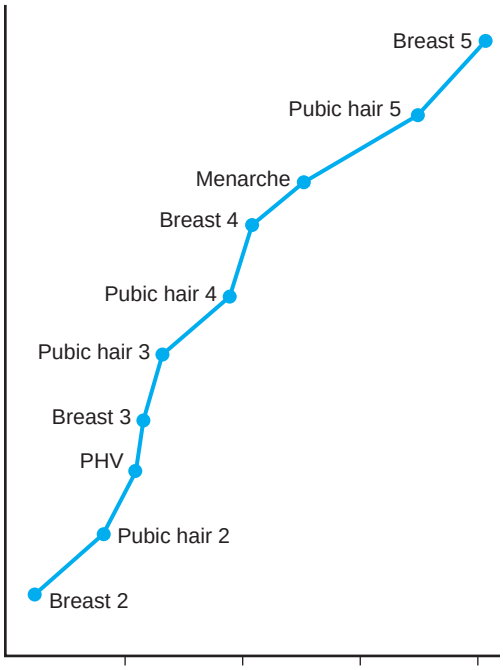


Figure 110-4 Sequence of pubertal events in females. PHV, peak height velocity. *(From Root AW: Endocrinology of puberty,* J Pediatr *83:1, 1973.)*

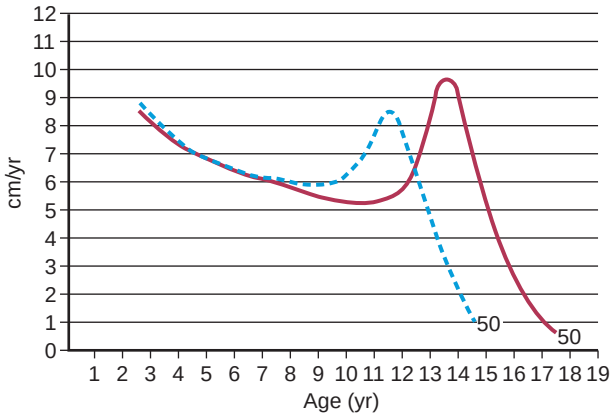


Figure 110-5 Height velocity curves for American males *(solid line)* and females *(dashed line)* who have their peak height velocity at the average age (i.e., average growth tempo). *(From Tanner JM, Davies PSW: Clinical longitudinal standards for height and height velocity for North American children,* J Pediatr *107:317, 1985.)*

emotional arousal. Adolescents' risk taking, desire for immediate gratification, and increased sensation and novelty seeking are similarly believed to result, in part, from this asynchronous brain maturation.

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 adolescent's belief that they are the center of everyone's attention. Despite being largely imagined, this perception of always being "on stage" can be stressful to the adolescent, who may feel that others are constantly judging or evaluating the adolescent. 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. Perhaps as a result 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

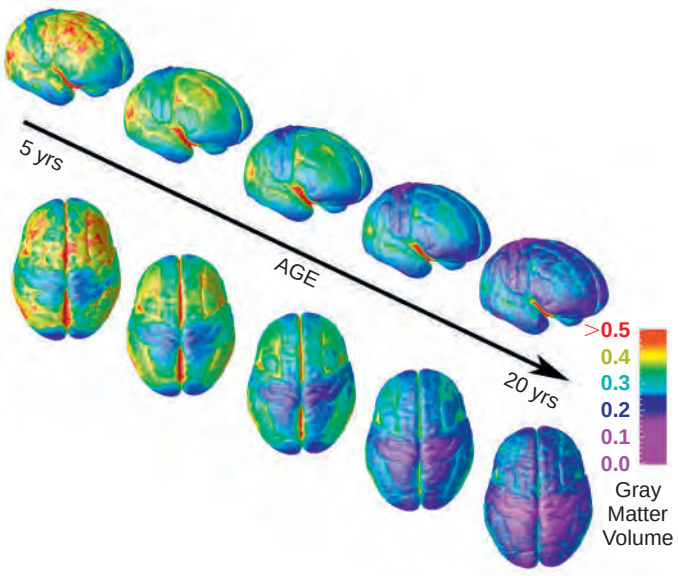


Figure 110-6 Brain Maturation ages 5-20 yr. Constructed from MRI scans of healthy children and teens, figure compresses 15 yr of brain development (ages 5-20) Red = more gray matter, blue = less gray matter. Gray matter wanes in a back-to-front wave as the brain matures and neural connections are pruned. *(Courtesy of Paul Thompson, PhD. UCLA Laboratory of Neuroimaging.)*

stress, adolescents may temporarily revert back to the cognitive processes and coping strategies used at younger ages.

Moral development generally accompanies cognitive development. Preadolescents, concrete and individualistic, follow rules in order 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 still may be highly subject to emotional context, however. Late adolescents may develop a rational conscience and an independent system of values, though these often are ultimately 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 chronologic age. While 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 has the ability to 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. Early adolescents tend to socialize largely with same sex 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 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 both 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, the latter of which may not be seen until late adolescence. At this 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 commonly the ages at which poor or distorted body image and eating disorders develop. Early adolescents undergo rapid physical changes and may experience uncertainty about whether all of 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 the adolescent is attractive to others. A strong emphasis on physical appearance during this time is normal. 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. Females may initially perceive these 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. Perhaps because they are more comfortable associating with older peers, they are vulnerable to making poor decisions when exposed to high-risk situations, still lacking the cognitive skills to effectively navigate these situations. Early-maturing males tend to have greater self-confidence, social, and academic success, while later-maturing males are at risk for more internalizing behaviors and diminished self-esteem. Many other factors influence how adolescents experience puberty, and supportive peers and adults can have a positive impact on psychosocial development. With successful navigation of these domains, the emerging adult moves 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 AND PARENTS

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 risk for psychosocial challenges. Emerging positive coping strategies should be promoted in all youth, particularly those with chronic illness or other challenges. Providers need to determine the young adolescents' cognitive development and capacity for abstract thought, and to 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 other risk-taking behaviors, 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. Adolescents may find themselves needing to make important decisions in highly affectively charged situations, in which they may be unable to effectively manage their emotions and use their higher cognitive functions to think through the consequences of their decision. For example, if a romantic couple gets "carried away" in a sexual situation with high emotional arousal, they 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 for how they will deal with this should it occur, it is possible 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. 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.

Bibliography is available at Expert Consult.

110.2 Sexual Identity Development

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TERMS AND DEFINITIONS

Sex and Sexual Identity

Sex is multifaceted, with at least 9 components: chromosomal sex, gonadal sex, fetal hormonal sex (prenatal hormones produced by the gonads), internal morphologic sex (internal genitalia), external morphologic sex (external genitalia), hypothalamic sex (sex of the brain), sex of assignment and rearing, pubertal hormonal sex, and gender identity and role. *Sexual identity* is a self-perceived identification distilled from any or all aspects of sexuality, and has at least 4 components: sex assigned at birth, gender identity, social sex role, and sexual orientation.

Sex Assigned at Birth

A newborn is assigned a sex before (typically through ultrasound) or at the time of birth based on the external genitalia (natal sex). In case of a *disorder of sex development*, these genitalia may appear ambiguous, and additional components of sex (e.g., chromosomal, gonadal, hormonal sex) are assessed. In consultation with specialists, parents assign the child a sex that they believe is most likely to be consistent with gender identity, which cannot be assessed until later in life (see Chapter 588).

Gender Identity, Gender Role, and Social Sex Role

Gender identity refers to a person's basic sense of being a boy/man, girl/woman, or other gender (e.g., transgender). *Gender role* refers to one's role in society, typically either the male or female role. Gender identity needs to be distinguished from *social sex role* (also referred to as gender expression), which refers to characteristics in personality, appearance, and behavior that are, in a given culture and time, considered masculine or feminine. Gender role is about one's presentation as a boy/man or girl/woman, whereas social sex role is about the masculine and/or

Bibliography

American College of Obstetricians and Gynecologists Committee on Adolescent Health Care: The initial reproductive health visit, *Obstet Gynecol* 116(1):240–243, 2010.

Biro FM, Galvez MP, Greenspan LC, et al: Pubertal assessment method and baseline characteristics in a mixed longitudinal study of girls, *Pediatrics* 126(3):e583–e590, 2010.

Centers for Disease Control and Prevention: Bullying among middle school and high school students—Massachusetts, 2009, *MMWR Morb Mortal Wkly Rep* 60:465–471, 2011.

Euling SY, Herman-Giddens ME, Lee PA, et al: Examination of U.S. puberty-timing data from 1940 to 1994 for secular trends: panel findings, *Pediatrics* 121(Suppl 3):S172–S191, 2008.

Hawton K: Self-harm in adolescence and future mental health, *Lancet* 379:198–199, 2012.

Johnson SB, Blum RW, Giedd JN: Adolescent maturity and the brain: the promise and pitfalls of neuroscience research in adolescent health policy, *J Adolesc Health* 45(3):216–221, 2009.

Masten SV, Foss RD, Marshall SW: Graduated driver licensing and fatal crashes involving 16- to 19-year-old drivers, *JAMA* 306:1098–1103, 2011.

Moran P, Coffey C, Romaniuk H, et al: The natural history of self-harm from adolescence to young adulthood: a population-based cohort study, *Lancet* 379:236–242, 2012.

Radzik M, Sherer S, Neinstein LS: Psychosocial development in normal adolescents. In Neinstein LS, Gordon CM, Katzman DK, et al, editors: *Adolescent health care: a practical guide*, Philadelphia, 2008, Lippincott Williams & Wilkins, pp 27–31.

Short MB, Rosenthal SL: Psychosocial development and puberty, *Ann N Y Acad Sci* 1135:36–42, 2008.

feminine characteristics one exhibits in a given gender role. Both boys/men, girls/women, and transgender persons can be masculine and/or feminine to varying degrees; gender identity and social sex role are not necessarily congruent. A child or adolescent might be *gender role nonconforming*, that is, a predominantly feminine boy or a predominantly masculine girl.

Sexual Orientation and Behavior

Sexual orientation refers to attractions, behaviors, fantasies, and emotional attachments toward men, women, or both. *Sexual behavior* refers to any sensual activity to pleasure oneself or another person sexually.

Gender Variant and Transgender

Gender variant refers to any gender identity or role that varies from what is typically associated with one's sex assigned at birth. Sometimes the term *gender variant identity* is used to refer to variation in gender identity and in that case is synonymous with transgender. *Transgender* people are a diverse group of individuals who cross or transcend culturally defined categories of gender. They include *transsexuals* (who typically live in the cross-gender role and seek hormonal and/or surgical interventions to modify primary or secondary sex characteristics); *cross-dressers* or *transvestites* (who wear clothing and adopt behaviors associated with the other sex for emotional or sexual gratification and may spend part of the time in the cross-gender role); *drag queens* and *kings* (female and male impersonators); and individuals identifying as *bigender* (both man and woman) or *genderqueer* (gender variant). Transgender individuals may be attracted to men, women, or other transgender persons.

FACTORS THAT INFLUENCE SEXUAL IDENTITY DEVELOPMENT

During prenatal sexual development, a gene located on the Y chromosome (*XRY*) induces the development of testes. The hormones produced by the testes direct sexual differentiation in the male direction resulting in the development of male internal and external genitalia. In the absence of this gene in XX chromosomal females, ovaries develop and sexual differentiation proceeds in the female direction resulting in female internal and external genitalia. These hormones may also play a role in sexual differentiation of the brain. In disorders of sex development, chromosomal and prenatal hormonal sex varies from this typical developmental pattern and may result in ambiguous genitalia at birth.

Gender identity develops early in life and is typically fixed by 2-3 yr of age. Children first learn to identify their own and others' sex (*gender labeling*), then learn that gender is stable over time (*gender constancy*), and finally learn that gender is permanent (*gender consistency*). What determines gender identity remains largely unknown, but it is thought to be an interaction of biologic, environmental, and sociocultural factors.

Some evidence has been found for the impact of biologic and environmental factors on social sex role and gender role behavior, while their impact on gender identity remains less clear. Animal research shows the influence of prenatal hormones on sexual differentiation of the brain. In humans, prenatal exposure to unusually high levels of androgens in girls with congenital adrenal hyperplasia is associated with more masculine gender role behavior, gender variant identity, and same-sex sexual orientation, but cannot account for all of the variance found (see Chapter 576). Research on environmental factors has focused on the influence of sex-typed socialization. Social sex role stereotypes develop early in life. Until later in adolescence, boys and girls are typically socially segregated by gender, reinforcing sex-typed characteristics such as boys' focus on rough-and-tumble play and asserting dominance, and girls focus on verbal communication and creating relationships. Parents, other adults, teachers, peers, and the media serve as gender socializing role models and agents by treating boys and girls differently.

For information on the development of sexual orientation, see Chapter 110.3.

GENDER VARIANCE/GENDER ROLE NONCONFORMITY AMONG CHILDREN AND ADOLESCENTS

Prevalence

Gender variance and gender role nonconformity need to be distinguished from a transgender or a gender variant identity. The former operate on the level of social sex role, whereas the latter is about variation in core gender identity. Gender role nonconformity is more common among girls (7%) than boys (5%), but boys are referred more often than girls for concerns regarding gender identity and role. This is likely a result of parents, teachers, and peers being less tolerant of gender-variant behaviors in boys than in girls.

Gender variance as part of exploring one's gender identity and role is part of normal sexual development. Gender variance in childhood may or may not persist into adolescence. Marked gender variance in adolescence often persists into adulthood. Only a minority of gender-variant children develop an adult transgender identity; most develop a gay or lesbian identity, and some, a heterosexual identity.

Etiology of Gender-Variant Behavior

Prenatal hormones play a role in the development of gender role nonconformity, but cannot completely account for all of the variance. A heritable component of gender-variant behavior exists, but twin studies indicate that genetic factors do not account for all of the variance. Family of origin factors hypothesized to play a role in the development of gender variance lack empirical support. Maternal psychopathology and emotional absence of the father are the only factors shown to be associated with gender variance, yet it is unclear whether these factors are cause or effect.

Stigma, Stigma Management, and Advocacy

Children with gender variance are subject to ostracism and bullying (see Chapter 39.1) from peers, which may negatively impact their psychosocial adjustment and lead to social isolation, loneliness, low self-esteem, depression, suicide, and behavioral problems. To assist children and families, individual stigma management strategies, as well as interventions to change the environment, can be offered. Stigma management might involve consultation with a health professional to provide support and education, normalizing the gender-variant behavior and encouraging the child and family to build on the child's strengths and interests to foster self-esteem. It might also involve making choices about certain preferences (e.g., a boy who likes to wear head bands) to limit these to times and environments that are more accepting. *Most health professionals agree that too much focus on curtailing gender-variant behavior leads to increased shame and undermines the child's self-esteem.*

The health professional and family can also assist the child or adolescent to find others with similar interests (within and beyond the gender-related interests) to strengthen positive peer support. Equally important are interventions in school and society to raise awareness and promote accepting and positive attitudes, take a stand against bullying and abuse, and implement antibullying policies and initiatives. *Gay, lesbian, bisexual, transgender, and straight alliance groups are helpful in providing a haven for gender-variant youth, as well as recognizing them as part of diversity to be respected and embraced within the school system.*

GENDER-VARIANT AND TRANSGENDER IDENTITY AMONG CHILDREN AND ADOLESCENTS

Prevalence

Approximately 1% of parents of 4-11 yr old boys report that their son wished to be of the opposite sex; for girls this percentage is 3.5% for 4-11 yr olds.

Boys are referred by caregivers more often than girls for concerns regarding gender identity. Only a minority of children's gender identity concerns persist into adolescence (20% in 1 study of boys). Persistence of gender identity concerns from adolescence into adulthood is higher; the majority identify as transgender in adulthood and may pursue sex

reassignment. On the basis of adults enrolled in a national sex reassignment program in the Netherlands, the prevalence of transsexual adults is estimated at 1:11,900 for male-to-females and 1:30,400 for female-to-males. The prevalence of transgender adults in the United Sates is estimated at 1:200.

Etiology of a Gender Variant Identity

The etiology of transgender identity remains unknown. Factors hypothesized to play a role in the development of a transgender identity include environmental and biologic factors. Gender variant children seem to have more trouble than other children with basic cognitive concepts concerning their gender. They may experience emotional distance from their father. Whether these factors are cause or effect remains unclear.

There may be an influence of prenatal and perinatal hormones on sexual differentiation of the brain. Some girls with congenital adrenal hyperplasia develop a male gender identity, yet most do not. The size of the sex-dimorphic central part of the bed nucleus of the stria terminalis in the hypothalamus of male-to-female transgender individuals is smaller than in males and within the range of nontransgender women; the opposite is true for female-to-male transgender individuals. This structure is regulated by hormones in animals, but in humans no evidence yet exists of a direct relationship between prenatal and perinatal hormones and the sexually dimorphic nature of this nucleus.

Clinical Presentation

Children with a gender variant identity may experience 2 sources of stress: internal distress inherent to the incongruence between sex assigned at birth and gender identity (gender dysphoria) or distress associated with social stigma. The first source of distress is reflected in discomfort with the developing primary and secondary sex characteristics and the gender role assigned at birth. The second source of distress relates to feeling different, not fitting in, peer ostracism, and social isolation, and may result in shame, low self-esteem, anxiety, or depression.

Boys with a gender variant identity may at an early age identify as a girl, expect to grow up female, or express the wish to do so. They may experience distress about being a boy and/or having a male body, prefer to urinate in a sitting position, and express a specific dislike of their male genitals and even want to cut off their genitals. They may dress up in girls' clothes as part of playing dress up or in private. Girls may identify as a boy, expect or wish to grow up male. They may experience distress about being a girl and/or having a female body, pretend to have a penis, or expect to grow one. Girls may express a dislike of feminine clothing and hairstyles. In early childhood, children may spontaneously express these concerns, yet depending on the response of the social environment, these feelings may go underground and be kept more private. The distress may intensify by the onset of puberty; the physical changes of puberty are described by many transgender adolescents and adults as traumatic.

Gender variant children and transgender adolescents may struggle with a number of general behavior problems. Both boys and girls have a predominance of internalizing (anxious and depressed) as opposed to externalizing behavioral difficulties. Boys are more prone to anxiety, have more negative emotions and a higher stress response, and are rated lower in self-worth, social competence, and psychological well-being. Gender variant children have more peer relationship difficulties than controls. Both femininity in boys and masculinity in girls are socially stigmatized, although the former seems to carry a higher level of stigma. Boys have been shown to be teased more than girls; teasing for boys increases with age. Poor peer relations is the strongest predictor of behavior problems in both boys and girls.

Transgender adolescents may struggle with a number of adjustment problems as a result of social stigma and lack of access to transgender-specific healthcare. Transgender youth, especially those of ethnic/racial minority groups, are vulnerable to verbal and physical abuse, academic difficulties, school dropout, illicit hormone and silicone use, substance use, difficulty finding employment, homelessness, sex work, forced sex, incarceration, HIV/sexually transmitted infections (STIs), and suicide. Parental support can buffer against psychologic distress, yet many parents react negatively to their child's gender variance, although mothers tend to be more supportive than fathers.

The Diagnosis of Gender Dysphoria: Criteria and Critique

Gender dysphoria (or incongruence) is classified as a mental disorder in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) and International Classification of Diseases, which, particularly for children, is controversial (Table 110-4). Critics have argued that the distress children experience is mainly the result of social stigma rather than being inherent to gender variance per se and hence should not be considered a mental disorder. Critics have also expressed concern about children with normal variation in gender role being labeled with a mental disorder perpetuating social stigma, yet there is a tendency of clinicians to underdiagnose rather than overdiagnose children whose gender variance goes beyond behavior and who report gender dysphoria. These children will benefit from the diagnosis to receive early treatment in the form of support, education, advocacy, and, in case of persistent puberty-delaying hormone therapy as a precursor to feminizing or masculinizing hormone therapy.

Transgender Identity Development

A stage model of coming out might be helpful to understand the experience and potential challenges transgender youth might face. In the *pre–coming out* stage, the individual is aware that their gender identity is different from that of most boys and girls. In addition to a gender identity that varies from sex assigned at birth, some of these children are also gender-role nonconforming while others are not. Those who are also gender-role nonconforming cannot hide their transgender identity, are noticed for who they are, and may face teasing, ridicule, abuse, and rejection. They must learn to cope with these challenges at an early age and usually proceed quickly to the next stage of *coming out*. Children who are not visibly gender role nonconforming are able to avoid stigma and rejection by hiding their transgender feelings. They often experience a split between their gender identity cherished in private and expressed in fantasy and a false self-presented outwardly to fit in and meet gendered expectations. These individuals often proceed to coming out later in life.

Coming out involves acknowledging one's transgender identity to self and others (parents, other caregivers, trusted health providers, peers). An open and accepting attitude is essential; rejection can perpetuate stigma and its negative emotional consequences. By accessing transgender community resources, including peer support (either online or offline), the transgender youth can then proceed to the *exploration* stage. This is a time of learning as much as possible about being transgender, getting to know similar others, and experimenting with various options for gender expression. Changes in gender role are carefully considered, as are medical interventions to feminize or masculinize the body to alleviate dysphoria. Successful resolution of this stage is a sense of pride in being transgender and comfort with gender role.

Once gender dysphoria has been alleviated, the individual can proceed with other human development tasks, including dating and relationships in the *intimacy* stage. As a result of social stigma and rejection, transgender individuals may struggle with feeling unlovable. Sexual development has often been compromised by gender and genital dysphoria. Now that greater comfort has been achieved with gender identity and role, dating and sexual intimacy have a greater chance of succeeding. Finally, in the *integration* stage, transgender is no longer the most important signifier of identity but one of several important parts of overall identity.

Interventions and Treatment

Health providers can assist gender variant children, adolescents, and their families by directing them to resources and by helping them to make informed decisions about changes in gender role and the available medical interventions to reduce intense and persistent gender dysphoria. To alleviate socially induced distress, interventions focus on stigma management and stigma reduction. It might be in the child's best interest to set reasonable limits on transgender expression

Table 110-4 Summary of DSM 5 Diagnostic Criteria for Gender Dysphoria

GENDER DYSPHORIA IN CHILDREN (302.6) (F64.2)

A. A marked incongruence between one's experienced/expressed gender and assigned gender, of at least 6 mo duration, as manifested by at least 6 of the following (1 of which must be criterion A1):
   1. A strong desire to be of the other gender or an insistence that one is the other gender (or some alternative gender different from one's assigned gender).
   2. In boys (assigned gender), a strong preference for cross-dressing or simulating female attire; or in girls (assigned gender), a strong preference for wearing only typical masculine clothing and a strong resistance to the wearing of typical feminine clothing.
   3. A strong preferences for cross-gender roles in make-believe play or fantasy play.
   4. A strong preference for the toys, games, or activities stereotypically used or engaged in by the other gender.
   5. A strong preference for playmates of the other gender.
   6. In boys (assigned gender), a strong rejection of typically masculine toys, games, and activities and a strong avoidance of rough-and-tumble play; or in girls (assigned gender), a strong rejection of typically feminine toys, games, and activities.
   7. A strong dislike of one's sexual anatomy.
   8. A strong desire for the primary and/or secondary sex characteristics that match one's experienced gender.
B. The condition is associated with clinically significant distress or impairment in social, school, or other important areas of functioning.

SPECIFY IF WITH A DISORDER OF SEX DEVELOPMENT (E.G., CONGENITAL ADRENAL HYPERPLASIA OR ANDROGEN INSENSITIVITY SYNDROME)

GENDER DYSPHORIA IN ADOLESCENTS OR ADULTS

A. A marked incongruence between one's experienced/expressed gender and assigned gender, of at least 6 mo duration, as manifested by at least 2 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 assigned gender).
   5. A strong desire to be treated as the other gender (or some alternative gender different from one's assigned 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 assigned gender).
B. The condition is associated with clinically significant distress or impairment in social, occupational, or other important areas of functioning.

SPECIFY IF WITH A DISORDER OF SEX DEVELOPMENT (E.G., CONGENITAL ADRENAL HYPERPLASIA OR ANDROGEN INSENSITIVITY SYNDROME)

SPECIFY IF POSTTRANSITION: 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 cross-sex medical procedure or treatment regimen, namely, regular cross-sex hormone treatment or gender reassignment surgery confirming the desired gender (e.g., penectomy, vaginoplasty in a natal male; mastectomy or phalloplasty in a natal female).

Adapted from the American Psychiatric Association, Diagnostic and statistical manual of mental disorders, *ed 5, Washington, DC, 2013, American Psychiatric Publishing.*

contributing to teasing and ridicule. The main goal of these interventions is not to change the child's gender variant behavior but to assist families, schools, and the wider community to create a supportive environment in which the child can thrive and safely explore his or her gender identity and expression. Decisions to change gender roles, particularly in school, are not to be taken lightly and are best carefully anticipated and planned in consultation with parents, child, teachers, school counselor, and other providers involved in the adolescent's care. Medical interventions are available as early as Tanner Stage 2. Such treatment is guided by the Standards of Care set forth by the World Professional Association for Transgender Health. Although some controversy still exists about the appropriateness of early medical intervention, follow up studies of adolescents treated in accordance with these guidelines show it to be effective in alleviating intense and persistent gender dysphoria. Care needs to be taken not to foreclose the child's exploration of identity.

Pediatricians who encounter transgender youth in their practice should be careful not to make assumptions about gender and sexual identity, but rather ask youth how they would describe themselves. This includes asking if they like being a boy or girl, have ever questioned this, or wished they were born the other sex; have a preferred nickname or pronoun (*he* or *she;* if not sure, avoid pronouns); and how they feel about their maturing body and sex characteristics, and what they would change about that if they could. Extra caution should be exercised during physical and genital exams because transgender youth may be particularly uncomfortable with their anatomy. When considering contraceptive options for female-to-males, alternatives to feminizing agents should be explored. For transgender-specific medical interventions, transgender youth should be referred to specialists in the treatment of gender dysphoria (see World Professional Association for Transgender Health, www.wpath.org). For other health concerns, ensure referral to transgender or lesbian, gay, bisexual, transgender (LGBT)-friendly providers, especially in the case of gender segregated treatment facilities. Gender Spectrum (www.genderspectrum.org), Advocates for Youth (www.advocatesforyouth.org), and Parents, Families and Friends of Lesbians and Gays (www.pflag.org) offer excellent support resources for transgender youth and their families.

Bibliography is available at Expert Consult.

110.3 Gay, Lesbian, and Bisexual Adolescents

Stewart L. Adelson and Mark A. Schuster

Understanding a child 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), such understanding is particularly important. GLB youth as a group have the same health and developmental needs as all youth, and their sexual orientation is a normal variation of human sexuality; however, they encounter distinct developmental challenges and can have additional health and mental health needs related to their orientation and others'

Bibliography

Biro FM: Puberty, *Adolesc Med* 18:425–433, 2007.

Bockting WO, Goldberg JM, editors: *Guidelines for transgender care*, Binghamton, NY, 2007, Haworth Medical Press.

Cohen-Kettenis PT, Pfäfflin F: *Transgenderism and intersexuality in childhood and adolescence: making choices*, Thousand Oaks, CA, 2003, Sage.

Coleman E, Bockting W, Botzer M, et al: Standards of care for the health of transsexual, transgender, and gender-nonconforming people, version 7, *Int J Transgenderism* 13(4):165–232, 2012.

Frankowski BL, and the Committee on Adolescence: Sexual orientation and adolescents, *Pediatrics* 113:1827–1832, 2004.

Hembree WC, Cohen-Kettenis P, Delemarre-van de Waal HA, et al: Endocrine treatment of transsexual persons: an endocrine society clinical practice guideline, *J Clin Endocrinol Metab* 94:3132–3134, 2009.

Lee PA, Houk C: Evaluation and management of children and adolescents with gender identification and transgender disorders, *Curr Opin Pediatr* 25:521–527, 2013.

Lee PA, Houk C, Ahmed SF, et al: International consensus conference on intersex organized by the Lawson Wilkins Pediatric Endocrine Society and the European Society for Paediatrics Endocrinology. Consensus statement on management of intersex disorders, *Pediatrics* 118:814–815, 2006.

Olson J, Forbes C, Belzer M: Management of the transgender adolescent, *Arch Pediatr Adolesc Med* 165(2):171–176, 2011.

Roberts AL, Rosario M, Corliss HL, et al: Children gender nonconformity: a risk indicator for childhood abuse and posttraumatic stress in youth, *Pediatrics* 129:410–417, 2012.

Spack NP: Management of transgenderism, *JAMA* 309:478–484, 2013.

Spack NP, Edwards-Leeper L, Feldman HA, et al: Children and adolescents with gender identity disorder referred to a pediatric medical center, *Pediatrics* 129:418–425, 2012.

reaction to it. Their sexual orientation is often different from that expected by family, peers, and society and they must cope with peer rejection, bullying, 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 medical and psychological problems as a result of these stresses and the epidemiology of health threats like HIV and other STIs. Pediatric healthcare providers are key in monitoring for such issues, supporting healthy development, and intervening when necessary to prevent or treat the problems for which GLB youth are at risk.

DEFINITIONS

Sexual orientation is the degree of attraction to the people of a particular sex. It encompasses emotional and erotic desires, physiologic arousal, sexual behavior, sexual identity, and social role. As sexuality develops, youth can be oriented entirely toward males, females, or both to various degrees on a continuum. Romantic attraction to the opposite sex is heterosexuality, to the same sex is homosexuality, and to both is bisexuality. **Gay** is a common term for homosexual, in both males and females; **lesbian** refers to homosexual females. Those unsure of their orientation are **curious** or **questioning**. The term **young men who have sex with men** (**MSM**) is sometimes used in the research literature to denote male youth who are engaging 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 are unsure of their sexual orientation, while others say they are gay, lesbian, or bisexual. Some who do not identify as GLB report same-sex attraction, fantasies, or behavior. Certainty about sexual orientation and identity increases through adolescence with sexual experience. Those who fear nonacceptance may try to suppress or deny their orientation. Consequently, various aspects of orientation—feelings, behavior, and identity—may not be consistent in an individual, and may change during development. Only some youth with homosexual experience identify as "gay," consistent with reluctance about having or revealing a gay identity and underscoring the difference between identity and behavior. Population surveys of youth from 2001-2009 found a median of 2.5% reported that they were "unsure" of their sexual orientation, 1.3% said they were "gay/lesbian," and 3.7% said they were "bisexual." In New York City in 2005-2007, 38.9% of adolescents with only same- or both-sex partners identified as straight.

DEVELOPMENT OF SEXUAL ORIENTATION IN CHILDHOOD AND ADOLESCENCE

See also Chapter 110.2.

Sexual orientation development begins prenatally and continues 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 psychological factors also influence sexual development. A gay or lesbian sexual orientation is sometimes preceded developmentally by childhood **gender nonconformity**, or variation from population averages in **gender role behavior**. These are activities, interests, styles, and other attributes recognized as masculine or feminine, like toy preferences and preference for opposite-sex playmates. Although childhood gender nonconformity is not experienced by all gay people—and not all gender nonconforming children grow up to be gay—nonconformity is not uncommon (particularly among males) and leads many gay or lesbian people to feel different from peers in childhood, even before sexual desire or identity emerges. When not protected from stigma, gender-nonconforming children may experience ostracism, bullying, or family nonacceptance. These reactions to gender nonconformity can lead to later difficulty integrating a healthy, positive self-image and to long-term mental health problems.

Less frequently, gay or lesbian sexual orientation in adolescence is preceded by childhood *gender incongruity/dysphoria*, a distinct phenomenon in which an individual's gender identity differs from phenotypic sex and assigned gender at birth.

STIGMA, RISK, AND RESILIENCE

Homosexuality has been documented across cultures and historical periods; its meaning and acceptance vary greatly with social context. Gay people are now generally more visible and accepted than previously in the United States; still, youth are often exposed to antihomosexual 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 groups may experience unique developmental stressors; African-American youth report feeling less comfortable than white peers with a gay identity and less comfortable disclosing it.

Some GLB youth experience difficulty coping with stigma. Family nonacceptance, feeling unsafe because of 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 like truancy, dropping out, running away, and homelessness. Even when not overtly threatened, GLB youth frequently encounter negative attitudes that force them to hide at a developmental period when acceptance holds great significance. Mental health problems, risk taking, or substance use may increase exposure to HIV/STIs. Stigma may also impede access to healthcare in some communities. Thus, along with factors influencing exposure and susceptibility to health threats, stigma partly mediates elevated risk for health and mental health problems in GLB youth.

It is important to reduce stigma against, support acceptance of, and promote resilient coping among GLB youth. Family connectedness and school support and safety are important protective factors against depression, suicidal thoughts and attempts, and substance abuse. GLB antiharassment policies and gay-straight alliances as well as anti-bullying programs increase school safety.

HEALTH AND MENTAL HEALTH

Depression and Suicidality

Rates of suicidality are about 2 or 3 times higher among gay and lesbian youth, and up to 5 times higher among bisexual youth, than among the general population. Family rejection, bullying, and other victimization motivated by homophobia accounts statistically for increased depression and suicidal thoughts and attempts in GLB adolescents. Suicidal thoughts or attempts are highest during the interval following a same-sex sexual experience and prior to self-acceptance as gay.

Sexually Transmitted Infections

The epidemiology of STIs (see Chapter 120), related to specific sexual practices, as well as prevalence of certain STIs in GLB communities, informs recommended counseling, screening, and treatment strategies. Anal intercourse has been shown to be the most efficient route of infection by hepatitis B (see Chapter 358), cytomegalovirus (see Chapter 255), and HIV (see Chapter 276). 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 (see Chapter 218) and herpes simplex virus infection (see Chapter 252.5), facilitate spread of HIV.

Among U.S. adolescents and young adults, young MSM continue to face the greatest toll of HIV/AIDS for various reasons, including misinformation, noncommunication with partners about risk reduction, potentially false assumptions about partners' serostatus, substance use, and impaired reasoning and judgment. Rates are especially high among black young MSM. Although possible, female-to-female sexual transmission of HIV is inefficient, and females who only engage in same-sex behavior are less likely than other youth to acquire an STI. However, boys and girls who identify as gay or lesbian may engage in sexual activity with partners of the other gender, so counseling and screening for all types of STIs are still relevant.

Substance Abuse

See also Chapter 114.

A subset of GLB youth display increased rates of alcohol and substance use, including more binge drinking and earlier onset and more rapid trajectory of substance use. Problem drinking may be greatest in youth who do not identify as GLB but have same-sex attractions or engage in same-sex sexual behavior. Marijuana and other illicit drug use is more common among bisexual females, but studies have found no increased rates among young gay and bisexual males, and males with bisexual behavior and identity are less likely to drink than young heterosexual males. Smoking is increased among bisexual adolescent females and possibly in adolescent lesbians; studies are conflicting regarding smoking in other GLB adolescent groups.

Obesity and Disordered Eating

See also Chapter 26.

Existing studies suggest certain GLB youth are at risk for disordered eating. Compared with heterosexual girls, lesbian and bisexual girls generally have a more positive body image, although they are more likely to be overweight. In contrast, young gay and bisexual males are more likely to have body image concerns and are more likely to restrict eating or engage in compensatory weight loss strategies. Binge eating may also be more common in GLB youth. Behaviorally bisexual youth may be at greatest risk for disordered eating.

Psychosocial Problems

Academic underachievement, truancy, and dropping out among GLB adolescents are frequently associated with homophobic victimization, harassment, violence, and feeling unsafe at school. Youth who eventually identify as GLB appear to experience higher rates than other youth of child abuse, running away, or being thrown out of their homes. Homosexual young people are overrepresented in homeless and runaway populations across the United States. Life on the streets or in shelters exposes them to drugs and sexual abuse and promotes illegal conduct for survival.

RECOMMENDATIONS FOR CARE

Evaluation

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

A nonjudgmental healthcare environment, with open communication and a positive relationship with youth and families, is important. 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., "are you dating someone" instead of "do you have a boyfriend/girlfriend?"). This is important at all ages. Discussing confidentiality and incorporating into each adolescent visit private time with no parent in the room (see Chapter 112) may facilitate discussing sexual orientation, as may use of appropriate health history forms, like 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. 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; see Chapter 112.1) are fundamental to providing high-quality care. While attuned to youth's' preferences—explicit or implied—for discussing sexual orientation, providers should take the lead tactfully, if necessary, regarding any pressing areas of clinical concern.

Medical and Sexual Health

Sexually transmitted infections (see Chapter 120) pose additional issues specific to GLB youth. Use of latex condoms for anal and oral intercourse should be discussed with boys, and the use of dental dams, cut open latex condoms, or plastic wrap during oral sex should be discussed with girls; the use of latex condoms for sexual appliances are recommended as well. 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 boy or lesbian girl who does not identify as bisexual has not had sex with the opposite gender. Lesbians can have an unplanned pregnancy. Similarly, youth who identify as heterosexual and are attracted only to the opposite sex may still have sexual activity with a partner of the same sex.

Although vaccination against hepatitides A and B is recommended for all children, it is particularly recommended that nonvaccinated adolescent males who are having sex or are likely to have sex with males get catchup vaccines. The same recommendation applies to the quadrivalent human papillomavirus vaccine for males. The Centers for Disease Control and Prevention 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). For treatment of STIs, see Chapter 120.

Mental Health

Awareness of mental health and social problems is important when caring for GLB youth, as for all youth (see Chapter 111). 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., Gay, Lesbian & Straight Education Network [GLSEN]) or for parents and others (e.g., Parents, Families, & Friends of Lesbians and Gays [PFLAG]). 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 homosexual or bisexual orientation. GLB orientation is not an illness, and leading health organizations, including the American Academy of Pediatrics, the American Academy of Family Physicians, the Society for Adolescent Health and Medicine, the American Academy of Child and Adolescent Psychiatry, and the American Medical Association, have concluded that such change is neither possible nor warranted. It is important to distinguish between a GLB orientation, which is not a mental illness, and mental health problems like 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 aim to foster physical and emotional health. Individual or family therapy might be indicated for some.

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, drug, 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. It is essential to know how to recognize and manage psychiatric emergencies such as suicidal thoughts and attempts (see Chapter 27).

Bibliography is available at Expert Consult.

Bibliography

Adelson SL, and the American Academy of Child and Adolescent Psychiatry (AACAP) Committee on Quality Issues (CQI): Practice parameter on gay, lesbian or bisexual sexual orientation, gender-nonconformity, and gender discordance in children and adolescents, *J Am Acad Child Adolesc Psychiatry* 51(9):957–974, 2012.

Birkett M, Espelage DL, Koenig B: LGB and questioning students in schools: The moderating effects of homophobic bullying and school climate on negative outcomes, *J Youth Adolesc* 38(7):989–1000, 2009.

Centers for Disease Control and Prevention (CDC): Sexual and reproductive health of persons aged 10–24 yr—United States, 2002–2007, *MMWR Morb Mortal Wkly Rep* 57(25):681–686, 2009.

Coker TR, Austin SB, Schuster MA: The health and health care of lesbian, gay, and bisexual adolescents, *Annu Rev Public Health* 31:457–477, 2010.

Corliss HL, Rosario M, Wypij D, et al: Sexual orientation and drug use in a longitudinal cohort study of U.S. adolescents, *Addict Behav* 35(5):517–521, 2010.

Garofalo R, Mustanski B, Johnson A, et al: Exploring factors that underlie racial/ethnic disparities in HIV risk among young men who have sex with men, *J Urban Health* 87(2):318–323, 2010.

Institute of Medicine, Committee on Lesbian, Gay, Bisexual, and Transgender Health Issues and Research Gaps and Opportunities: *The health of lesbian, gay, bisexual, and transgender people: building a foundation for better understanding*, Washington, DC, 2011, National Academies Press.

Jiang Y, Perry DK, Hesser JE: Adolescent suicide and health risk behaviors: Rhode Island's 2007 Youth Risk Behavior Survey, *Am J Prev Med* 38(5):551–555, 2010.

Kann L, Olsen EO, McManus T, et al: Sexual identity, sex of sexual contacts, and health-risk behaviors among students in grades 9-12—youth risk behavior surveillance, selected sites, United States, 2001-2009, *MMWR Surveill Summ* 60(7):1–133, 2011.

Levine DA: Committee on Adolescence: Office-based care for lesbian, gay, bisexual, transgender, and questioning youth, *Pediatrics* 132:e297–e313, 2013.

Mustanski BS, Garofalo R, Emerson EM: Mental health disorders, psychological distress, and suicidality in a diverse sample of lesbian, gay, bisexual, and transgender youths, *Am J Public Health* 100(12):2426–2432, 2010.

Perrin EC, Siegel BS, Committee on Psychosocial Aspects of Child and Family Health: Promoting the well-being of children whose parents are gay or lesbian, *Pediatrics* 131:e1374–e1383, 2013.

Robinson JP, Espelage DL, Rivers I: Developmental trends in peer victimization and emotional distress in LGB and heterosexual youth, *Pediatrics* 131:423–430, 2013.

Ryan C, Huebner D, Diaz RM, et al: Family rejection as a predictor of negative health outcomes in white and Latino lesbian, gay, and bisexual young adults, *Pediatrics* 123(1):346–352, 2009.

Ryan C, Russell ST, Huebner DM, et al: Family acceptance in adolescence and the health of LGBT young adults, *J Child Adolesc Psychiatr Nurs* 23(4):205–213, 2010.

Toomey R, Ryan C, Diaz R, et al: Gender nonconforming lesbian, gay, bisexual, and transgender youth: School victimization and young adult psychosocial adjustment, *Dev Psychol* 46(6):1580–1589, 2010.

Chapter 111

The Epidemiology of Adolescent Health Problems

Gale R. Burstein

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 110). Many of the psychological 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. 111-1). In addition to cognitive development, there are both risk and protective factors for adverse adolescent health behaviors that are dependent on the social environment as well as the mental health of an adolescent (Table 111-1).

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, 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. Environmental factors, such as family, peers, school, community, and religiosity, also contribute to adolescents' health and risk behaviors. The 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. 111-2).

Although according to the 2012 CDC National Health Interview Survey, a probability sample survey conducted annually, an estimated 81% of 12-17 yr olds report excellent or very good health, 23% missed 3-5 school days in the past year, 9% are uninsured, 6% have no usual place of healthcare, 11% have asthma, 11% have respiratory allergies, 10% have a learning disability, 12% have attention deficit hyperactivity disorder, and 17% take prescription medications routinely. In 2010, the mortality rate among adolescents 15-19 yr of age was 49 deaths per 100,000 population. While varying by gender, the leading causes of death overall among adolescents 15-19 yr of age are (1) unintentional injuries; (2) homicide; and (3) suicide (Table 111-2).

Within the adolescent population, disparities in health occur. Adolescent health outcomes and behaviors vary among populations that can be defined by race or ethnicity, gender, education or income, disability, geographic location (e.g., rural or urban), or sexual orientation. Health disparities result from multiple factors, including poverty, environmental threats, inadequate access to healthcare, individual and behavioral factors, and educational inequalities (Table 111-3).

Table 111-1 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, 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	Connectedness with school and family, religious affiliation

Adapted from McIntiosh N, Helms P, Smyth R, editors. Fofar and Arneil's textbook of pediatrics, *ed. 6, Edinburgh, 2003, Churchill Livingstone, pp. 1757-1768; and Viner R, Macfarlane A: Health promotion,* BMJ *330:527-529, 2005.*

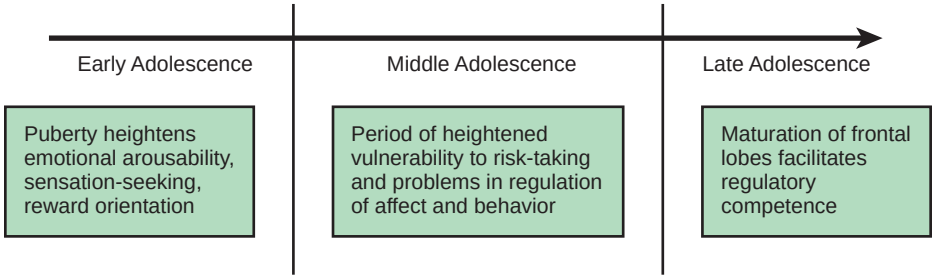


Figure 111-1 It has been speculated that the impact of puberty on arousal and motivation occurs before the maturation of the frontal lobes is complete. This gap may create a period of heightened vulnerability to problems in the regulation of affect and behavior, which might help to explain the increased 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 *9:69–74, 2005.)*

Table 111-2 Leading Causes of Death Among 15-19 Yr Olds by Gender, United States, 2010*

LEADING CAUSES OF DEATH	MALE	FEMALE
#1	Accidents (unintentional injuries)	Accidents (unintentional injuries)
#2	Assault (homicide)	Intentional self-harm (suicide)
#3	Intentional self-harm (suicide)	Assault (homicide)

*Based on data from Heron M: Deaths: Leading causes for 2009. National vital statistics reports; vol 62. No. 6. Hyattsville, MD, 2013, National Center for Health Statistics.

Table 111-3 Adolescent Health Outcomes by Race/Ethnicity, United States, 2010-2012

OUTCOME	WHITE	BLACK	AI/AN	API	HISPANIC
Deaths*	47.5	70.6	61.5	22.8	41.5
Births§	20.5	43.9	34.9	9.7	46.3
Obese†	11.5	18.2	N/A	N/A	14.1
Asthma†	22.8	26.8	N/A	N/A	20.3
Depressed†	27.2	24.7	N/A	N/A	32.6
Chlamydia*	830.1	4,977.7	2,509.8	313.0***	1,191.0
Gonorrhea*	85.3	1,513.5	324.6	36.5***	139.7
HIV*	2.5	46.3	5.8	2.9***	8.1

*Rates of death in 2010, per 100,000 15-19 year old population by race/ethnicity.
**Rates of infection in 2011 per 100,000 15-19 year old population by race/ethnicity.
***Rates of Asian-only race.
†Percent high school students reporting health outcome.
§Rates of births in 2011 per 1,000 15-19 yr old females by race/ethnicity.
AI/AN, American Indian or Alaska Native; API, Asian or Pacific Islander; HIV, human immunodeficiency virus; N/A, not available.

ACCESS TO HEALTHCARE

Access to healthcare may be limited for adolescents compared to other age groups. Adolescents in the United States make fewer visits to physicians for ambulatory office visits than does 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 and young adults are less likely to be insured than all other age groups. Young adults 18-24 yr are more likely to be uninsured because until the passage in 2010 of America's Affordable Care Act, many were no longer eligible to receive benefits from their parents' health plans or public insurance programs. In addition, health insurance status differs based on income and race/ethnicity. Adolescents and young adults who are near poor (100-199% federal poverty level) and poor (below 100% federal poverty level) are less likely to have health insurance coverage than those with higher family incomes; and Hispanic and black adolescents and young adults are less likely to have health insurance coverage than their non-Hispanic white and Asian peers. Uninsured children and adolescents are less likely to receive preventive visits and have a regular source of care than the insured, and are more likely to go without treatment of symptoms.

Adolescents who actually receive preventive care may still not have access to time alone with their provider or discuss important confidential health issues, such as sexually transmitted infections, HIV, or pregnancy prevention. Less than half (40%) 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 64% and 33.5% for sexually experienced females and males, respectively.

Under the Patient Protection and Affordable Care Act, healthcare providers will strive to improve the health of their patient population. 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 2020 agenda includes 11 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 yr (Table 111-4). This

Table 111-4 Healthy People 2020 Adolescent Health (AH) Objectives

- **AH-1**: Increase the proportion of adolescents who have had a wellness checkup in the past 12 months
- **AH-2**: Increase the proportion of adolescents who participate in extracurricular and out-of-school activities
- **AH-3**: Increase the proportion of adolescents who are connected to a parent or other positive adult caregiver
  - **AH-3.1**: Increase the proportion of adolescents who have an adult in their lives with whom they can talk about serious problems
  - **AH-3.2**: Increase the proportion of parents who attend events and activities in which their adolescents participate
- **AH-4**: (Developmental) Increase the proportion of adolescents and young adults who transition to self-sufficiency from foster care
- **AH-5**: Increase educational achievement of adolescents and young adults
  - **AH-5.1** ***(Leading Health Indicator)***: Increase the proportion of students who graduate with a regular diploma 4 years after starting 9th grade
  - **AH-5.2**: Increase the proportion of students who are served under the Individuals with Disabilities Education Act who graduate high school with a diploma
  - **AH-5.3**: Increase the proportion of students whose reading skills are at or above the proficient achievement level for their grade
  - **AH-5.4**: Increase the proportion of students whose mathematics skills are at or above the proficient achievement level for their grade
  - **AH-5.5**: Increase the proportion of adolescents who consider their school work to be meaningful and important
  - **AH-5.6**: Decrease school absenteeism among adolescents due to illness or injury
- **AH-6**: Increase the proportion of schools with a school breakfast program
- **AH-7**: Reduce the proportion of adolescents who have been offered, sold, or given an illegal drug on school property
- **AH-8**: Increase the proportion of adolescents whose parents consider them to be safe at school
- **AH-9**: (Developmental) Increase the proportion of middle and high schools that prohibit harassment based on a student's sexual orientation or gender identity
- **AH-10**: Decrease the proportion of public schools with a serious violent incident
- **AH-11**: Reduce adolescent and young adult perpetration of, as well as victimization by, crimes
  - **AH-11.1**: Decrease the rate of minor and young adult perpetration of violent crimes
  - **AH-11.2**: Decrease the rate of minor and young adult perpetration of serious property crimes
  - **AH-11.3**: (Developmental) Decrease the percentage of counties and cities reporting youth gang activity
  - **AH-11.4**: (Developmental) Reduce the rate of adolescent and young adult victimization from crimes of violence

From U.S. Department of Health and Human Services: Healthy People 2020, *available at: www.hhs.gov/ash/oah/resources-and-publications/healthy-people-2020.html.*

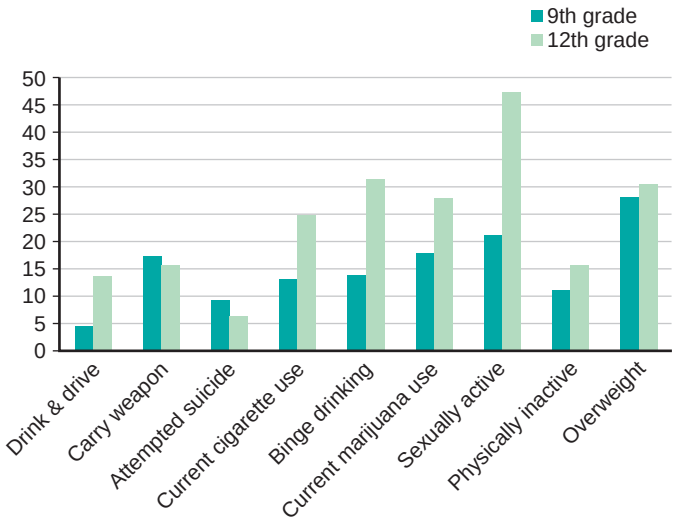


Figure 111-2 Selected health behaviors among 9th and 12th grade high school students. *(Data from Centers for Disease Control and Prevention:* 2011 Youth risk behavior surveillance system. http://www.cdc.gov/healthyyouth/yrbs/index.htm.*)*

science-based initiative is centered around a framework for public health prevention priorities and actions to improve the health status of U.S. youth.

Bibliography is available at Expert Consult.

Bibliography

Bloom B, Jones LI, Freeman G: Summary health statistics for U.S. children: National Health Interview Survey, 2012. National Center for Health Statistics, *Vital Health Stat* 10(2548):2013. Available at: www.cdc.gov/nchs/data/series/sr_10/sr10_254.pdf.

Blum RW, Bastos FIPM, Kabiru CW, et al: Adolescent health in the 21st century, *Lancet* 379:1567–1568, 2012.

Catalano RF, Fagan AA, Gavin LE, et al: Worldwide application of prevention science in adolescent health, *Lancet* 379:1653–1662, 2012.

Centers for Disease Control and Prevention: Sexual and reproductive health of persons aged 10–24 years, United States, 2002–2007, *MMWR Surveill Summ* 58(6):1–58, 2009.

Centers for Disease Control and Prevention: *Diagnoses of HIV Infection in the United States and Dependent Areas, vol 23*, 2011. http://www.cdc.gov/hiv/library/reports/surveillance/2011/surveillance_report_vol_23.html.

Centers for Disease Control and Prevention: *Sexually Transmitted Disease Surveillance 2012*, Atlanta, 2012, U.S. Department of Health and Human Services. Available at: www.cdc.gov/std/stats11/default.htm.

Center for Disease Control and Prevention: Youth risk behavior surveillance—United States, 2011, *MMWR Surveill Summ* 61(SS–4):2012. Available at: www.cdc.gov/HealthyYouth/yrbs/index.htm.

Hamilton BE, Martin JA, Ventura SJ: *Births: Preliminary Data for 2011. National vital statistics reports; Volume 61, Number 05*, Hyattsville, MD, 2012, National Center for Health Statistics. Available at: http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_05.pdf.

Heron M: *Deaths: Leading causes for 2010. National vital statistics reports; vol 61. No. 7*, Hyattsville, MD, 2012, National Center for Health Statistics. Available at: www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_07.pdf.

Irwin CE Jr, Adams SH, Park MJ, et al: Preventive care for adolescents: few get visits and fewer get services, *Pediatrics* 123:e565–e572, 2009.

Martin JA, Hamilton BE, Osterman JK, et al: *Births: Final data for 2012. National vital statistics reports*, Vol 62, No 9, Hyattsville, MD, 2013, National Center for Vital Statistics. http://www.cdc.gov/nchs/data/nvsr/nvsr62/nvsr62_09.pdf.

Murphy SL, Xu JQ, Kochanek KD: *Deaths: Final data for 2010. National vital statistics reports*, Vol 61, No. 4, Huntsville, MD, 2013, National Center for Vital Statistics. http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_04.pdf.

Patton GC, Coffey C, Cappa C, et al: Health of the world's adolescent: a synthesis of internationally comparable data, *Lancet* 379:1665–1674, 2012.

Sawyer SM, Afifi RA, Bearinger LH, et al: Adolescence: a foundation for future health, *Lancet* 379:1630–1638, 2012.

Steinberg L: Cognitive and affective development in adolescence, *Trends Cogn Sci* 9:69–74, 2005.

U.S. Department of Health and Human Services: *Office of Disease Prevention and Health Promotion: Healthy People 2020*, Washington, DC, 2013. Available at: www.hhs.gov/ash/oah/resources-and-publications/healthy-people-2020.html.

Viner R, Booy R: Epidemiology of health and illness, *BMJ* 330:411–414, 2005.

Viner R, Macfarlane A: Health promotion, *BMJ* 330:527–529, 2005.

Viner RM, Ozer EM, Denny S, et al: Adolescence and the social determinants of health, *Lancet* 379:1641–1650, 2012.

Chapter 112

Delivery of Healthcare to Adolescents

Gale R. Burstein

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, cardiovascular and pulmonary disease, type 2 diabetes, reproductive health disease, and cancer.

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, and not subject to exclusion for preexisting conditions, should be available for all adolescents and young adults who have no access to private insurance. **Comprehensive, coordinated benefits** should meet the developmental needs of adolescents, particularly for reproductive, mental health, dental, and substance abuse 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. **Healthcare providers, trained and experienced** to care for adolescents, 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 creation and dissemination of provider education about adolescent preventive health guidelines have been demonstrated to improve the content of recommended care (Table 112-1). 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, and culturally competent. 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.

Table 112-1 Bright Futures/American Academy of Pediatrics Recommendations for Preventive Healthcare for 11-21 Yr Olds

	PERIODICITY AND INDICATIONS
HISTORY	Annual
MEASUREMENTS	
Body mass index	Annual
Blood pressure	Annual
SENSORY SCREENING	
Vision	At 11, 15, and 18 yr visits or if risk assessment positive
Hearing	If risk assessment positive
DEVELOPMENTAL/BEHAVIORAL ASSESSMENT	
Developmental surveillance	Annual
Psychosocial/behavioral assessment	Annual
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	If risk assessment positive
STI screening	If sexually active
HIV screening§	Discussed and offer
Cervical dysplasia screening†	Beginning at age 21 yr
ORAL HEALTH	Annual refer to dental home or administer oral health risk assessment
ANTICIPATORY GUIDANCE	Annual‡

*Schedules as per the Advisory Committee on Immunization Practices, published annually at http://www.cdc.gov/vaccines/schedules/hcp/index.html and in the January issue of *Pediatrics*.

†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*.

§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. 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.

Adapted from Bright Futures and American Academy of Pediatrics Committee on Practice and Ambulatory Medicine. 2014 Recommendations for Pediatric Preventive Health Care. Pediatrics 133:568-570, 2014.

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 2011 National Health Interview Survey, an estimated 90% of 12-17 yr old U.S. adolescents had 1 or more contacts with a healthcare professional in the past year, 98% identify a usual source of care at a doctor's office or clinic, and 17% made at least 1 emergency department visit in the past year. Uninsured adolescents are the least likely to receive care. In 2011, an estimated 9% of 12-17 yr olds were without health insurance, 2% had unmet healthcare needs and 4% delayed healthcare because of cost. However, even among adolescents who are fully insured with a usual source of care, most do not receive preventive healthcare. An analysis of claims data from a large Minnesota health plan with approximately 700,000 members found that among patients ages 11-18 yr who were enrolled for at least 4 yr between 1998 and 2007, few received preventive care visits. One-third of adolescents had no preventive care visits from age 13 through 17 yr, and another 40% had only a single such visit. Nonpreventive care visits were more frequent in all age-groups, averaging about 1 per yr at age 11 yr, climbing to about 1.5 per yr at age 17 yr. Among older adolescence, females had both more preventive care and more nonpreventive care visits than did males (Table 112-2).

The Patient Protection and Affordable Care Act (ACA), enacted in March, 2010, has significantly expanded access to both commercial health plans and Medicaid for young adults age 19-26 yr (Fig. 112-1). From June 2010 through June 2012, the proportion of young adults with insurance increased from 65.7% to 73.8%. ACA provisions require that commercial health plans (a) continuing dependent coverage to 26 yr, regardless of the young adults' financial or dependent status, marriage, or educational enrollment; (b) mandate university and college student health plans to enhance consumer protections for students; (c) provide financial assistance for young adults to enroll into health insurance exchanges with incomes ranging from 133% to 399% of the federal poverty level; and offer preventive healthcare services free of any cost sharing, deductibles or copayments. For Medicaid, states must offer enrollment to all adults with incomes less than 133% of the federal poverty level.

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 110). Health education and promotion, as well as disease prevention, should be the focus of every visit. In 2008, the American Academy of Pediatrics in collaboration with the U.S. Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau, published the 3rd edition of *Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents*, which offers providers a strategy for delivery of adolescent preventive health services with screening and counseling recommendations for early, middle, and late adolescence (Table 112-3). Bright Futures is rooted in the philosophy of preventive care and reflects the concept of caring for children in a "medical home." These guidelines emphasize effective partnerships with parents and the community to support the adolescent's health and development.

The Centers for Disease Control and Prevention's Advisory Committee on Immunization Practices currently recommends routine adolescent vaccines for universal administration beginning at the 11-12 yr old visit or as soon as possible, (a) tetanus–diphtheria–acellular pertussis vaccine (Tdap), (b) the meningococcal conjugate vaccine (MCV4), and (c) the human papillomavirus vaccine (see Chapter 172). The Advisory Committee on Immunization Practices recommends annual influenza vaccination and hepatitis A vaccination (HAV) 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, injection drug users, and those with chronic liver disease or clotting factor disorders, or who live in areas that target older children for HAV vaccine.

The time spent on various elements of the screening will vary with the issues that surface during the assessment. For gay and lesbian youth (see Chapter 110.3), emotional and psychologic issues related to their experiences, from fear of disclosure to the trauma of homophobia, may direct the clinician to spend more time assessing emotional and psychologic supports in the young person's environment. For youth with

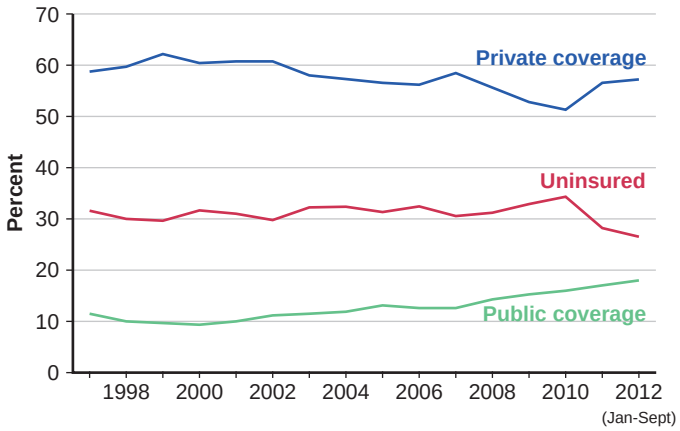


Figure 112-1 Percentage of adults age 19-25 yr with health insurance by coverage type and percentage uninsured at the time of the interview: United States, 1997–September, 2012. Note: Estimates for 2012 are based on data collected in January through September. Data are based on household interviews of a sample of the civilian noninstitutionalized population. *(Data from CDC/NCHS, National Health Interview Survey, 1997-2012, Family Core Component.)*

Table 112-2 Adjusted Mean Number of Preventive and Nonpreventive Care Visits Among Continuously Enrolled Adolescents Between the Ages of 13 and 18 Yr, Health Partners 1998-2007

CHARACTERISTIC	PREVENTIVE CARE VISITS MEAN NUMBER (SD)	*P* VALUE	NONPREVENTIVE CARE VISITS MEAN NUMBER (SD)	*P* VALUE
INSURANCE TYPE				
Commercial	1.070 (0.947)	<0.001	6.829 (6.756)	<0.005
Governmental	1.1781 (1.094)		6.412 (8.009)	
SEX				
Male	1.162 (0.985)	<0.001	7.729 (7.514)	<0.001
Female	0.991 (0.916)		5.918 (5.937)	

Note: Among adolescents with continuous enrollment (>333 days between birthdays) for 4 or more yr. Regression model adjusted mutually for insurance type and sex.

SD: standard deviation.

From Nordin JD, Solberg LI, Parker ED: Adolescent primary care visit patterns. Ann Fam Med *8:511–516, 2010.*

Table 112-3 Adolescent Screening Recommendations

		11-14 YR OLD VISIT	15-17 YR OLD VISIT	18-21 YR OLD VISIT
Universal Screening		**Action**	**Action**	**Action**
Vision (once during each of 3 adolescent age groups)		Snellen test	Snellen test	Snellen test
Dyslipidemia		Lipid screen (once between 9-11 yr)	NA	Lipid screen (once between 18-21 yr)
Selective Screening	**Risk Assessment**	**Action If RA+**	**Action If RA+**	**Action If RA+**
Vision at other ages	+ on risk screening questions	Snellen test	Snellen test	Snellen test
Hearing	+ on risk screening questions	Audiometry	Audiometry	Audiometry
Anemia	+ on risk screening questions	Hemoglobin or hematocrit	Hemoglobin or hematocrit	Hemoglobin or hematocrit
Tuberculosis	+ on risk screening questions	Tuberculin skin test	Tuberculin skin test	Tuberculin skin test
Dyslipidemia	+ on risk screening questions and not previously screened with normal results	Lipid screen	Lipid screen	Lipid screen
STIs	Sexually active	Chlamydia and gonorrhea screen (use tests appropriate for population and clinical setting)	Chlamydia and gonorrhea screen (use tests appropriate for population and clinical setting)	Chlamydia and gonorrhea screen (use tests appropriate for population and clinical setting)
	Sexually active and + on risk screening questions	Syphilis test	Syphilis test	Syphilis test
HIV	Discuss and offer	HIV test*	HIV test*	HIV test*
Pregnancy	Sexually active, without contraception, late menses or amenorrhea	Urine hCG	Urine hCG	Urine hCG (without late or absent menses or heavy or irregular bleeding)
Cervical dysplasia†	NA	NA	NA	Pap smear at age 21 yr
Alcohol or drug use	+ on risk screening questions	Administer alcohol and drug screening tool	Administer alcohol and drug screening tool	Administer alcohol and drug screening tool

*CDC recommends universal, voluntary HIV screening of all sexually active people, beginning at age 13 yr. 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. 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.

†Screening for Cervical Cancer. April 2012. U.S. Preventive Services Task Force. http://www.uspreventiveservicestaskforce.org/uspstf/uspscerv.htm.

hCG, human chorionic gonadotropin; NA, not applicable; RA, risk assessment.

Adapted from Hagan JF, Shaw JS, Duncan PM, eds. Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents, *3rd ed. Elk Grove Village, IL: American Academy of Pediatrics; 2008; and American Academy of Pediatrics, Committee on Practice and Ambulatory Medicine, Bright Futures Periodicity Schedule Workgroup: 2014 recommendations for pediatric preventive health care,* Pediatrics *133(3):568–570, 2014.*

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.

Bibliography is available at Expert Consult.

112.1 Legal Issues

Gale R. Burstein

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 112-4). 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 yr) before they are allowed to 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. Nearly 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.

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

Bibliography

American Academy of Pediatrics: Adolescents and HIV infection: the pediatrician's role in promoting routine testing, *Pediatrics* 128:1023–1029, 2011.

Bloom B, Jones LI, Freeman G: Summary of health statistics for U.S. children: National Health Interview Survey, 2012. National Center for Health Statistics, *Vital Health Statistics 10* (258):2013. http://www.cdc.gov/nchs/data/series/sr_10/sr10_258.pdf.

Bright Futures and American Academy of Pediatrics Committee on Practice and Ambulatory Medicine: 2014 Recommendations for Pediatric Preventive Health Care, *Pediatrics* 133:568–570, 2014.

Centers for Disease Control and Prevention: *Preteen and Teen Vaccines*. http://www.cdc.gov/vaccines/who/teens/for-hcp.html.

Centers for Disease Control and Prevention: Sexually transmitted diseases treatment guidelines, 2014 (in press).

English A, Park MJ: *Access to health care for young adults: the Affordable Care Act is making a difference*, Chapel Hill, NC, 2012, Center for Adolescent Health and the Law; and San Francisco, CA: National Adolescent Health and Young Adult Information Center.

English A, Park MJ: *The Supreme Court ACA decision: What happens now for adolescents and young adults*, Chapel Hill, NC, 2012, Center for Adolescent Health and the Law; and San Francisco, CA: National Adolescent Health and Young Adult Information Center.

Hagan JF, Shaw JS, Duncan PM, editors: *Bright futures: guidelines for health supervision of infants, children, and adolescents*, ed 3, Elk Grove Village, IL, 2008, American Academy of Pediatrics.

Martinez ME, Cohen RA: *Health insurance coverage: early release of estimates from the National Health Interview Survey*, 4, 2014. http://www.cdc.gov/nchs/data/nhis/earlyrelease/insur201409.pdf.

Nordin JD, Solberg LI, Parker ED: Adolescent primary care visit patterns, *Ann Fam Med* 8:511–516, 2010.

U.S. Preventive Services Task Force. *Screening for Cervical Cancer*. 2012. http://www.uspreventiveservicestaskforce.org/uspstf/uspscerv.htm.

U.S. Preventive Services Task Force. *Screening for HIV*. http://www.uspreventiveservicestaskforce.org/uspstf/uspshivi.htm.

Table 112-4 Types of Minor Consent Statutes or Rules of Common Law That Allow for the 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 human immunodeficiency virus infection or acquired immunodeficiency syndrome • 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 *128:427–433, 2011.*

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 his or her 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 of 1996, 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* to the primary insured or the primary beneficiary listing services rendered by the provider and reimbursed by the health plan. An explanation of benefit 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.

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 female patient is examined by a male physician.

Bibliography is available at Expert Consult.

112.2 Screening Procedures

Gale R. Burstein

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 as well as 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

Bibliography

American Academy of Pediatrics Committee on Pediatric Emergency Medicine and Committee on Bioethics: Policy statement: consent for emergency medical services for children and adolescents, *Pediatrics* 128:427–433, 2011.

Coleman DL, Rosoff PM: The legal authority of mature minors to consent to general medical treatment, *Pediatrics* 131:786–793, 2013.

Ford C, English A, Sigmond G: Confidential healthcare for adolescents: position paper of the Society for Adolescent Medicine, *J Adolesc Health* 35:1–8, 2004.

The Alan Guttmacher Institute: *An overview of minors' consent laws. State policies in brief*, 2014, Guttmacher Institute. http://www.guttmacher.org/statecenter/spibs/spib_OMCL.pdf.

National Institute for Health Care Management Foundation: *Protecting confidential health services for adolescents and young adults: strategies and considerations for health plans. NIHCM Foundation Issue in Brief*. May 2011. http://www.nihcm.org/images/stories/NIHCM-Confidentiality-Final.pdf.

Weiss C: *Protecting minors' health information under the federal medical privacy regulations*, New York, NY, 2003, American Civil Liberties Union. http://www.aclu.org/files/FilesPDFs/med_privacy_guide.pdf.

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 as well as the parent should be given an opportunity 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 there are extreme time limitations 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 if the patient and interviewer are not language compatible provides a challenge but not necessarily a barrier under most circumstances (see Chapter 4). 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, adequate training and experience should be sought by clinicians wishing to give comprehensive care to adolescent patients.

PSYCHOSOCIAL ASSESSMENT

A few questions should be asked in order 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 ("What do you see yourself doing 5 yr from now?"), 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?"), and an eating disorder ("Do you ever feel that food controls you rather than vice versa?"). Bright Futures materials provide questions and patient encounter forms to structure the assessments that are available at their website (*http://brightfutures.aap.org/index.html*). The **HEADS/SF/FIRST** mnemonic, basic or expanded, can be useful in guiding the interview if encounter forms are not available (Table 112-5). Based on the assessments, appropriate counseling or referrals are recommended for more thorough probing or for in-depth interviewing.

Table 112-5 HEADS/SF/FIRST

Home. Space, privacy, frequent geographic moves, neighborhood.
Education/School. Frequent school changes, repetition of a grade/in each subject, teachers' reports, vocational goals, after-school educational clubs (language, speech, math, etc.), learning disabilities
Abuse. Physical, sexual, emotional, verbal abuse; parental discipline
Drugs. Tobacco, 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, and number of attempts
Safety. Seat belts, helmets, sports safety measures, hazardous activities, driving while intoxicated
Sexuality/Sexual Identity. Reproductive health (use of contraceptives, presence of sexually transmitted infections, feelings, pregnancy)
Family and **F**riends. **Family:** Family constellation, genogram, single/married/separated/divorced/blended family, family occupations and shifts; history of addiction in 1st- and 2nd-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
Image. Height and weight perceptions, body musculature and physique, appearance (including dress, jewelry, tattoos, body piercing as fashion trends or other statement)
Recreation. 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/Girl Scouts; Big Brother/Sister groups, campus groups]). How many hours per day, days per week involved?
Spirituality and Connectedness. Use HOPE* or FICA† acronym; adherence, rituals, occult practices, community service or involvement
Threats 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 practices; **e**ffects on medical care and end of life issues.
†FICA, faith beliefs; importance and influence of faith; community support.
From Dias PJ: Adolescent substance abuse. Assessment in the office, Pediatr Clin North Am *49:269–300, 2002.*

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 621). Vision testing should, therefore, be performed in order 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 (see Chapter 637). 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 445). An individual whose blood pressure exceeds the 95th percentile for his or her age is suspect for having hypertension, regardless of the absolute reading. Those adolescents with blood pressure between the 90th and 95th percentiles should receive appropriate counseling relative to weight and have a follow-up examination in 6 mo. Those with blood pressure above the 90th percentile should have their blood pressure 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 2nd and 3rd consecutive readings, using the change rather than the disappearance as the diastolic pressure. Most adolescents with elevations of blood pressure have labile hypertension. If the blood pressure is below 2 SD for age, anorexia nervosa and Addison disease should be considered.

Scoliosis

See Chapter 679.

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 yr in females and 14 yr in males. Curves measuring greater than 10 degrees should be monitored by an orthopedist until growth is complete.

Breast Examination

See Chapters 115 and 551.

Examination of the female adolescent's breasts is performed to detect masses, evaluate progression of sexual maturation, provide reassurance about development, and teach the technique of self-examination with the hope that this practice will continue into the higher risk later years. However, there is disagreement on the justification for promoting this routinely, given the rare instances of malignant breast masses in this age group.

Scrotum Examination

The peak incidence of germ cell tumors of the testes is in late adolescence and early adulthood. Palpation of the testes may have an immediate yield and should serve as a model for instruction of self-examination. Because varicoceles often appear during puberty, the examination also provides an opportunity to explain and reassure the patient about this entity (see Chapter 545).

Pelvic Examination

See Chapter 548.

Laboratory Testing

The increased incidence of iron-deficiency anemia after menarche mandates 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 446). 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 1 males have an average hematocrit of 39%, whereas those who have completed puberty (sexual maturity rating 5; see Chapter 110) have an average value of 43%. Tuberculosis testing on an annual basis is important in adolescents with risk factors, such as an adolescent with HIV, living in the household with someone with HIV, the incarcerated adolescent, or those with other risk factors, because puberty has been shown to activate this disease in those not previously treated. Hepatitis C virus screening should be offered to adolescents who report risk factors, such as injection drug use, received blood products or organ donation before 1992, or long-term hemodialysis.

Sexually active adolescents should undergo screening for STIs as per Centers for Disease Control and Prevention guidelines, regardless of symptoms (see Chapter 120). There are clear indications for chlamydia and gonorrhea screening of females 24 yr old and younger, 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 high prevalence of chlamydia (e.g., adolescent clinics, correctional facilities, and sexually transmitted disease clinics) and should be offered to young men who have sex with men. HIV screening should be discussed and offered to all adolescents aged 15 yr and older and to younger adolescents who are at increased risk. Routine screening of adolescents who are asymptomatic for certain STIs (e.g., syphilis, trichomoniasis, herpes simplex virus, and human papillomavirus) is not recommended. However, young men who have sex with men and pregnant adolescent females might require more thorough evaluation for all sexually transmitted diseases. Because cervical cancer incidence low and complications from procedures may outweigh benefits of screening adolescent females, cervical cancer screening should not begin until age 21 yr.

Bibliography is available at Expert Consult.

112.3 Transitioning to Adult Care

Cynthia Holland-Hall and Gale R. Burstein

The importance of successfully transitioning the care of adolescents with special healthcare needs (SHCN) from pediatric to adult services has been recognized for over a decade. Successful transition is associated with improved health outcomes and quality of life; poorly managed transition may lead to worsening of chronic disease control. Nonetheless, few pediatric practices incorporate explicit, comprehensive transition services into the care of their patients with SHCN. Barriers to providing transition services include lack of access to appropriate providers of adult primary and subspecialty care, time, and reimbursement by insurance companies. Internists accepting young adult patients with SHCN also perceive a need for better training in congenital and child-onset medical conditions. Families may experience anxiety about leaving trusted pediatric providers, or fear that their child is incapable of assuming care for his or her medical condition. Among the patients themselves, a higher degree of self-efficacy for disease management and independently negotiating the healthcare system, as well as a positive attitude toward transition, lead to a greater perceived readiness to transition their care to an adult model. Medical providers, family members, and adolescent patients therefore each play a critical role in implementing and executing a plan for successful transition.

Table 112-6 Key Elements of the Transition of Health Care 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, as well as 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-year age range, to adult providers, to whom pediatric providers continue to serve as a resource until transition is complete

The American Academy of Pediatrics, in conjunction with other key professional societies, has published detailed, comprehensive guidelines for incorporating transition services into the medical home for all adolescents, regardless of the presence or absence of SHCN. These guidelines are based on expert opinion, since the evidence on transition outcomes is limited. Transition encompasses much more than simply the transfer of care to another provider. In fact, many of the elements of transition apply even to family physicians who do not intend to transfer the patient's care, but who still should assist the patient in adapting to an adult model of healthcare delivery. Table 112-6 includes the key elements of healthcare transition. Tools to assist providers with all of these steps are available online from the National healthcare Transition Center (www.gottransition.org).

The process begins with the development of a transition policy and its dissemination to all families of young adolescents, ensuring that 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 this plan should be updated at subsequent visits until the patient is ready for implementation of the adult care model in early adulthood. Critical to the transition process is skills training for the adolescent in communication, self-advocacy, and self-care. The ultimate goal is to help all young people maximize their potential as they become young adults.

Bibliography is available at Expert Consult.

Bibliography

Broder KR, Cohn AC, Schwartz B, et al: Adolescent immunizations and other clinical preventive services: a needle and a hook?, *Pediatrics* 121(Suppl 1): S25–S34, 2008.

Centers for Disease Control and Prevention: Sexually transmitted diseases treatment guidelines, 2014 (in press).

Duncan PM, Duncan ED, Swanson J: Bright futures: the screening table recommendations, *Pediatr Ann* 37:152–158, 2008.

Hagan JF Jr, Shaw JS, Duncan P, editors: *Bright futures: guidelines for health supervision of infants, children, and adolescents*, ed 3, Elk Grove Village, IL, 2008, American Academy of Pediatrics.

Kreipe RE: Introduction to interviewing: the art of communication with adolescents, *Adolesc Med* 10:1–17, 2008.

USPSTF A-Z Topic Guide. *U.S. Preventive Services Task Force*. http://www.uspreventiveservicestaskforce.org/uspstf/uspstopics.htm.

U.S. Preventive Services Task Force. *Screening for Cervical Cancer*, 2012. http://www.uspreventiveservicestaskforce.org/uspstf/uspscerv.htm.

U.S. Preventive Services Task Force. *Screening for HIV, U.S.* http://www.uspreventiveservicestaskforce.org/uspstf/uspshivi.htm.

U.S. Preventive Services Task Force. *Screening for Major Depressive Disorder in Children and Adolescents*, 2009. http://www.uspreventiveservicestaskforce.org/uspstf/uspschdepr.htm.

Bibliography

American Academy of Pediatrics, American Academy of Family Physicians, and American College of Physicians, Transitions Clinical Report Authoring Group: Supporting the health care transition from adolescence to adulthood in the medical home, *Pediatrics* 128:182–200, 2011.

McManus M, Fox H, O'Connor K, et al: *Pediatric perspectives and practices on transitioning adolescents with special needs to adult health care*, Washington, DC, 2008, National Alliance to Advance Adolescent Health. Fact Sheet No. 6. Available at: http://www.thenationalalliance.org/publications/index.cfm?typeID=1.

van Staa A, van der Stege HA, Jedeloo S, et al: Readiness to transfer to adult care of adolescents with chronic conditions: exploration of associated factors, *J Adolesc Health* 48:295–302, 2011.

Chapter 113
Violent Behavior

Margaret M. Stager

Violence is recognized by the World Health Organization (WHO) as a leading worldwide public health problem. 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 39). Youths may be perpetrators, victims, or observers of violence (or any combination of the 3 roles) with varying severity of impact on the individual, family, and larger community. Multiple factors have been identified that may increase the risk of a youth engaging in violence, including poverty, war, substance abuse, mental health disorders, and poor family functioning.

EPIDEMIOLOGY

In 2010, homicide in the United States was the second leading cause of death for 10-24 yr olds totaling 4,828 deaths, which were largely males (86%) killed by a handgun (82.8%). The 2010 homicide rate for teens ages 12-17 yr was 3.0/100,000 youth down 65% 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 per 100,000, most countries with homicide rates above 10 per 100,000 are developing nations or countries with rapid socioeconomic changes. The prevalence of behaviors that contribute to violence has not decreased from 1999 to 2011; fighting and weapon carrying remain prevalent among U.S. youth. The rate of homicide by handgun is considerably higher than homicide by other weapon type, suggesting that access to firearms may play a major role in youth injuries and deaths (Fig. 113-1). Gang-related homicides among youths in 5 major U.S. cities are more likely to involve young (15-19 yr) males (80%), racial/ethnic minority (73%), and a firearm (90%) in comparison to nongang homicides. In addition, gang homicides are more likely to occur in public places, in the afternoon/evening hours, and rarely are related to drug trade/use. One quarter of the gang homicides are classified as drive-by shootings.

Violence at schools in the United States remains a significant problem with 32.8% of students reported being in a fight on school property 1 or more times in the preceding 12 mo. The 2011 Youth Risk Behavior Surveillance System reported 16.6% youths overall carried a weapon such as a gun, knife, or club in the last 30 days; 5.4% 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 increased monitoring at home and at school. Weapon carrying is highest among white males overall, which may begin as early as 9th grade. Student reports of physical fighting at schools have nearly tripled in the last 4 yr. These violence-related behaviors at school affect the students' perception of safety. More than 5% of students did not go to school on 1 or more days in the preceding 30 days because they felt it was unsafe at school.

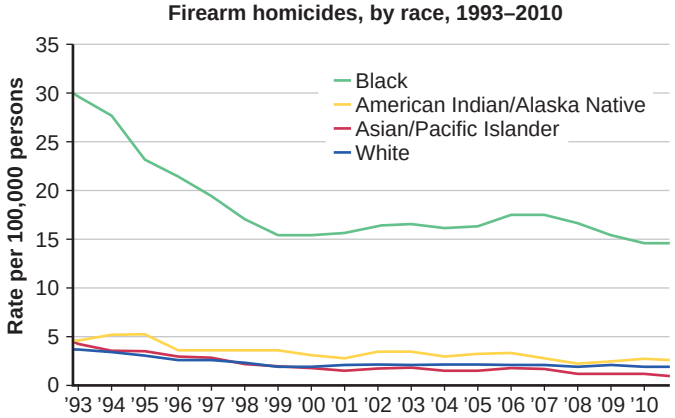


Figure 113-1 Firearm homicides, by race, 1993-2010. *(Data from Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, Web-based Injury Statistics Query and Reporting System (WISQARS), 1993–2010. Retrieved March 2013 from http://www.cdc.gov/ncipc/wisqars.)*

Dating violence (or intimate partner violence) occurs between 2 people in a close relationship and can be physical (punching, kicking, hitting or shoving), emotional (shaming, bullying, controlling or stalking), or sexual (forcing one's partner to engage in a sexual act when he/she does not consent to it). Incidents of dating violence often occur during the adolescent years with 22.4% of women and 15% of men experiencing some type of partner violence between the ages of 11 and 17 yr. The highest prevalence rates are seen in African-American students and older students. It may start with teasing, name calling, or shaming. It may progress electronically, such as frequent calls, texting, or posting sexual pictures of a partner on social media. Risk factors for being a victim of dating violence includes those who use alcohol, believe dating violence is acceptable, have lack of parental supervision, or have a friend who is in a violent relationship. Most teens do not report the behaviors because they fear retaliation from the partner. Teens who are victims of dating violence are more likely to experience decreased school performance, use drugs and alcohol, have an eating disorder, or experience depression. School-based prevention programs that address attitudes and behaviors linked with dating violence, such as Safe Dates, offer training experiences to change social norms amongst teens. 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.

ETIOLOGY

The WHO places youth violence in a model within the context of 3 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 against another group of individuals with social, political, or economic motivation. The types of violence in this model have behavioral links, in that child abuse victims are more likely to experience violent and aggressive interpersonal behavior as adolescents and adults. Overlapping risk factors exist for the types of violence, such as 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 4 categories that explore the potential nature of violence as involving physical, sexual, or psychological force, or deprivation.

There may be 2 types of antisocial youth: 1 that is life-course persistent and 1 that is life-course limited. **Adolescent-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 public health model emphasizes the environment and other external influences. A third theoretical model examines violent behaviors across the spectrum occurring within and outside the family and is referred to as the **cycle of 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. 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

There are several identified risk factors for youth violence, including poverty, association with delinquent peers, poor school performance/low education status, disconnection from adult role models or mentors, prior history of violence or victimization, poor family functioning, childhood abuse, substance abuse, and certain mental health disorders. The most common disorders associated with aggressive behavior in adolescents are mental retardation, learning disabilities, moderately severe language disorders, and mental disorders such as attention-deficit/hyperactivity and mood disturbances. The link between severe mental illness and violent behaviors is strongest for those with cooccurring alcohol or substance abuse or dependence.

Inability to master prosocial skills such as the establishment and maintenance of positive family and peer relations and poor resolution of conflict may put adolescents with these disorders at higher risk of physical violence and other risky behaviors. **Conduct disorder** and **oppositional defiant disorder** are specific psychiatric diagnoses whose definitions are associated with violent behavior (Table 113-1). They occur comorbidly with other disorders, such as attention-deficit/hyperactivity disorder (see Chapter 30), and increase an adolescent's vulnerability for juvenile delinquency, substance use or abuse, sexual promiscuity, adult criminal behavior, incarceration, and antisocial personality disorder. Other cooccurring risk factors for youth violence include use of anabolic steroids, gang tattoos, belief in one's premature death, 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 his or her personal safety may suggest a problem requiring a more in-depth evaluation. The **FISTS** mnemonic provides guidance for structuring the assessment (Table 113-2). 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 mental disorders are indications for evaluation by a mental 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.

TREATMENT

In the instance of acute injury secondary to violent assault, the treatment plan should follow standards established by the American Academy of Pediatrics model protocol, which includes, but is not limited to, 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 circumstance surrounding the assault, and a treatment plan on discharge that is designed to protect the adolescent from subsequent injury episodes and minimize the development of psychologic disability. Victims as well as witnesses of violence are at risk for posttraumatic stress disorder, and future aggressive and/or violent behavior.

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 existing comorbid conditions, such as attention-deficit/hyperactivity disorder, depression, and substance abuse, appears to reduce aggressive behavior.

PREVENTION

The WHO recognizes a multifactorial approach to prevention: individual approaches, relationship approaches, community approaches, and societal approaches (Table 113-3). **Individual approaches** concentrate on changing attitudes and behaviors to avoid aggressive and

Table 113-2 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?)

The FISTS mnemonic is 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 *72:S41–S50, 1997.*

Table 113-1 Oppositional Defiant Disorder, Conduct Disorder, and Juvenile Delinquency

PSYCHIATRIC DISORDER LABELS		
Oppositional Defiant Disorder	**Conduct Disorder**	**Legal Label Juvenile Delinquency**
Recurrent pattern of negativistic, defiant, disobedient, and hostile behavior toward authority figures that has a significant adverse effect on functioning (e.g., social, academic, occupational)	Repetitive and persistent pattern of behavior that violates the basic rights of others or major age-appropriate societal norms or rules	Offenses that are illegal because of age; illegal acts
Examples: losing temper; arguing with adults; defying or refusing to comply with request or rules of adults; annoying behavior; blaming others; and being irritable, spiteful, resentful	Examples: physical fighting, deceitfulness, stealing, destruction of property, threatening or causing physical harm to people or animals, driving without a license, prostitution, rape (even if not adjudicated in the legal system)	Examples: single or multiple instances of being arrested or adjudicated for any of the following: stealing, destruction of property, threatening or causing physical harm to people or animals, driving without a license, prostitution, rape
Diagnosed by a mental health clinician	Diagnosed by a mental health practitioner	Adjudicated in the legal system

From Greydanus DE, Pratt HD, Patel DR, et al: The rebellious adolescent, Pediatr Clin North Am *44:1460, 1997.*

Table 113-3 Public Health Approach to Youth Violence Prevention Model with Examples

	VICTIM (HOST)	PERPETRATOR (VECTOR)	FIREARM (AGENT)	SOCIAL ENVIRONMENT	PHYSICAL ENVIRONMENT
Primary prevention	Conflict resolution Violence anticipatory guidance	Substance abuse treatment Home visiting programs for new and single parents	Handgun and assault weapons ban Firearm registration	Job opportunities Adult-supervised activities	Better lighting Zoning-enforced limits in liquor licenses
Secondary prevention	Medical services Psychologic services	Job training Psychosocial rehabilitation	Handgun locks Public education on risks of ownership	School incident debriefing Safe havens	Increased police presence Graffiti removal
Tertiary prevention	Physical rehabilitation Psychosocial services	Incarceration Educational-psychosocial rehabilitation	Firearm surveillance	Foster care Alternative schools	Urban planning, e.g., decrease population density in public housing and mixture of income levels

From Calhoun AD, Clark-Jones F: Theoretical frameworks: developmental psychopathology, the public health approach to violence, and the cycle of violence, Pediatr Clin North Am *45:287, 1998.*

violent behavior as well as teaching coping strategies and nonviolent conflict resolution for all children as well as youths who have already displayed some violent tendencies. **Relationship approaches** focus more on victims, families, and peer relationships, especially those with the potential to trigger aggressive or violent responses. Solutions include improving skills in coping or problem solving in recent perceived crises, interpersonal conflicts, and close relationships. Family-based programs provide training for parents in areas of effective communication, child development, and solving problems in nonviolent methods. **Community-based approaches** raise public awareness in an effort to stimulate action by community members to reduce violence and protect vulnerable community members. Universal school-based violence prevention programs have been found to be effective in reducing violent and aggressive behaviors. Interventions beginning as early as preschool have been found to have positive outcomes years later. **Societal approaches** include broader advocacy and legislative actions, as well as 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 18 states 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. Ultimately, the National Violent Death Reporting System will be expanded to include all 50 states. The CDC characterizes specific successful programs and summarizes program content on its website (www.cdc.gov).

Bibliography is available at Expert Consult.

Bibliography

Ackard DM, Neumark-Sztainer D: Date violence and date rape among adolescents: Associations with disordered eating behaviors and psychological health, *Child Abuse Negl* 26:455–473, 2002.

American Academy of Pediatrics, Stirling J Jr, Committee on Child Abuse and Neglect and Section on Adoption and Foster Care, et al: Understanding the behavioral and emotional consequences of child abuse, *Pediatrics* 122:667–673, 2008. Erratum in: Pediatrics 123:197, 2009.

Beaver KM, Vaughn MG, Delisi M, et al: Anabolic-androgenic steroid use and involvement in violent behavior in a nationally representative sample of young adult males in the United States, *Am J Public Health* 98:2185–2187, 2008.

Black MC, Basile KC, Breiding MJ, et al: *The National Intimate Partner and Sexual Violence Survey (NISVS): 2010 Summary Report*, Atlanta, GA, 2011, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention. Available from http://www.cdc.gov/ViolencePrevention/pdf/NISVS_Report2010-a.pdf.

Centers for Disease Control and Prevention: Physical Dating Violence Among High School Students–United States, 2003, *MMWR MMWR Morb Mortal Wkly Rep* 55:532–535, 2006.

Centers for Disease Control and Prevention: Youth risk behavior surveillance–United States, 2011, *MMWR Surveill Summ* 61(no.SS-4):2012. Available from http://www.cdc.gov/mmwr/pdf/ss/ss6104.pdf>.

Centers for Disease Control and Prevention: *CDC overview: electronic media and youth violence: a CDC issue brief for educators and caregivers*. http://www.cdc.gov/ncipc/dvp/yvp/electronic_aggression.htm.

Centers for Disease Control and Prevention: Gang Homicides–Five U.S. Cities, 2003-2008, *MMWR Morb Mortal Wkly Rep* 61:46–51, 2012.

Centers for Disease Control and Prevention, National Center for Injury Prevention and Control: *Web-based Injury Statistics Query and Reporting System (WISQARS)* [online]. 2010. Available from http://www.cdc.gov/injury. Cited 2012 Oct 19.

Champion H, Wagoner K: Adolescent date fighting victimization and perpetration from a multi-community samples: associations with substance use and other violent victimization and perpetration, *Int J Adolesc Med Health* 20:419–429, 2008.

Council on Communications and Media: From the American Academy of Pediatrics: policy statement–impact of music, music lyrics, and music videos on children and youth, *Pediatrics* 124:1488–1494, 2009.

Eaton DK, Kann L, Kinchen S, et al: Youth Risk Behavior Surveillance–United States, 2011, *MMWR Surveill Summ* 61:4, 2012.

Elbogen EB, Johnson SC: The intricate link between violence and mental disorder: results from the national epidemiologic survey on alcohol and related conditions, *Arch Gen Psychiatry* 66:152–161, 2009.

Hahn R, Fuqua-Whitley D, Wethington H, et al: The effectiveness of universal school-based programs of the prevention of violent and aggressive behavior, *MMWR Recomm Rep* 56(RR–7):1–12, 2007.

Haynie DL, Farhat T, Brooks-Russell A, et al: Dating violence perpetration and victimization among U.S. adolescents: Prevalence, patterns, and associations with health complaints and substance use, *J Adolesc Health* 53(2):194–201, 2013.

Herrenkohl TI, Hill KG: Developmental trajectories of family management and risk for violent behavior in adolescence, *J Adolesc Health* 39:206–213, 2006.

Karch DL, Dahlberg LL, Patel N, et al: Surveillance for violent deaths—National Violent Death Reporting System, 16 States, 2006, *MMWR Surveill Summ* 58(1):1–44, 2009.

Komar D, Lathrop S: Tattoo types and frequencies in New Mexican white Hispanics and white non-Hispanic: autopsy data from homicidal and accidental deaths, 2002-2005, *Am J Forensic Med Pathol* 29:285–289, 2008.

Lormand DK, Markham CM, Peskin MF, et al: Dating violence among urban, minority, middle school youth and associated sexual risk behaviors and substance use, *J Sch Health* 83(6):415–421, 2013.

Molnar BE, Browne A: Violent behavior by girls reporting violent victimization: a protective study, *Arch Pediatr Adolesc Med* 159:731–739, 2005.

White N, Lauritsen JL: *Violent Crime Against Youth, 1994-2010*, Washington, DC, 2012, U.S. Department of Justice, Office of Justice Programs, Bureau of Justice Statistics. NCJ 240106.

Chapter 114

Substance Abuse

Margaret M. Stager

Although varying in percentages by nation and culture, a substantial proportion of adolescents will engage in use of a wide range of substances such as alcohol, tobacco, or marijuana. Their reactions to and the consequences of these exposures are influenced by a complex interaction between biologic and psychosocial development, environmental messages, and societal attitudes. Occasional or situational use of certain substances, such as alcohol in the United States, may be viewed as normative given the proportion of youths who report some experience with these substances. Others view the potential for adverse outcomes even with occasional use in immature adolescents, such as motor vehicle crashes and other injuries, sufficient justification to consider any drug use in younger adolescents a considerable risk.

Individuals who initiate drug use at an early age are at a greater risk for becoming addicted than those who try drugs in early adulthood. Drug use in younger, less-experienced adolescents can act as a substitute for developing age-appropriate coping strategies and enhance vulnerability to poor decision making. The first use of the most commonly used drugs occurs before age 18 yr, with 88% of people reporting age of first alcohol use at <21 yr old, the legal drinking age in the United States. Inhalants have been identified as a popular first drug for youth in grade 8. When drug use begins to negatively alter functioning in adolescents at school and at home, and risk-taking behavior is seen, intervention is warranted. Serious drug use is not an isolated phenomenon. It occurs across every segment of the population and is 1 of the most challenging public health problems facing society. The challenge to the clinician is to identify youths at risk for substance abuse 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 drugs with the greatest *harm*, and at times focusing on *harm reduction* with or without abstinence, is an important modern approach to adolescent substance abuse (Figs. 114-1 and 114-2).

ETIOLOGY

Substance abuse is biopsychosocially determined (Fig. 114-3). Biologic factors, including genetic predisposition, are established contributors. Behaviors such as rebelliousness, poor school performance, delinquency, and criminal activity and personality traits such as low self-esteem, anxiety, and lack of self-control are frequently associated with or predate the onset of drug use. Psychiatric disorders are often comorbidly associated with adolescent substance use. Conduct disorders and antisocial personality disorders are the most common diagnoses coexisting with substance abuse, particularly in males. Teens with depression (see Chapter 26), attention deficit disorder (see Chapter 33), and eating disorders (see Chapter 28) have high rates of substance use. The determinants of adolescent substance use and abuse are explained using a number of theoretical models, with factors at the individual level, the level of significant relationships with others, and the level of the setting or environment. 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 *drug use* may differ from those associated with adolescent *drug abuse*. Adolescent *use* is more commonly related to social and peer factors, whereas *abuse* is more often a function of psychological and biologic factors. The likelihood that an otherwise normal adolescent would experiment with drugs may be dependent on the availability of the drug 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. An abusing adolescent may have genetic or biologic factors coexisting with dependence on a particular drug for coping with day-to-day activities.

Specific historical questions can assist in determining the severity of the drug problem through a rating system (Table 114-1). The type of drug used (marijuana vs. heroin), the circumstances of use (alone or

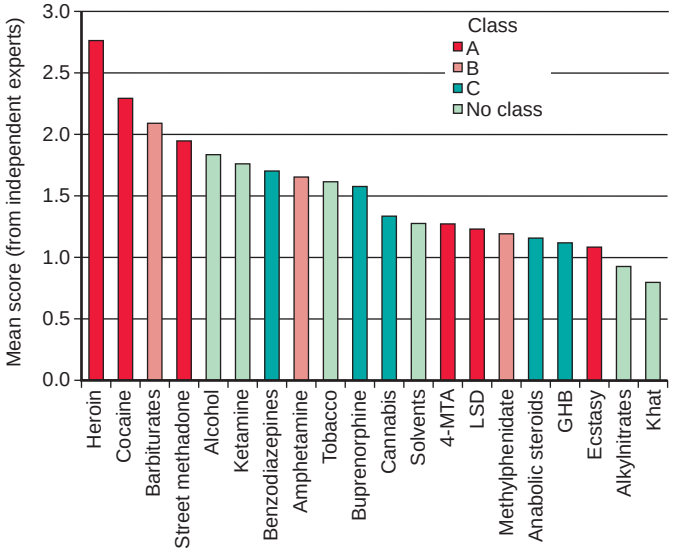


Figure 114-1 Mean harm scores for 20 substances as determined by an expert panel based on 3 criteria: physical harm to user; potential for dependence; and effect on family, community, and society. Classification under the Misuse of Drugs Act, when appropriate, is shown by the color of each bar. Class A drugs are deemed potentially most dangerous; class C least dangerous. *(From Nutt D, King LA, Saulsbury W, et al: Development of a rational scale to access the harm of drugs of potential misuse,* Lancet *369:1047–1053, 2007.)*

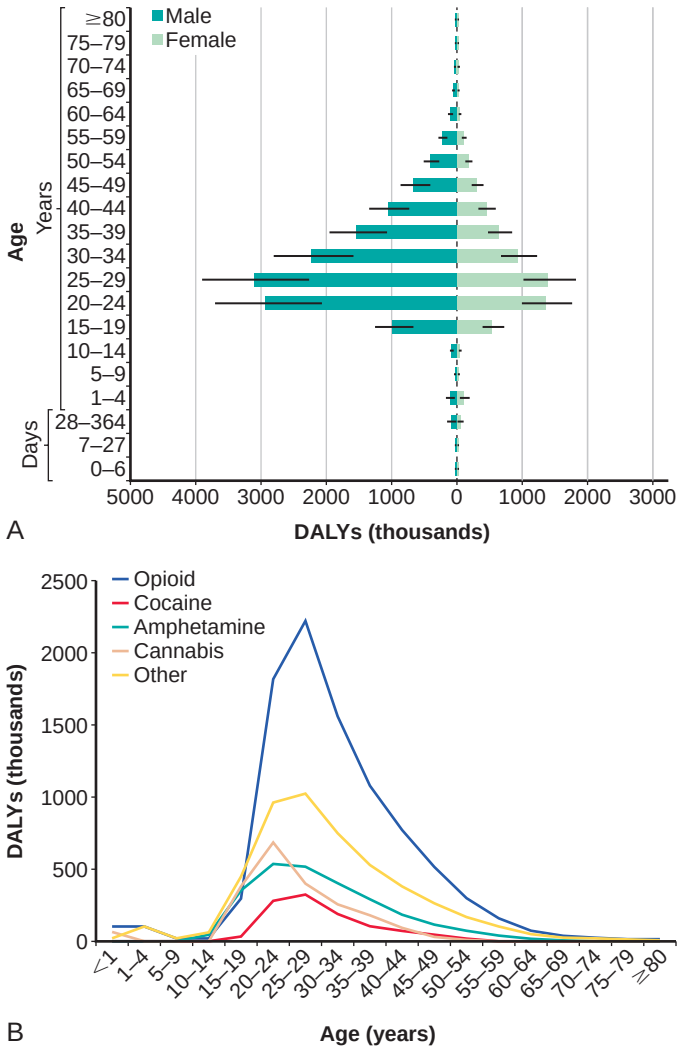


Figure 114-2 Total burden (DALYs) of drug dependence by age and sex in 2010. **A,** DALYs attributable to drug dependence, by age and sex. **B,** DALYs attributable to each type of drug dependence by age. DALYs, disability-adjusted life years. *(From: Degenhardt L, Whitford HA, Ferrari AJ, et al: Global burden of disease attributable to illicit drug use and dependence: findings from the Global Burden of Disease study 2010.* Lancet *382:1564-1574, 2013, Fig. 2, p. 1569.)*

Table 114-1 Assessing the Seriousness of Adolescent Drug Abuse

VARIABLE	0	+1	+2
Age (yr)	>15	<15	
Sex	Male	Female	
Family history of drug abuse		Yes	
Setting of drug use	In group		Alone
Affect before drug use	Happy	Always poor	Sad
School performance	Good, improving		Recently poor
Use 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 drug	Marijuana, beer, wine	Hallucinogens, amphetamines	Whiskey, opiates, cocaine, barbiturates

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

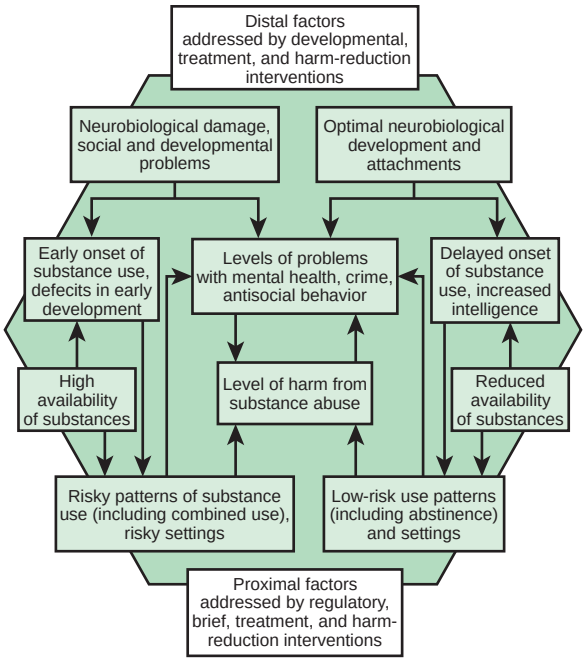


Figure 114-3 Protection and risk model for distal and proximal determinants of risky substance use and related harms. *(From Toumbourou JW, Stockwell T, Neighbors C, et al: Interventions to reduce harm associated with adolescent substance use,* Lancet *369:1391–1401, 2007.)*

Table 114-2 Stages of Adolescent Substance Abuse

STAGE	DESCRIPTION
1	Potential for abuse • Decreased impulse control • Need for immediate gratification • Available drugs, 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 drugs, e.g., stimulants, LSD, sedatives • Behavioral changes and some consequences • Increased frequency of use; use alone • Buying or stealing drugs
4	Regular use: preoccupation with the "high" • Daily use of drugs • Loss of control • Multiple consequences and risk taking • Estrangement from family and "straight" friends
5	Burnout: use of drugs to feel normal • Polysubstance use/cross-addiction • Guilt, withdrawal, shame, remorse, depression • Physical and mental deterioration • Increased risk taking, self-destructive, suicidal

in a group setting), the frequency and timing of use (daily before school vs. rarely on a weekend), the premorbid mental health status (depressed vs. happy), as well as the teenager's general functional status should all be considered in evaluating any youngster found to be abusing a drug. The stage of drug use/abuse should also be considered (Table 114-2). A teen may spend months or years in the experimentation phase trying a variety of illicit substances, including the most common drugs, cigarettes, alcohol, and marijuana. Often it is not until regular use of drugs resulting in negative consequences (problem use) that the teen is identified as having a problem, either by parents, teachers, or a physician. Certain protective factors play a part in buffering the risk factors as well as assisting in anticipating the long-term outcome of experimentation. Having emotionally supportive parents with open communication styles, involvement in organized school activities, having mentors or role models outside of the home, and recognition of the importance of academic achievement are examples of the important protective factors.

EPIDEMIOLOGY

Alcohol, cigarettes, and marijuana are the most commonly reported substances used among U.S. teens (Table 114-3). 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 drugs than do older teenagers, with the exception of inhalants (in 2012, 6.0% in 8th grade, 5.1% in 10th grade, 4.7% in 12th grade). Males have higher rates of both licit and illicit drug use than females, with greatest differences seen in their higher rates of frequent use of smokeless tobacco, cigars, and anabolic steroids. In school surveys, drug use rates of Hispanics are between whites and African-Americans, with the exception of 12th grade Hispanics reporting highest rates of cocaine use. African-Americans report less use of drugs across all drug categories (including levels of cigarette use) in comparison to whites and Hispanics. In examining trends in drug use, positive findings are that fewer students reported cigarette, alcohol, or stimulant use than in the previous 3 yr. Marijuana use continues to decline with daily use of marijuana in 2012 as 1.1% in 8th graders, 3.5% in 10th graders, and 6.5% in 12th graders.

Table 114-3 Thirty Day Prevalence Use of Alcohol, Cigarettes, Marijuana, and Inhalants in 8th Graders, 10th Graders, and 12th Graders, 2010 and 2012

	8TH GRADERS (%)	10TH GRADERS (%)	12TH GRADERS (%)
ALCOHOL (ANY USE)			
2010	13.8	28.9	41.2
2012	11.0	27.6	41.5
CIGARETTES (ANY USE)			
2005	7.1	13.6	19.2
2008	4.9	10.8	17.1
SMOKELESS TOBACCO			
2010	4.1	7.5	8.5
2012	2.8	6.4	7.9
MARIJUANA/HASHISH			
2010	8.0	16.7	21.4
2012	6.5	17.0	22.9
INHALANTS			
2010	3.6	2.0	1.4
2012	2.7	1.4	0.9
AMPHETAMINES			
2010	0.5	0.6	0.9
2012	0.5	0.5	1.0

National Institute of Drug Abuse: *2012 Monitoring the Future Study,* www.drugabuse.gov

Prescription drug abuse, or nonmedical use of a prescription drug or an over-the counter (OTC) medicine has gained popularity among teens in the last 3 yr (Table 114-4). In 2012, 14.8% of high school seniors had used a prescription drug or an OTC medicine for nonmedical reasons in the past year. The most commonly used substances were Adderall (7.6%), Vicodin (7.5%), OTC cough medicine (5.6%),

Table 114-4 Commonly Abused Prescription Drugs

NIDA NATIONAL INSTITUTE ON DRUG ABUSE

Commonly Abused Prescription Drugs

Visit NIDA at www.drugabuse.gov

National Institutes of Health
U.S. Department of Health and Human Services

Substances: Category and Name	Examples of *Commercial* and Street Names	DEA Schedule*/How Administered	*Intoxication Effects*/Health Risks
Depressants			
Barbiturates	*Amytal, Nembutal, Seconal, Phenobarbital:* barbs, reds, red birds, phennies, tooies, yellows, yellow jackets	II, III, IV/injected, swallowed	*Sedation/drowsiness, reduced anxiety, feelings of well-being, lowered inhibitions, slurred speech, poor concentration, confusion, dizziness, impaired coordination and memory*/slowed pulse, lowered blood pressure, slowed breathing, tolerance, withdrawal, addiction; increased risk of respiratory distress and death when combined with alcohol
Benzodiazepines	*Ativan, Halcion, Librium, Valium, Xanax, Klonopin:* candy, downers, sleeping pills, tranks	IV/swallowed	
Sleep Medications	*Ambien (zolpidem), Sonata (zaleplon), Lunesta (eszopiclone)*	IV/swallowed	*for barbiturates—euphoria, unusual excitement, fever, irritability*/life-threatening withdrawal in chronic users
Opioids and Morphine Derivatives**			
Codeine	*Empirin with Codeine, Fiorinal with Codeine, Robitussin A-C, Tylenol with Codeine:* Captain Cody, Cody, schoolboy; (with glutethimide: doors & fours, loads, pancakes and syrup)	II, III, IV/injected, swallowed	*Pain relief, euphoria, drowsiness, sedation, weakness, dizziness, nausea, impaired coordination, confusion, dry mouth, itching, sweating, clammy skin, constipation*/slowed or arrested breathing, lowered pulse and blood pressure, tolerance, addiction, unconsciousness, coma, death; risk of death increased when combined with alcohol or other CNS depressants
Morphine	*Roxanol, Duramorph:* M, Miss Emma, monkey, white stuff	II, III/injected, swallowed, smoked	
Methadone	*Methadose, Dolophine:* fizzies, amidone, (with MDMA: chocolate chip cookies)	II/swallowed, injected	*for fentanyl*—80–100 times more potent analgesic than morphine
Fentanyl and analogs	*Actiq, Duragesic, Sublimaze:* Apache, China girl, dance fever, friend, goodfella, jackpot, murder 8, TNT, Tango and Cash	II/injected, smoked, snorted	*for oxycodone*—muscle relaxation/twice as potent analgesic as morphine; high abuse potential
Other Opioid Pain Relievers: Oxycodone HCL Hydrocodone Bitartrate Hydromorphone Oxymorphone Meperidine Propoxyphene	*Tylox, Oxycontin, Percodan, Percocet:* Oxy, O.C., oxycotton, oxycet, hillbilly heroin, percs *Vicodin, Lortab, Lorcet:* vike, Watson-387 *Dilaudid:* juice, smack, D, footballs, dillies *Opana, Numorphan, Numorphone:* biscuits, blue heaven, blues, Mrs. O, octagons, stop signs, O Bomb *Demerol, meperidine hydrochloride:* demmies, pain killer *Darvon, Darvocet*	II, III, IV/chewed, swallowed, snorted, injected, suppositories	*for codeine*—less analgesia, sedation, and respiratory depression than morphine *for methadone*—used to treat opioid addiction and pain; significant overdose risk when used improperly
Stimulants			
Amphetamines	*Biphetamine, Dexedrine, Adderall:* bennies, black beauties, crosses, hearts, LA turnaround, speed, truck drivers, uppers	II/injected, swallowed, smoked, snorted	*Feelings of exhilaration, increased energy, mental alertness*/increased heart rate, blood pressure, and metabolism, reduced appetite, weight loss, nervousness, insomnia, *seizures, heart attack, stroke*
Methylphenidate	*Concerta, Ritalin:* JIF, MPH, R-ball, Skippy, the smart drug, vitamin R	II/injected, swallowed, snorted	*for amphetamines—rapid breathing, tremor, loss of coordination, irritability, anxiousness, restlessness*/delirium, panic, paranoia, hallucinations, impulsive behavior, aggressiveness, tolerance, addiction *for methylphenidate*—increase or decrease in blood pressure, digestive problems, loss of appetite, weight loss
Other Compounds			
Dextromethorphan (DXM)	*Found in some cough and cold medications:* Robotripping, Robo, Triple C	not scheduled/swallowed	*Euphoria, slurred speech*/increased heart rate and blood pressure, dizziness, nausea, vomiting, confusion, paranoia, distorted visual perceptions, impaired motor function

** Schedule I and II drugs have a high potential for abuse. They require greater storage security and have a quota on manufacturing, among other restrictions. Schedule I drugs are available for research only and have no approved medical use. Schedule II drugs are available only by prescription and require a new prescription for each refill. Schedule III and IV drugs are available by prescription, may have five refills in 6 months, and may be ordered orally. Most Schedule V drugs are available over the counter.*

*** Taking drugs by injection can increase the risk of infection through needle contamination with staphylococci, HIV, hepatitis, and other organisms. Injection is a more common practice for opioids, but risks apply to any medication taken by injection.*

Courtesy of the National Institute on Drug Abuse, U.S. Department of Health and Human Services, National Institutes of Health, www.drugabuse.gov.

tranquilizers (5.3%), sedatives (4.5%), and OxyContin (4.3%). Rural adolescents were 26% more likely than urban adolescents to have used prescription drugs nonmedically; use was associated with decreased health status, major depressive episode(s), and other drug (marijuana, cocaine, hallucinogens, and inhalants) and alcohol use. In a large-scale study of 16,209 adolescent exposures to prescription drugs, 52.4% were females, and the mean age was 16.6 yr (SD ± 1.7 yr). The 5 most frequently misused or abused drugs were hydrocodone (32%), amphetamines (18%), oxycodone (15%), methylphenidate (14%), and tramadol (11%). Many of these drugs can be found in the parents' home, some are OTC, while others are purchased from drug dealers at schools and colleges. Teen users of nonmedical opioids use other substances concurrently with the opioid use. Most frequently the teens combine opioids with marijuana, alcohol, cocaine, and tranquilizers putting them at risk for serious complications and overdose.

Anonymous screening of urine sampled from public inner city rest rooms in London demonstrated the presence of various amphetamine derivatives, cocaine, ketamine and cannabis as well as cathinone/cathine metabolites.

CLINICAL MANIFESTATIONS

Although manifestations vary by the specific substance of use, adolescents who use drugs often present in an office setting with no obvious physical findings. Drug use 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 drug screens, is recommended in emergency settings; while 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 (Table 114-5). 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 114-6). 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 drug use is associated with venous "tracks" and needle marks, while nasal mucosal injuries are associated with nasal insufflation of drugs. Seizures can be a direct effect of drugs such as cocaine and amphetamines or an effect of drug withdrawal in the case of barbiturates or tranquilizers.

SCREENING FOR SUBSTANCE ABUSE DISORDERS

In a primary care setting the annual health maintenance examination provides an opportunity for identifying adolescents with substance use or abuse issues. The direct questions as well as 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. Additionally, there are several self-report screening questionnaires available with varying degrees of standardization, length, and reliability. The **CRAFFT mnemonic** is specifically designed to screen for adolescents' substance use in the primary setting (Table 114-7). Privacy and confidentiality need to be considered 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 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 drug 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. Table 114-8 demonstrates the types of tests commonly used for detection by substance, along with the approximate retention time between the use and the identification of the substance in the urine. 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 the physical findings and the urine drug screen result. In 2007 the American of Academy of Pediatrics released guidelines that strongly discourage home-based or school-based testing.

DIAGNOSIS

The *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)* no longer identifies substance use disorders as those of *abuse* or of *dependence* as was done in previous editions. 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 abuse disorder may leave persisting 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 4 categories. The **first category** includes the criterion of *impaired control, social impairment, risky use, and pharmacologic criteria.* These criteria describe an individual taking increasing amounts of the substance and one who expresses a persistent desire to cut down substance use with unsuccessful efforts and the increased time, effort, and other resources the teen may be using to obtain the substance. 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 drug that is most likely to occur in in settings in which the drug had been available, such as a specific type of social situation. The **second cluster** of criterion (5-7) reflects social impairment, including the inability to perform as expected in school, home or at a job, increasing social problems and withdrawing from the individual's family. The **third cluster** of 2 criteria addresses increased risk-involvement associated with use of the substance, and the **final cluster** includes 2 criteria addressing pharmacologic responses (tolerance and/or withdrawal). The total number of criterion present is associated with a determination of a mild, moderate, or severe disorder.

These criteria may have limitations in use 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 in adolescence is associated with comorbidities and acts of juvenile delinquency. Youth may engage in other high-risk behaviors such as robbery, burglary, drug dealing, or prostitution for the purpose of acquiring the money necessary to buy drugs or alcohol. Regular use of any drug 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 and trauma. Drug and alcohol use 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 hepatitides B and C viruses as well as HIV (see Chapter 276).

TREATMENT

Adolescent drug abuse is a complex condition requiring a multidisciplinary approach that attends to the needs of the individual, not just drug use. Fundamental principles for treatment include accessibility to treatment; utilizing a multidisciplinary approach; employing individual or group counseling; offering mental health services; monitoring of drug use while in treatment; and understanding that recovery from drug abuse/addiction may involve multiple relapses. For most patients,

Table 114-5 Common Names and Salient Features of Club Drugs Used Recreationally

	MDMA	EPHEDRINE	γ-HYDROXYBUTYRATE	γ-BUTYROLACTONE	1,4-BUTANEDIOL	KETAMINE	FLUNITRAZEPAM	NITRITES	BATH SALTS
Common name	Ecstasy, XTC, E, X, Adam, hug drug, Molly	Herbal Ecstasy, herbal fuel, zest	Liquid Ecstasy, goop soap, Georgia homeboy, grievous bodily harm	Blue nitro, longevity, revivarant, GH revitalizer, gamma G, nitro, insom-X, remforce, firewater, invigorate	Thunder nectar, serenity, pine needle extract, zen, enliven, revitalize plus, lemon drops	K, special K, vitamin K, ket, kat	Roofies, circles, rophies, rib, roche, roaches, forget pill, R2, Mexican valium, roopies ruffies	Poppers, ram, rock hard, thrust, TNT	White lightning, Ivory wave, Cloud 9, Zoom, White rush
Duration of action	4-6 hr	4-6 hr	1.5-3.5 hr	1.5-3.5 hr	1.5-3.5 hr	1-3 hr	6-12 hr	Minutes	2-8 hr.
Elimination half-life	8-9 hr	5-7 hr	27 min	ND	ND	2 hr	9-25 hr	ND	Prolonged
Peak plasma concentration	1-3 hr	2-3 hr	20-60 min*	15-45 min	15-45 min	20 min	1 hr	Seconds	Varies
Physical dependence	No	No	Yes	Yes	Yes	No	Yes	No	Yes
Antidote	No	No	No	No	No	No	Yes	No	Treat with benzodiazepine
DEA schedule	I	None	III	None	None	III	IV	None	I
Detection with routine drug screen	Yes†	Yes†	No	No	No	No‡	No‡	No	In progress
Best detection method (time frame)	GC/MS (4 hr-2 days)	GC/MS (4 hr-2 days)	GC/MS (1-12 hr)	GC/MS (1-12 hr)	GC/MS (1-12 hr)	GC/MS (1 day)	GC/MS (1-12 hr)	GC/MS (1-12 hr)	GC/MS (1-12 hr)

*Depends on dose.
†Concentrations that are sufficiently high can give positive results for amphetamine because of cross-reactions.
‡Flunitrazepam can give positive results for benzodiazepines; ketamine can give positive results for phencyclidine.
DEA, U.S. Drug Enforcement Agency, currently reviewing possibility of flunitrazepam being placed into schedule of the U.S. Controlled Substance Act; GC/MS, gas chromatography–mass spectroscopy. Duration, half-life, and peak plasma are probably different after high or sequential doses because of nonlinear kinetics; ND, not determined in human beings.
Modified from Ricaurte GA, McCann UD: Recognition and management of complications of new recreational drug use. Lancet *365:2137–2145, 2005.*

Table 114-6 The 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 jimson weed and Amanita muscaria).
SYMPATHOMIMETIC SYNDROMES	
Common signs	Delusions, paranoia, tachycardia (or bradycardia if the drug 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-met hylenedioxymethamphetamine, 3,4-methylenedioxyethamphetamine, and 2,5-dimethoxy-4-bromoamphetamine), 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 *326:1678, 1992. ©1992 Massachusetts Medical Society. All rights reserved.*

Table 114-7 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 drugs?
- Do you ever use alcohol or drugs to **R**elax, feel better about yourself or fit in?
- Do you ever use alcohol or drugs while you are by yourself (**A**lone)?
- Do you ever **F**orget things you did while using alcohol or drugs?
- Do your Family or **F**riends ever tell you that you should cut down on your drinking or drug use?
- Have you ever gotten into **T**rouble while you were using alcohol or drugs?

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

Table 114-8 Urine Screening for Drugs Commonly Abused by Adolescents

DRUG	MAJOR METABOLITE	INITIAL	FIRST CONFIRMATION	SECOND CONFIRMATION	APPROXIMATE RETENTION TIME
Alcohol (blood)	Acetaldehyde	GC	IA		7-10 hr
Alcohol (urine)	Acetaldehyde	GC	IA		10-13 hr
Amphetamines		TLC	IA	GC, GC/MS	48 hr
Barbiturates		IA	TLC	GC, GC/MS	Short-acting (24 hr); long-acting (2-3 wk)
Benzodiazepines		IA	TLC	GC, GC/MS	3 days
Cannabinoids	Carboxy- and hydroxymetabolites	IA	TLC	GC/MS	3-10 days (occasional user); 1-2 mo (chronic user)
Cocaine	Benzoylecgonine	IA	TLC	GC/MS	2-4 days
Methaqualone	Hydroxylated metabolites	TLC	IA	GC/MS	2 wk
Opiates					
Heroin	Morphine Glucuronide	IA	TLC	GC, GC/MS	2 days
Morphine	Morphine Glucuronide	IA	TLC	GC, GC/MS	2 days
Codeine	Morphine Glucuronide	IA	TLC	GC, GC/MS	2 days
Phencyclidine		TLC	IA	GC, GC/MS	8 days

GC, gas chromatography; IA, immunoassay; MS, mass spectrometry; TLC, thin-layer chromatography.

Modified from Drugs of abuse—urine screening [physician information sheet]. Los Angeles, Pacific Toxicology. From MacKenzie RG, Kipke MD: Substance use and abuse. In Friedman SB, Fisher M, Schonberg SK, editors: Comprehensive adolescent health care, *St. Louis, 1998, Mosby.*

Table 114-9 Domains of Risk and Protective Factors for Substance Abuse Prevention

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

From National Institute on Drug Abuse: Preventing drug use among children and adolescents. A research based guide for parents, educators, and community leaders. *NIH publication No. 04-4212(B), ed 2, Bethesda, MD, 2003, National Institute on Drug Abuse.*

Table 114-10 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 drug 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

remaining in treatment for a minimum period of 3 mo will result in a significant improvement.

PROGNOSIS

For adolescent substance abusers who have been referred to a drug treatment program, positive outcomes are directly related to regular attendance in posttreatment groups. For males with learning problems or conduct disorder, outcomes are poorer than for those without such disorders. Peer use patterns and parental use have a major influence on outcome for males. For females, factors such as self-esteem and anxiety are more important influences on outcomes. The chronicity of a substance use disorder makes relapse an issue that must always be kept in mind when managing patients after treatment, and appropriate assistance from a health professional qualified in substance abuse management should be obtained.

PREVENTION

Preventing drug use among children and teens requires prevention efforts aimed at the individual, family, school, and community levels. The National Institute on Drug Abuse (NIDA) 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 drug abuse (legal and illegal); should address the specific type(s) of drug abuse within an identified community; and should be culturally competent to improve effectiveness (Table 114-9). The highest risk periods for substance use in children and adolescents are during life transitions such as the move from elementary school to middle school, or from middle school to high school. Prevention programs need to target these emotionally and socially intense times for teens in order to adequately anticipate potential substance use or abuse. Examples of effective research-based drug abuse 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).

Bibliography is available at Expert Consult.

114.1 Alcohol

Margaret M. Stager

Alcohol is the most popular drug among teens in the United States. By 12th grade, approximately 75% of adolescents in high schools report ever having an alcoholic drink, with 20.5% having their first drink before age 13 yr. Multiple factors can affect a young teen's risk of developing a drinking problem at an early age (Table 114-10). One-third of high school seniors admit to combining drinking behaviors with other risky behaviors, such as driving or taking additional substances. Binge drinking remains especially problematic among the older teens and young adults. Thirty-one percent of high school seniors report having 5 or more drinks in a row in the last 30 days. Higher use is seen in males (23.8%) than in females (19.8%), and whites (24.0%) and Hispanics (24.2%) than in blacks (12.4%). Overall, the prevalence of binge drinking decreased from 2009 (24.2%) to 2011 (21.9%). Teens with binge drinking patterns are more likely to be assaulted, engage in high risk sexual behaviors, have academic problems, and acquire injuries than those teens without binge drinking patterns.

Alcohol contributes to more deaths in young individuals in the United States than all the illicit drugs 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 spanned 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 like 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 2 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),** which is later followed by fibrosis, the hallmark of **cirrhosis.** Early hepatic involvement may result in elevation in γ-glutamyl transpeptidase and serum glutamic-pyruvic transaminase. The second metabolic pathway, which is utilized at high serum alcohol levels, involves the microsomal enzyme system of the liver, in which the cofactor is reduced nicotinamide-adenine dinucleotide phosphate. The net effect of activation of this pathway is to decrease metabolism of drugs 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 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 complications of alcohol use can occur from a single large ingestion. The most common is acute erosive **gastritis,** which is manifested by epigastric pain, anorexia, vomiting, and

Bibliography

Archer JRH, Dargan PI, Hudson S, et al: Analysis of anonymous pooled urine from portable urinals in central London confirms the significant use of novel psychoactive substances, *Q J Med* 106:147–152, 2013.

Bonomo Y, Proimos J: Substance misuse: alcohol, tobacco, inhalants, and other drugs, *BMJ* 330:777–780, 2005.

Centers for Disease Control and Prevention: Youth risk behavior surveillance–United States, 2011, *MMWR Surveill Summ* 61(no.SS-4), 2012. Available from: www.cdc.gov/mmwr/pdf/ss/ss6104.pdf.

Degenhardt L, Whiteford HA, Ferrari AJ, et al: Global burden of disease attributable to illicit drug use and dependence: findings from the Global Burden of Disease Study 2010, *Lancet* 382:1564–1574, 2013.

Friedman RA: The changing face of teenage drug abuse—the trend toward prescription drugs, *N Engl J Med* 354:1448–1450, 2006.

Groenman AP, Oosterlaan J, Rommelse N, et al: Substance use disorders in adolescents with attention deficit hyperactivity disorder: a 4-year follow-up study, *Addiction* 108(8):1503–1511, 2013.

Gu Q, Dillon CF, Burt VL: Prescription drug use continues to increase: U.S. prescription drug data for 2007-2008, *NCHS Data Brief* (42):1–8, 2010.

Havens JR, Young AM, Havens CE: Nonmedical prescription drug use in a nationally representative sample of adolescents: evidence of greater use among rural adolescents, *Arch Pediatr Adolesc Med* 165(3):250–255, 2011.

Hingson RW, Zha W, Weitzman ER: Magnitude of and trends in alcohol-related mortality and morbidity among U.S. college students ages 18–24, 1998–2005, *J Stud Alcohol Drugs Suppl* 16:12–20, 2009.

Johnston LD, O'Malley PM, Bachman JG, et al: *Monitoring the Future National Results on Drug Use: 2012 Overview, Key Findings on Adolescent Drug Use*, Ann Arbor, 2013, Institute for Social Research, The University of Michigan.

Levy S, Sherritt L, Vaughn BL, et al: Results of random drug testing in an adolescent substance abuse program, *Pediatrics* 119:e843–e848, 2007.

Nakawaki B, Crano WD: Predicting adolescents' persistence, non-persistence, and recent onset of nonmedical use of opiods and stimulants, *Addict Behav* 37(6):716–721, 2012.

National Institute on Drug Abuse: *Principles of Drug Addiction Treatment: A Research-Based Guide (3rd Edition). NIH Publication Number 12-4180*. 2012. http://www.drugpubs.drugabuse.gov.

National Institute on Drug Abuse: *NIDA infofacts: club drugs (GHB, ketamine, and Rohypnol)*. http://www.nida.nih.gov/infofacts/Clubdrugs.html.

Nutt D, King LA, Saulsbury W, et al: Development of a rational scale to assess the harm of drugs of potential misuse, *Lancet* 369:1047–1053, 2007.

Pilowsky DJ, Wu LT: Screening instruments for substance use and brief interventions targeting adolescents in primary care: a literature review, *Addict Behav* 38(5):2146–2153, 2013.

Riggs P: Non-medical use and abuse of commonly prescribed medications, *Curr Med Res Opin* 24(3):869–877, 2008.

Ross-Durow PL, et al: Adolescents access to their own prescription medications in the home, *J Adolesc Health* 53(2):260–264, 2013.

Toumbourou JW, Stockwell T, Neighbors C, et al: Interventions to reduce harm associated with adolescent substance use, *Lancet* 369:1391–1401, 2007.

Wong CF, Silva K, Kecojevic A, et al: Coping and emotion regulation profiles as predictors of nonmedical prescription drug and illicit drug use among high-risk young adults, *Drug Alcohol Depend* 132(1–2):165–171, 2013.

Zosel A, Bartelson BB, Bailey E, et al: Characterization of adolescent prescription drug abuse and misuse using the Researched Abuse Diversion and Addiction-related Surveillance (RADARS) System, *J Am Acad Child Adolesc Psychiatry* 52(2):196–204, 2013.

Zuckerman MD, Boyer EW: HIV and club drugs in emerging adulthood, *Curr Opin Pediatr* 24:219–224, 2012.

Table 114-11 Alcohol Use Disorders Identification Test (AUDIT)

	SCORE (0-4)*
1. How often do you have a drink containing alcohol?	Never (0) to more than 4 per wk (4)
2. How many drinks containing alcohol do you have on a typical day?	One or 2 (0) to more than 10 (4)
3. How often do you have 6 or more drinks on 1 occasion?	Never (0) to daily or almost daily (4)
4. How often during the last year have you found that you were not able to stop drinking once you had started?	Never (0) to daily or almost daily (4)
5. How often during the last year have you failed to do what was normally expected from you because of drinking?	Never (0) to daily or almost daily (4)
6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?	Never (0) to daily or almost daily (4)
7. How often during the last year have you had a feeling of guilt or remorse after drinking?	Never (0) to daily or almost daily (4)
8. How often during the last year have you been unable to remember what happened the night before because you had been drinking?	Never (0) to daily or almost daily (4)
9. Have you or someone else been injured as a result of your drinking?	No (0) to yes, during the last year (4)
10. Has a relative, friend, doctor or other health worker been concerned about your drinking or suggested that you should cut down?	No (0) to yes, during the last year (4)

*Score ≥8 = problem drinking.
From Schuckit MA: Alcohol-use disorders, Lancet *373:492–500, 2009, Table 1.*

heme-positive stools. Less commonly, vomiting and midabdominal pain may be caused by acute alcoholic **pancreatitis;** diagnosis is confirmed by the finding of elevated serum amylase and lipase levels.

DIAGNOSIS

Primary care settings provide opportunity to screen teens for alcohol use or problem behaviors. Brief alcohol screening instruments (CRAFFT [see Table 114-7] or AUDIT [Alcohol Use Disorders Identification Test, Table 114-11]) perform well in a clinical setting as techniques to identify alcohol use disorders. A score of ≥8 on the AUDIT questionnaire identifies people who drink excessively and who would benefit from reducing or ceasing drinking (Table 114-11). Teenagers in the early phases of alcohol use exhibit few physical findings. Recent use of alcohol may be reflected in elevated γ-glutamyl transferase and aspartate amino transferase.

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 drugs should be considered as possible confounding factors.

TREATMENT

The usual mechanism of death from the alcohol overdose syndrome is respiratory depression, and artificial ventilatory support must be provided until the liver can eliminate sufficient amounts of alcohol from the body. In a patient without alcoholism, it generally takes 20 hr 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 been found to be quite effective interventions for teens.

Bibliography is available at Expert Consult.

114.2 Tobacco

Margaret M. Stager

CIGARETTES

The average smoker in the United States starts at age 12 yr, and most are regular smokers by age 14 yr. More than 90% of adolescent smokers become adult smokers. Factors associated with youth tobacco use include exposure to smokers (friends, parents), availability of tobacco, low socioeconomic status, poor school performance, low self-esteem, lack of perceived risk of use, and lack of skills to resist influences to tobacco use.

Current smoking rates among U.S. high school students (as is the case for students in many industrialized nations) have trended downward over the last decade for lifetime cigarette use (from 20.0% to 12.4%) and current frequent cigarette use (from 16.8% to 6.4%). Overall, more whites report current tobacco use (20.3%) than Hispanics (17.5%) or blacks (10.5%). Clove cigarettes (kreteks) and flavored cigarettes (bidis) are popular with younger students. Both types of flavored cigarettes contain tobacco with other additives and deliver more nicotine and other harmful substances because they are unfiltered. Use of cigars and mini-cigars (cigarillos) has not changed in the past 3 yr, with 13.1% of students reporting smoking at least 1 during the 30 days prior to the survey. Cigar/cigarillo use is highest among males (17.8% vs. females 8.0%), and high school seniors (23.9%) versus lower grades (9th grade 12.3%, 10th grade 15.4% and 11th grade 20.4%). Tobacco use is linked to other high-risk behaviors. Teens who smoke are more likely than nonsmokers to use alcohol and engage in unprotected sex, are 8 times more likely to use marijuana, and are 22 times more likely to use cocaine.

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 prevalence is higher than other tobacco use, although cigars and smokeless tobacco are also used; in the Eastern Mediterranean, shisha (flavored tobacco smoked in hookah pipes) 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 rates by teens in low- and middle-income nations are increasing.

PHARMACOLOGY

Nicotine, the primary active ingredient in cigarettes, is addictive. Nicotine is absorbed by multiple sites in the body, including the lungs, skin, gastrointestinal 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 average nicotine content of 1 cigarette is 10 mg and the average nicotine intake per cigarette ranges from 1-3 mg. Nicotine, as delivered in cigarette smoke, has a half-life of about 2 hr. **Cotinine** is the major metabolite of nicotine via C-oxidation. It has a biologic half-life of 19-24 hr and can be detected in urine, serum, and saliva.

CLINICAL MANIFESTATIONS

Adverse health effects from regular smoking include an increased prevalence of chronic cough, sputum production, and wheezing.

Bibliography

American Academy of Pediatrics Committee on Substance Abuse: Policy statement—alcohol use by youth and adolescents: a pediatric concern, *Pediatrics* 125:1078–1087, 2010.

Centers for Disease Control and Prevention: Vital signs: Drinking and driving among high school students aged ≥ 16 years–United States, 1991-2011, *MMWR Morb Mortal Wkly Rep* 61:796–800, 2012.

Centers for Disease Control and Prevention: Vital Signs: Binge drinking among women and high school girls–United States, 2011, *MMWR Morb Mortal Wkly Rep* 62:9–14, 2013.

Chun TH, Linakis JG: Interventions for adolescent alcohol use, *Curr Opin Pediatr* 24:238–242, 2012.

Chung T, Smith GT, Donovan JE, et al: Drinking frequency as a brief screen for adolescent alcohol problems, *Pediatrics* 129:205–212, 2012.

Hastings G, Sheron N: Alcohol marketing: grooming the next generation, *BMJ* 346:f1277, 2013.

Howland J, Rohsenow DJ: Risks of energy drinks mixed with alcohol, *JAMA* 309:245–246, 2013.

Jackson C, Ennett ST, Dickinson DM, et al: Letting children sip: Understanding why parents allow alcohol use by elementary school-aged children, *Arch Pediatr Adolesc Med* 166:1053–1057, 2012.

Kriston L, Hölzel L, Weiser AK, et al: Meta-analysis: are 3 questions enough to detect unhealthy alcohol use? *Ann Intern Med* 149:879–888, 2008.

McCambridge J, McAlaney J, Rowe R: Adult consequences of late adolescent alcohol consumption: a systematic review of cohort studies, *PLoS Med* 8(2):e100413, 2011.

Miller P: Energy drinks and alcohol: downplaying the harms, *BMJ* 347:25, 2013.

Sanchez ZM, Santos MGR, Pereira APD, et al: Childhood alcohol use may predict adolescent binge drinking: a multivariate analysis among adolescents in Brazil, *J Pediatr* 163:363–368, 2013.

Schöffl I, Kothmann JF, Schöffl I, et al: "Vodka energy": Too much for the adolescent nephron? *Pediatrics* 128:e227–e231, 2011.

Sepkowitz KA: Energy drinks and caffeine-related adverse effects, *JAMA* 309:243–244, 2013.

Tyler KA: Examining the changing influence of predictors on adolescent alcohol misuse, *J Child Adolesc Subst Abuse* 16:95–114, 2007.

Walton MA, Chermack ST, Shope JT, et al: Effects of a brief intervention for reducing violence and alcohol misuse among adolescents, *JAMA* 304(5):527–535, 2010.

Yuma-Guerreno PJ, Lawson KA, Velasquez PJ, et al: Screening, brief intervention, and referral for alcohol use in adolescents: A systematic review, *Pediatrics* 130:115–122, 2012.

Smoking during pregnancy is associated with an average decrease in fetal weight of 200 g; this decrease, added to the already smaller size of infants born to teenagers, increases perinatal morbidity and mortality. Tobacco smoke induces hepatic smooth endoplasmic reticulum enzymes and, as a result, may also influence metabolism of drugs such as phenacetin, theophylline, and imipramine. Withdrawal symptoms can occur when adolescents try to quit. Irritability, decreased concentration, increased appetite, and strong cravings for tobacco are common withdrawal symptoms.

ELECTRONIC CIGARETTES (E-CIGARETTES)

E-cigarettes are electronic nicotine delivery systems that are battery operated, which heat and then vaporize nicotine dissolved in propylene glycol, glycerin, or other solvents. They come in tobacco, mint, cherry, or chocolate flavors, and are highly marketed to adolescents. They have the potential to create nicotine dependency and have not been effective in smoking-cessation programs.

Adverse effects include dry cough, throat irritation, and lipoid pneumonia. Potentially toxic substances have been detected in the vapor (diethylene glycol) as well as carcinogens (nitrosamines). Second-hand exposure is a possibility. These products have been banned in some countries; they are not regulated by the FDA.

SMOKELESS TOBACCO

The 2 forms of smokeless tobacco (SLT) are "chew," a leafy tobacco product sold in pouches, and "snuff," a finely ground tobacco product sold in tins or packets. Users place the SLT along the gum line of the lower jaw whereby the nicotine is absorbed by the mucous membranes. Smokeless tobacco use is largely reported by males in 10th (11.2%) and 12th grades (13.5%) for the 30-day prevalence rates. Snus, is a Swedish tobacco product that is available as a loose powder, or in a small teabag-like sachet. It is placed under the lower lip and unlike American chewing tobacco there is no need to spit. Annual prevalence of Snus use in 2012 was 2.4%, 6.9%, and 7.9% among 8th, 10th, and 12th graders, respectively.

Introduced in 2009, there are several dissolvable SLT products on the market. The Orbs are pellets of ground tobacco that resemble candy and come in various flavors. The Sticks are twin, matchstick-like ground tobacco, and the Strips are flat sheets that quickly dissolve in the mouth. All of these products are small and easily concealed, and therefore can be used throughout the day without detection, especially as there is no need to spit.

Exposure to SLT increases the users risk for oral cancers of the mouth, pharynx, larynx, and esophagus, as well as gum disease and nicotine addiction. Use of SLT among high school boys exceeds 20% in Arkansas, Kentucky, Montana, North Dakota, Oklahoma, South Dakota, Tennessee, Wyoming, and West Virginia (the latter with the highest rate at 25.5%).

TREATMENT

The approach to smoking cessation in adolescents includes the **5 As (Ask, Advise, Assess, Assist, and Arrange)** and use of nicotine replacement therapy in addicted teens who are motivated to quit and are not using SLT. Consensus panels recommend the 5 As, although evidence of efficacy in adolescents is limited. Nicotine patch studies to date in adolescents suggest a positive effect on reducing withdrawal symptoms and that pharmacotherapy should be combined with behavioral therapy to reach higher cessation and lower relapse rates. In a limited number of students, cessation rates of 15% were reported at 3 and 6 mo. Nicotine replacement therapy is also available as a gum, inhaler, nasal spray, lozenge, or microtab (Table 114-12). However, the nicotine patch and nasal spray were found to have numerous side effects in adolescent subjects. Medications such as bupropion are not FDA approved for use in adolescents <18 yr old; some pilot studies in adolescents report cessation efficacy with 150 mg or 300 mg of bupropion daily. Varenicline has successfully been used in adults; however, it now includes a black box warning of neuropsychiatric side effects such as agitation, hostility, depressed mood, and suicidal ideation.

The American Lung Association's Not-On-Tobacco Program (NOT) is a nationally recognized best-practice model for teen smoking cessation. More than 100,000 teens in 48 states have participated in the NOT, which resulted in either quitting (15% on average) or decreased tobacco use. The NOT is a 10 wk, developmentally appropriate, teen-focused, small group program that addresses topics such as stress management, effects of smoking, preparing to quit, dealing with peer pressure, and establishing support networks. The program is available as a train-the-trainer model, including training manuals and student materials (see www.lung.org).

In keeping with teens' high use of cell phones, support for teen smoking cessation is now available as a text-messaging service. Smokefree TXT, a free text messaging service, is offered by the National Cancer Institute and aims to engage teens to quit smoking using daily text messaging on their cell phone. Teens can sign up online (teen.smokefree.gov) or text QUIT to iQUIT (47848). Another cell phone

Table 114-12 Smoking Cessation Pharmacotherapy Available in the United States

THERAPY BRAND	NAME	STRENGTHS	FDA-APPROVED ADULT DOSING	AVAILABILITY*	STUDIED IN ADOLESCENTS	QUIT DATE
NICOTINE REPLACEMENT THERAPY						
Gum‡	Nicorette	2 mg, 4mg	The 0.4-mg strength should be used by patients who smoke 25 or more cigarettes a day; otherwise the 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 wks	Rx	No	
Lozenge	CommitTM, Nicorette mini	2 mg, 4 mg	The 4-mg strength should be used by patients who smoke their first cigarette within 30 minutes of waking; otherwise, the 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	Prior to beginning nicotine replacement therapy

Table 114-12 Smoking Cessation Pharmacotherapy Available in the United States—cont'd

THERAPY BRAND	NAME	STRENGTHS	FDA-APPROVED ADULT DOSING	AVAILABILITY*	STUDIED IN ADOLESCENTS	QUIT DATE
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 wks 1-6 Step 2: one 14-mg patch daily for wks 7-8 Step 3: one 7-mg patch daily for wks 9-10 For patients who smoke <10 cigarettes daily: begin with the 14-mg patch daily for 6 wks, followed by the 7-mg patch for 2 wks	OTC	Yes	
NONNICOTINE THERAPY						
Bupropion SR‡	Zyban	150-mg sustained release tablets	150 mg by mouth in the morning for 3 days, then increase to 150 mg by mouth twice daily	Rx	Yes	1 wk after starting therapy
Varenicline	Chantix	0.5-, 1-mg tablets	0.5 mg by mouth in the morning for 3 days; increase to 0.5 mg by mouth twice daily for 4 days, then increase to 1 mg by mouth twice daily	Rx	No	

*OTC indicates available over the counter; Rx indicates it is a prescription product.
†None are FDA-approved for use in patients younger than 18 yr.
‡Generics available.
From JP Karpinski, et al: Smoking cessation treatment for adolescents J Pediatr Pharmacol Ther *15(4):249–260, 2010, Table 2.*

application, QuitSTART, is available for teens as an interactive cell phone-based guide that helps them track cravings, monitor moods, offer cessation tips, and follow quit attempts. Both Smokefree TXT and QuitSTART link teens to social media webpages which offer additional information on cessation tools and programs.

Bibliography is available at Expert Consult.

114.3 Marijuana

Margaret M. Stager

Marijuana (THC, "pot," "weed," "hash," "grass"), derived from the *Cannabis sativa* hemp plant, is the most commonly abused illicit drug. 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 hr, respectively. Marijuana is generally smoked as a cigarette ("reefer" or "joint") or in a pipe. 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 refilled with marijuana. 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, 23.1% of high school students have used marijuana at least once during the previous 30 days, and current marijuana use is highest in black males and seniors. Eight percent of students report having tried marijuana before the age of 13 yr, with a range from 4.3-18.5% across various states, indicating the need for early prevention efforts.

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 114-13). Visual hallucinations and perceived body distortions occur rarely, but there may be "flashbacks" or recall of frightening hallucinations experienced under marijuana's influence that usually occur during stress or with fever.

Smoking marijuana for a minimum of 4 days/wk for 6 mo 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 drug's use in patients receiving cancer chemotherapy. Although the possibility of teratogenicity has been raised because of findings in animals, there is no evidence of such effects in humans. An **amotivational syndrome** has been described in long-term marijuana users who lose interest in age-appropriate behavior, yet 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 114-13).

The increased THC content of marijuana of 5-15–fold compared to that of the 1970s, is related to the observation of a **withdrawal syndrome,** occurring 24-48 hr after discontinuing the drug. Heavy users experience malaise, irritability, agitation, insomnia, drug craving, shakiness, diaphoresis, night sweats, and gastrointestinal disturbance. The symptoms peak by the 4th day, and they resolve in 10-14 days. Certain drugs may interact with marijuana to potentiate sedation (alcohol, diazepam), potentiate stimulation (cocaine, amphetamines), or be antagonistic (propranolol, phenytoin).

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

Bibliography

American Academy of Pediatrics Committees on Environmental Health, Substance Abuse, Adolescence, Native American Child Care: Policy statement–tobacco use: a pediatric disease, *Pediatrics* 124:1474–1487, 2009.

Bam TS, Bellew W, Berezhnova I, et al: Position statement on electronic cigarettes or electronic delivery systems, *Int J Tuberc Lung Dis* 18:5–7, 2014.

Bertholon JF, Becquemin MH, Annesi-Maesano I, et al: Electronic cigarettes: a short review, *Respiration* 86:433–438, 2013.

Cahill K, Stevens S, Lancaster T: Pharmacological treatments for smoking cessation, *JAMA* 311:193–194, 2014.

Centers for Disease Control and Prevention: Cigarette use among high school students—United States, 1991–2007, *MMWR Morb Mortal Wkly Rep* 57:686–688, 2008.

FDA News Release: *FDA and public health experts warn against electronic cigarettes*. 2009. http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm173222.htm.

Hampton T: Experts call for research plus regulation of e-cigarettes, *JAMA* 311:123–124, 2014.

Hatsukami D, Stead LF, Gupta PC: Tobacco addiction, *Lancet* 371:2027–2038, 2008.

Johnston V, Liberato S, Thomas D: Incentives for preventing smoking in children and adolescents (review), *Cochrane Database Syst Rev* (10):CD008645, 2012.

Karpinksi JP, Timpe EM, Lubsch L: Smoking cessation treatment for adolescents, *J Pediatr Pharmacol Ther* 15(4):249–260, 2010.

Larsen E, Rise J, Lund KE: Risk and protective factors of adolescent exclusive snus users compared to non-users of tobacco, exclusive smokers and dual users of snus and cigarettes, *Addict Behav* 38(7):2288–2294, 2013.

Martinasek MP, McDermott RJ, Martini L: Waterpipe (hookah) tobacco smoking among youth, *Curr Probl Pediatr Adolesc Health Care* 41(2):33–58, 2011.

Muramoto M, Leischow S, Sherrill D, et al: Randomized, double-blind, placebo-controlled trial of 2 dosages of sustained-release bupropion for adolescent smoking cessation, *Arch Pediatr Adolesc Med* 161:1067–1074, 2007.

NG M, Freeman MK, Fleming TD, et al: Smoking prevalence and cigarette consumption in 187 countries, 1980–2012, *JAMA* 311:183–192, 2014.

Palazzolo DL: Electronic cigarettes and vaping: a new challenge in clinical medicine and public health. A literature review, *Front Public Health* 1(56):1–20, 2013.

Pepper JK, McRee AL, Gilkey MB: Healthcare providers' beliefs and attitudes about electronic cigarettes and preventive counseling for adolescent patients, *J Adolesc Health* 2013. pii: S1054-139X(13)00522-3. doi: 10.1016/j.jadohealth.2013.10.001. [Epub ahead of print].

Pollock JD, Koustova E, Hoffman A, et al: Treatments for nicotine addiction should be a top priority, *Lancet* 374:513–514, 2009.

The Medical Letter: Electronic cigarettes, *Med Lett Drugs Ther* 55:89–90, 2013.

Zhu SH, Gamst A, Lee M, et al: The use and perception of electronic cigarettes and snus among the U.S. population, *PLoS ONE* 8:e79332, 2013.

Table 114-13 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
CHRONIC ADVERSE EFFECTS • Cannabis dependence syndrome (in around 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

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

SYNTHETIC MARIJUANA

Spice, K2, crazy clown, aroma, black mamba, blaze, dream, and funky monkey are 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 assays to detect THC. In the United States, the chemicals in Spice are designated a schedule I controlled substance by the DEA, thereby making it illegal to sell, buy, or possess them. Nonetheless, synthetic marijuana is the second most common illicit drug used by high school seniors. More than 1 in 10 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 marijuana 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 include vomiting, tachycardia, hypertension, hyperthermia, confusion, extreme anxiety, profuse sweating, agitation, aggression, dysphoria, hallucinations, seizures, rhabdomyolysis, dystonia, unresponsiveness, confusion, and myocardial ischemia. 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.

Bibliography is available at Expert Consult.

114.4 Inhalants

Margaret M. Stager

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 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), aerosols (spray paint, 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 114-14). **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 11.4% of high school students reporting having ever used inhalants in. Eighth and 9th graders report highest use, suggesting targeted prevention strategies are warranted for this age group.

Table 114-14 Hazards of Chemicals Found in Commonly Abused 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")*, **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
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

CLINICAL MANIFESTATIONS

The major effects of inhalants are psychoactive (Table 114-15). The intoxication lasts only a few minutes, so a typical user will huff repeatedly over an extended period of time (hours) in order 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 hr. 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; and increased intraocular pressure.

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 often dangerous setting in which the inhalation occurs (inner-city roof tops). Common neuromuscular changes reported in chronic inhalant abusers include difficulty coordinating movement, gait disorders, muscle tremors, and spasticity, particularly in the legs (Table 114-16). Chronic use may cause pulmonary hypertension, restrictive lung defects or reduced

Bibliography

Blakemore SJ: Teenage kicks: cannabis and the adolescent brain, *Lancet* 381:888–889, 2013.

Bottorff JL, Johnson JL, Moffat BM, et al: Relief oriented use of marijuana by teens, *Subst Abuse Treat Prev Policy* 4:7, 2009.

Brook JS, Zhang C, Brook DW: Developmental trajectories of marijuana use from adolescence to adulthood, *Arch Pediatr Adolesc Med* 165(11):55–60, 2011.

Centers for Disease Control and Prevention: Acute kidney injury associated with synthetic cannabinoid use–multiple states, 2012, *MMWR Morb Mortal Wkly Rep* 62(6):93–98, 2013.

Centers for Disease Control and Prevention: Severe illness associated with synthetic cannabinoid use–Brunswick, Georgia, 2013, *MMWR Morb Mortal Wkly Rep* 62(939):2013.

Centers for Disease Control and Prevention: Severe illness associated with reported use of synthetic marijuana–Colorado, August-September 2013, *MMWR Morb Mortal Wkly Rep* 62:1016–1017, 2013.

Cohen J, Morrison S, Greenberg J, et al: Clinical presentation of intoxication due to synthetic cannabinoids, *Pediatrics* 129:e1064–e1067, 2012.

Galli JA, Sawaya RA, Friedenberg FK: Cannabinoid hyperemesis syndrome, *Curr Drug Abuse Rev* 4:241–249, 2011.

Hall W: Driving while under the influence of cannabis, *BMJ* 344:e595, 2012.

Kuepper R, van Os J, Lieb R, et al: Continued cannabis use and risk of incidence and persistence of psychotic symptoms: 10 year follow-up cohort study, *BMJ* 342:537, 2011.

Lynne-Landsman SD, Livingston MD, Wagenaar AC: Effects of state medical marijuana laws on adolescent marijuana use, *Am J Public Health* 103:1500–1506, 2013.

McGuinness TM, Newell D: Risky recreation: synthetic cannabinoids have dangerous effects, *J Psychosoc Nurs Ment Health Serv* 50(8):16–18, 2012.

Meier MH, Caspi A, Ambler A, et al: Persistent cannabis users show neuropsychological decline from childhood to midlife, *Proc Natl Acad Sci U S A* 109:E2657–E2664, 2012.

National Institute on Drug Abuse: *Drug Facts: Spice (Synthetic Marijuana)*. 2012. http://www.drugabuse.gov.

Substance Abuse and Mental Health Services Administration, Office of Applied Studies: *The NSDUH report: marijuana use and perceived risk of use among adolescents 2002 to 2007*, Rockville, MD, 2009, Substance Abuse and Mental Health Services Administration.

The Partnership at DrugFree.Org: *Parents 360; Synthetic Drugs: Bath Salts, K2/Spice. A Guide for Parents and Other Influencers*. 2012. http://www.drugfree.org.

van Winkel R: Genetic Risk and Outcome of Psychosis (GROUP) Investigators: Family-based analysis of genetic variation underlying psychosis-inducing effects of cannabis, *Arch Gen Psychiatry* 68:148–157, 2011.

Woo TM, Hanley JR: How high do they look?: Identification and treatment of common ingestions in adolescents, *J Pediatr Health Care* 27(2):135–144, 2013.

Wood KE: Exposure to bath salts and synthetic tetrahydrocannabinol from 2009 to 2012 in the United States, *J Pediatr* 163(1):213–216, 2013.

Table 114-15 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 uncoordination, 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 abuse, Arch Dis Child Educ Pract Ed *91:ep93-ep100, 2006, Table 1.*

Table 114-16 Documented Clinical Presentations of Volatile Substance Abuse

CLINICAL PRESENTATIONS OF ACUTE AND CHRONIC VOLATILE SUBSTANCE ABUSE	
Ventricular fibrillation	Muscle weakness
Asystolic cardiac arrest	Abdominal pain
Myocardial infarction	Cough
Ataxia	Aspiration pneumonia
Agitation	Chemical pneumonitis
Limb and trunk uncoordination	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

From Harris D: Volatile substance abuse, Arch Dis Child Educ Pract Ed *91:ep93-ep100, 2006, Table 2.*

diffusion capacity, peripheral neuropathy, hematuria, tubular acidosis, and possibly cerebral and cerebellar atrophy. Chronic inhalant abuse 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 inhalant users than among low-frequency inhalant users. Death in the acute phase may result from cerebral or pulmonary edema or myocardial involvement (Table 114-16).

DIAGNOSIS

Diagnosis of inhalants is difficult because of the ubiquitous nature of the products and decreased parental awareness of their dangers. In the primary care setting, providers need to enquire of parents if they have witnessed any unusual behaviors in their teen; noticed high-risk products in their bedrooms; seen paint on the teen's hands, nose, or mouth; or found paint coated or chemical coated rags. Complete blood counts, 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.

Bibliography is available at Expert Consult.

114.5 Hallucinogens

Margaret M. Stager

Several naturally occurring and synthetic substances are used by adolescents for their hallucinogenic properties. They have chemical structures similar to neurotransmitters such as serotonin, yet their exact mechanism of action remains unclear. Lysergic acid diethylamide (LSD) and methylenedioxymethamphetamine (MDMA) (Ecstasy or Molly) are the most commonly reported hallucinogens used.

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 between 30 and 60 min, and it peaks between 2 and 4 hr. By 10-12 hr, an individual returns to the predrug state. Four percent of U.S. 12th graders report trying LSD at least once.

Clinical Manifestations

The effects of LSD can be divided into 3 categories: somatic (physical effects), perceptual (altered changes in vision and hearing), and psychic effects (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 drug as it does not typically produce drug-seeking behavior.

Treatment

An individual is considered to have a "bad trip" when the sensory experiences causes the user to become terrified or panicked. These episodes should be treated by removing the individual from the aggravating situation and placing him 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 mescaline and the stimulant methamphetamine. Like other hallucinogens, this drug is

Bibliography

Garland EL, Howard MO: Adverse consequences of acute inhalant intoxication, *Exp Clin Psychopharmacol* 19(2):134–144, 2011.

Grant-Alfieri A, Schaechter J, Lipschultz SE: Ingesting and aspirating dry cinnamon by children and adolescents: the "cinnamon challenge", *Pediatrics* 131:833–835, 2013.

Harris D: Volatile substance abuse, *Arch Dis Child Educ Pract Ed* 91:ep93–ep100, 2006.

Marsolek MR, White NC, Litovitz TL: Inhalant abuse: monitoring trends by using poison control data, 1993–2008, *Pediatrics* 125:906–913, 2010.

National Institute on Drug Abuse: *NIDA infofacts: inhalants*. http://www.nida.nih.gov/infofacts/inhalants.html.

National Survey on Drug Use and Health: *Adolescent inhalant use and selected respiratory conditions*. http://www.oas.samhsa.gov/2k10/175/175RespiratoryCondHTML.pdf.

Nonnemaker JM, Crankshaw EC, Shive DR, et al: Inhalant use initiations among U.S. adolescents: evidence from the National Survey of Parents and Youth using discrete-time survival analysis, *Addict Behav* 36(8):878–881, 2011.

Scott KD, Scott AA: An examination of information-processing skills among inhalant-using adolescents, *Child Care Health Dev* 38(3):412–419, 2012.

Substance Abuse and Mental Health Services Administration, Office of Applied Studies: *The NSDUH report: trends in adolescent inhalant use: 2002 to 2007*, Rockville, MD, 2009, Substance Abuse and Mental Health Services Administration.

Williams JF, Storck M, Committee on Substance Abuse and Committee on Native American Child Health Inhalant Abuse: Inhalant abuse, *Pediatrics* 119:1009–1017, 2007.

proposed to interact with serotoninergic neurons in the central nervous system (CNS). It is the preferred drug at "raves," all-night dance parties, and is also known as one of the "club drugs" along with γ-hydroxybutyrate (GHB) and ketamine (see Table 114-5). Between 2009 and 2010, past-year use of MDMA increased among both 8th and 10th graders in the US but then declined in both grades. Nationwide, the prevalence of having ever used MDMA was 8.2% of students with highest use reported among males and Hispanics (10.6%). MDMA use increased among high school students from 2009-2011 (8.2%). LSD use remained stable during this time period (2009: 8%; 2011: 8.7%).

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 drug. 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. There are no specific treatment regimens 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 use 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 yr later. There are no specific pharmacologic treatments for MDMA addiction. Drug abuse recovery groups are recommended.

PHENCYCLIDINE

Phencyclidine (PCP) (sternyl, 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 causes cramps, diarrhea, and hematemesis. It is a "dissociative drug" that produces feelings of detachment from the surrounding environment and self. The drug 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 (hallucinogenic drug) among U.S. high school students remained stable from 2009 (8.0%) to 2011 (8.7%).

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 min after smoking 1-5 mg and last for 4-6 hr. 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 hr. Hypotension, generalized seizures, and cardiac arrhythmias commonly occur with plasma concentrations from 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, analysis of urine must be depended on for diagnosis.

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 be present also. 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 be helpful if the patient is agitated and not comatose. Rapid excretion of the drug 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.

Bibliography is available at Expert Consult.

114.6 Cocaine

Margaret M. Stager

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 sec. 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 of time known as "binges." Drug 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 114-6). Cocaine use among high school students has decreased in the last decade, with 8.5% of 12th graders having tried the drug (any route) at least once. Current cocaine use in last 30 days remains stable at 3% of students.

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 abusers experience anxiety, irritability, and sometimes paranoid psychosis. Lethal effects are possible, especially when cocaine is used in combination with other drugs, such as heroin, in an injectable form known as a "speedball." Cocaine, when taken with alcohol, 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 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. Cognitive-behavioral therapy has been shown to be effective when provided in combination with additional services and social support.

Bibliography is available at Expert Consult.

Bibliography

Brière FN, Fallu JS, Janosz M, et al: Prospective associations between meth/amphetamine (speed) and MDMA (ecstasy) use and depressive symptoms in secondary school students, *J Epidemiol Community Health* 66:990–994, 2012.

Bryner JK, Wang UK, Hui JW, et al: Dextromethorphan abuse in adolescence, *Arch Pediatr Adolesc Med* 160:1217–1222, 2006.

Centers for Disease Control and Prevention: Ecstasy overdoses at a New Year's eve rave—Los Angeles, CA, 2010, *MMWR Morb Mortal Wkly Rep* 59(22):677–680, 2010.

Halpern JH, Sherwood AR, Hudson JI, et al: Residual neurocognitive features of long-term ecstasy users with minimal exposure to other drugs, *Addiction* 106:777–786, 2010.

Hysek CM, Vollenweider FX, Liechti ME: Effects of a β-blocker on the cardiovascular response to MDMA (Ecstasy), *Emerg Med J* 27:586–589, 2010.

Ricaurte GA, McCann UD: Recognition and management of complications of new recreational drug use, *Lancet* 365:2137–2145, 2005.

Wu LT, Ringwalt CL, Weiss RD, et al: Hallucinogen-related disorders in a national sample of adolescents: the influence of ecstasy/MDMA use, *Drug Alcohol Depend* 104(1–2):156–166, 2009.

Bibliography

Apantaku-Olajide T, Darker CD, Smyth BP: Onset of cocaine use: associated alcohol intoxication and psychosocial characteristics among adolescents in substance abuse treatment, *J Addict Med* 7(3):183–188, 2013.

Centers for Disease Control and Prevention: Syringe exchange programs—United States, 2008, *MMWR Morb Mortal Wkly Rep* 59(45):1488–1492, 2010.

Kerr T, Montaner JSG, Wood E: Sciences and politics of heroin prescription, *Lancet* 375:1849–1850, 2010.

Marsden J, Eastwood B, Bradbury C, et al: Effectiveness of community treatments for heroin and crack cocaine addiction in England: a prospective, in-treatment cohort study, *Lancet* 374:1262–1270, 2009.

Starrels JL, Becker WC, Alford DP, et al: Systematic review: treatment agreements and urine drug testing to reduce opioid misuse in patients with chronic pain, *Ann Intern Med* 152:712–720, 2010.

114.7 Amphetamines

Margaret M. Stager

Methamphetamine, commonly known as "ice," is a nervous system stimulant and schedule II drug with a high potential for abuse. Most of the methamphetamine currently abused 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, by smoking, needle injection, or absorption across mucous membranes. Amphetamines have multiple CNS effects, among them the release of neurotransmitters and an indirect catecholamine agonist effect. In recent years, there has been a general decline of methamphetamine use among high school students. In the 2012 Monitoring the Future Study, 1.1% of 12th graders report using methamphetamine at least once reflecting a steady decline in use over the last 10 yr.

CLINICAL MANIFESTATIONS

Methamphetamine rapidly increases the release and blocks the reuptake of dopamine, a powerful "feel good" neurotransmitter (Table 114-17). 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 seizures (see Table 114-6). Binge effects 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 hepatitis B and C can result from long-term use. There is a withdrawal syndrome associated with amphetamine use, with early, intermediate, and late phases (Table 114-17). The early phase is characterized as a "crash" phase with depression, agitation, fatigue, and desire for more of the drug. Loss of physical and mental energy, limited interest in the environment, and anhedonia mark the intermediate phase. In the final phase, drug 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 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 cognitive-behavioral interventions have been shown to effective treatment options.

Bibliography is available at Expert Consult.

114.8 Opiates

Margaret M. Stager

Heroin is a highly addictive synthetic opiate drug 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 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 use more heroin to achieve the same intense effect. Heroin use among 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. Highest use is seen in black males, with a growing prevalence in suburban high school students; ranges vary from 0.8% to 5.3% across large urban, suburban, and rural school districts.

CLINICAL MANIFESTATIONS

The clinical manifestations are determined by the purity of the heroin or its adulterants, combined with the route of administration. The immediate effects include euphoria, diminution in pain, flushing of the skin, and pinpoint pupils (see Table 114-17). 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 of the extremities. Attempts to conceal these stigmata may include amateur tattoos in unusual sites.

Table 114-17 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/diarrhoea; 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 drug users admitted to hospital, Lancet *374:1284–1292, 2009, Table 2.*

Bibliography

Setlik J, Bond R, Ho M: Adolescent prescription ADHA medication abuse is rising along with prescriptions for these medications, *Pediatrics* 124:875–880, 2009.

Spoth RL, Clair S, Shin C, et al: Long-term effects of universal preventive interventions on methamphetamine use among adolescents, *Arch Pediatr Adolesc Med* 160:876–882, 2006.

Skin abscesses secondary to unsterile techniques of drug administration are commonly 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 Laboratory and latex fixation tests.

WITHDRAWAL

After a period of ≥8 hr without heroin, the addicted individual undergoes, during a 24-36 hr period, a series of physiologic disturbances referred to collectively as "withdrawal" or the **abstinence syndrome** (see Table 114-17). 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, the addition of 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 and 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 drug, buprenorphine + naloxone, has been formulated to minimize abuse during detoxification.

OVERDOSE SYNDROME

The overdose syndrome is an acute reaction after the administration of an opiate. It is the leading cause of death among drug users. 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, as well as overdose of alcohol, barbiturates, PCP, or methadone. Diagnosis of opiate toxicity is facilitated by intravenous administration of the opiate antagonist naloxone, 0.01 mg/kg (2 mg is a common initial dose for an adolescent), which causes dilation of pupils constricted by the opiate. Diagnosis is confirmed by the finding of morphine in the serum.

TREATMENT

Treatment of acute heroin overdose consists of maintaining adequate oxygenation and continued administration of naloxone, a pure opioid antagonist. It may be given intravenously, intramuscularly, subcutaneously, or through the endotracheal tube. Naloxone has an ultrarapid onset of action (1 min) and a duration of action of 20-60 min. If there is no response, other etiologies for the respiratory depression must be explored. Naloxone may have to be continued for 24 hr if methadone, rather than shorter-acting heroin, has been taken. 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.

Bibliography is available at Expert Consult.

114.9 Bath Salts

Margaret M. Stager

Bath salts refers to a group of previously OTC, but now illicit, substances containing 1 or more synthetic chemicals similar to cathinone, an amphetamine-like stimulant found in the Khat plant. The bath salts, marketed under brand names such as Ivory Wave, Cloud Nine, or Vanilla Sky, are sold online or in drug 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 derived from the 2012 Monitoring the Future survey of 8th, 10th, and 12th grade students, who use at 0.8%, 0.6%, and 1.3%, 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 ecstasy (MDMA). The chemicals in bath salts raise brain dopamine levels causing the user to feel a surge of euphoria, 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 as a consequence of elevations of serotonin. Intoxication from bath salts may cause excited delirium syndrome, which includes dehydration, rhabdomyolysis, and kidney failure. 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 2 of the synthetic cathinones, mephedrone and MDPV, is illegal in the United States.

Bibliography is available at Expert Consult.

Bibliography

Beletsky L, Rich JD, Walley AY: Prevention of fatal opioid overdose, *JAMA* 308:1863–1864, 2012.

Center for Disease Control and Prevention: Overdose deaths involving prescription opioids among Medicaid enrollees—Washington, 2004–2007, *MMWR Morb Mortal Wkly Rep* 58:1171–1174, 2009.

Center for Disease Control and Prevention: Buprenorphine prescribing practices and exposures reported to a poison center–Utah, 2002-2011, *MMWR Morb Mortal Wkly Rep* 61:997–1000, 2012.

Center for Disease Control and Prevention: Community-based opioid overdose prevention programs providing naloxone–United States, 2010, *MMWR Morb Mortal Wkly Rep* 61:101–105, 2012.

Center for Disease Control and Prevention: Acetyl fentanyl overdose fatalities–Rhode Island, March-May 2013, *MMWR Morb Mortal Wkly Rep* 62:703–704, 2013.

Center for Disease Control and Prevention: Deaths and severe adverse events associated with anesthesia-assisted rapid opioid detoxification–New York City, 2012, *MMWR Morb Mortal Wkly Rep* 62:777–780, 2013.

Coffin PO, Sullivan SD: Cost-effectiveness of distributing naloxone to heroin users for lay overdose reversal, *Ann Intern Med* 158:1–9, 2013.

Dhalla IA: Opium, opioids, and an increased risk of death, *BMJ* 344:e2617, 2012.

Fiellin DA: Treatment of adolescent opioid dependence, *JAMA* 300:2057–2058, 2008.

In brief: buprenorphine/naloxone (Zubsolv) for opioid dependence, *Med Lett Drugs Ther* 55:83–84, 2013.

Krupitsky E, Nunes EV, Ling W, et al: Injectable extended-release naltrexone for opioid dependence: a double-blind, placebo-controlled, multicenter randomized trial, *Lancet* 377:1506–1512, 2011.

Kuehn BM: SAMHSA: Pain medication abuse a common path to heroin, *JAMA* 310:1433–1434, 2013.

McCabe SE, Boyd CJ, Cranford JA, et al: Motives for nonmedical use of prescription opioids among high school seniors in the United States, *Arch Pediatr Adolesc Med* 163:739–744, 2009.

Smyth BP, Fagan J, Kernan K: Outcome of heroin-dependent adolescents presenting for opiate substitution treatment, *J Subst Abuse Treat* 42(1):35–44, 2012.

The Lancet (Editorial): The lethal burden of drug overdose, *Lancet* 382:833, 2013.

Warden D, Subramaniam GA, Carmody T, et al: Predictors of attrition with buprenorphine/naloxone treatment in opioid dependent youth, *Addict Behav* 37(9):1046–1053, 2012.

Bibliography

Centers for Disease Control and Prevention: Emergency department visits after use of a drug sold as "bath salts"—Michigan, November 13, 2010-March 31, 2011, *MMWR Morb Mortal Wkly Rep* 60:624–627, 2011.

Joksovic P, Mellos N, van Wattum PJ, et al: Bath salts induced psychosis and serotonin toxicity, *J Clin Psychiatry* 73(8):1125, 2012.

Mas-Morey P, Visser MH, Winkelmolen L, et al: Clinical toxicology and management of intoxications with synthetic cathinones "bath salts", *J Pharm Pract* 26(4):353–357, 2013.

National Institute on Drug Abuse: *Drug facts: synthetic cathinones "bath salts"*. 2012. http://www.drugabuse.gov.

Rasimas JJ: Bath salts and the return of serotonin syndrome, *J Clin Psychiatry* 73(8):1126–1127, 2012.

Ross EA, Reisfield GM, Watson MC, et al: Psychoactive "bath salts" intoxication with methylenedioxypyrovalerone, *Am J Med* 125:854–858, 2012.

The Partnership at DrugFree.Org. Parents 360; Synthetic drugs: bath salts, K2/Spice: a guide for parents and other influencers. 2012. http://www.drugfree.org.

Warrick BJ, Hill M, Hekman K, et al: A 9-state analysis of designer stimulant, "bath salt," hospital visits reported to poison control centers, *Ann Emerg Med* 62(3):244–251, 2013.

Winder GS, Stern N, Hosanagar A: Are bath salts the next generation of stimulant abuse? *J Subst Abuse Treat* 44(1):42–45, 2013.

Winstock AR, Mitcheson L: New recreational drugs and the primary care approach to patients who use them, *BMJ* 344:35–40, 2012.

Wood KE: Exposure to bath salts and synthetic tetrahydrocannabinol from 2009 to 2012 in the United States, *J Pediatr* 163:213–216, 2013.

Chapter 115

The Breast

Cynthia Holland-Hall and Gale R. Burstein

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 young 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 Fig. 110-2 in Chapter 110).

FEMALE DISORDERS

See Chapter 551.

MALE DISORDERS

Pubertal gynecomastia (see Chapter 585), occurring in up to 60% of normal adolescent males, has long been attributed to a transient imbalance of estrogen and androgen concentrations. Onset typically is between 10 and 13 yr, peaking at SMR 3-4. This physiologic condition usually regresses within 18-24 mo. Careful physical examination is essential to distinguish between true gynecomastia, characterized by a discreet disc of palpable glandular tissue under the nipple–areolar complex, and pseudogynecomastia, characterized by more diffuse adiposity of the anterior chest wall. Reassurance and continued observation are recommended in most cases; 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. 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, antiretrovirals, and histamine$_2$-receptor blockers. Calcium channel blockers, certain antipsychotics, and proton pump inhibitors may be causative. Among drugs of abuse, alcohol and anabolic steroids may be associated with gynecomastia, but very little evidence supports an association with marijuana, opiates, 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 583), but this malignancy is otherwise exceedingly rare in adolescents.

Bibliography is available at Expert Consult.

Bibliography

Bowman JD, Kim MS, Bustamante JJ: Drug-induced gynecomastia, *Pharmacotherapy* 32:1123–1140, 2012.

Joffe A: Gynecomastia. In Neinstein LS, Gordon CM, Katzman DK, et al, editors: *Adolescent health care: a practical guide*, ed 5, Philadelphia, 2008, Lippincott Williams & Wilkins, pp 180–184.

Krause W: Drug-inducing gynaecomastia–a critical review, *Andrologia* 44:621–626, 2011.

Lawrence SE, Faught KA, Vethamuthu J, et al: Beneficial effects of raloxifene and tamoxifen in the treatment of pubertal gynecomastia, *J Pediatr* 145:71–76, 2004.

Nordt CA, Divasta AD: Gynecomastia in adolescents, *Curr Opin Pediatr* 20:375–382, 2008.

Chapter 116

Menstrual Problems

Gina S. Sucato and Gale R. Burstein

See also Chapter 550.

Menstrual disturbances—including delayed onset, irregularity, heavy flow, and pain—occur in 75% of females during adolescence. Menstrual problems vary in presentation. For adolescents with minor variations from normal (Table 116-1), an explanation of symptoms and reassurance of reproductive health 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 aggressive management, potentially including referral to a specialist in adolescent gynecology.

NORMAL MENSTRUATION

The average age of **menarche**, or first menses, varies according to the racial/ethnic background of the population and (possibly) socioeconomic status. There is often a close concordance of the age at menarche between mother and daughter, suggesting that genetic factors are determinants, as well as individual factors such as weight, exercise level, and chronic medical conditions. In the United States, the age of menarche has been relatively stable over the last few decades. The average age at menarche is 12.6 yr for non-Hispanic whites, 12.1 yr for non-Hispanic blacks, and 12.3 yr for Hispanic Americans. Age of menarche has declined in countries and populations experiencing improved nutritional standards and other living conditions. For example, in South Africa, average menarcheal age for blacks has been decreasing at a rate of approximately 0.50 yr/decade compared to an average decline of 0.22 yr/decade for whites.

Menarche typically occurs within 2.5 yr (range: 0.5-3 yr) of the onset of breast budding (thelarche), which is the first sign of puberty in most females. Menarche usually occurs during breast sexual maturity rating (SMR; i.e., Tanner) stage 4. Periods gradually become more regular, and by 3 yr after menarche, 90% of females have an average cycle length of between 21 and 45 days. The older the age at which menarche occurs, the longer it takes for consistently ovulatory cycles to be established. However, for most adolescents, by 5-6 yr after menarche, menstrual cycles are similar to that of adults: between 21 and 35 days long with 75% of cycles being ovulatory.

Table 116-1 Characteristics of Normal Menses*

Cycle length	21-35 days from the 1st day of one period to the 1st day of the next (during 1st 3 yr after menarche can be 21-45 days)
Duration of menses	7 or fewer days
Blood flow	6 or fewer (soaked) pads or tampons per day

*Adolescents with 2 or more cycles outside this range or who skip their period for 3 consecutive mo warrant more thorough evaluation.

MENSTRUAL IRREGULARITIES

In young adolescents, many variations in menstruation are explained by anovulation that results from immaturity of the hypothalamic-pituitary-ovarian axis that governs menstrual cyclicity. However, organic pathology should be considered and excluded in a logical and cost-effective manner. An accurate menstrual history is an important, but often lacking, first step toward a diagnosis. At the time of menarche, all patients should be encouraged to track their periods, something several free smart phone and tablet applications can facilitate.

Previously, a range of terms have been used to describe abnormal menstrual bleeding. These include menorrhagia to indicate regularly occurring bleeding that was excessive in amount or duration, and metrorrhagia to indicate irregular bleeding between periods. Such terms 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 terms that describe the bleeding as heavy menstrual bleeding, or intermenstrual bleeding. A qualifying letter is added to indicate the etiology of the abnormal bleeding. Of the nine categories of etiologies, the three most relevant to adolescents are ovulatory dysfunction (AUB-O), previously referred to as dysfunctional uterine bleeding, discussed in Chapter 116.2, coagulopathy (AUB-C), and not yet classified (AUB-N).

In addition to a standard medical history noting hospitalizations, chronic illness, and medication 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. As with all adolescent visits, 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.

In addition to the basic growth parameters of weight, height, blood pressure, heart rate, and body mass index, a careful review of the patient's growth chart is indicated. Physical exam should document SMR; signs of androgen excess, such as hirsutism or severe acne; and signs suggestive of an eating disorder (see Chapter 28), such as lanugo or knuckle calluses. A careful external genital examination should be performed, but in the absence of sexual activity, an internal pelvic examination is rarely necessary. If being considered for the young adolescent, an internal exam should be performed by someone with expertise in this age group using proper equipment and technique. Trans-abdominal pelvic ultrasound can be a useful adjunct for evaluating anatomic abnormalities in the adolescent.

Bibliography is available at Expert Consult.

116.1 Amenorrhea

Gina S. Sucato and Gale R. Burstein

Amenorrhea, the absence of menstruation, generally requires evaluation if there has been no menstruation within 4 yr of the onset of

Bibliography

Bardini B, Rosenfield RL: Normal pubertal development: Part II: Clinical aspects of puberty, *Pediatr Rev* 32:281–292, 2011.

Hillard PJ: Menstruation in adolescents. What's normal what's not, *Ann N Y Acad Sci* 1135:29–35, 2008.

Jones LL, Griffiths PL, Norris SA, et al: Age at menarche and the evidence for a positive secular trend in urban South Africa, *Am J Hum Biol* 21(1):130–132, 2009.

puberty (**primary amenorrhea**), or for the length of 3 previous cycles in a postmenarchal patient (**secondary amenorrhea**). However the following caveats exist: Lack of any pubertal signs by age 13 yr in a girl should prompt evaluation for pubertal delay, and in sexually active patients, or those with other symptoms suggesting pathology, evaluation should be initiated without waiting for 3 missed cycles. The evaluation of a patient presenting with amenorrhea should begin by ascertaining whether she has ever had any previous menstrual bleeding. Some aspects of the evaluation of both primary and secondary amenorrhea are identical; entities that can interrupt the menstrual cycle can also prevent menarche. However, in females with primary amenorrhea consideration must also be given to the possibility of genetic and anatomic conditions.

The differential diagnosis of amenorrhea is broad (Table 116-2) and requires a careful history and physical exam to guide any necessary diagnostic studies. Key to the evaluation is understanding the timing and tempo of the patient's pubertal milestones. Age 15 yr is commonly considered the age at which an evaluation for primary amenorrhea should be undertaken. Evaluation should begin sooner if 4 yr have elapsed since the onset of puberty (breast development in most females). Conversely, expectant management with close follow-up can be considered in a patient whose history, physical (showing some signs of pubertal development), and family history suggest constitutional delay of puberty. When a patient presents with primary amenorrhea, genetic and anatomic conditions are added to the differential diagnosis (Table 116-3).

HISTORY AND PHYSICAL EXAMINATION

Important elements of the history include dietary intake, exercise level, and a thorough review of any ongoing symptoms, including fever, headache, vision changes, chronic respiratory or gastrointestinal complaints, changes in bowel history, galactorrhea, changes in hair or nails, excessive body hair, severe acne, unexplained musculoskeletal complaints, and changes in vaginal discharge (which can disappear in females who are hypoestrogenic for reasons such as poor caloric intake). Any underlying medical conditions and the adequacy of their control should be noted, as well as the presence of any known renal or skeletal anomalies, which can be associated with reproductive system anomalies. Medications, particularly those for psychiatric conditions, should be documented. Family history of menarchal age, eating disorders (see Chapter 28), and **polycystic ovary syndrome (PCOS**; see Chapter 552) should be elicited. A thorough social history is necessary, especially concerning the presence or absence of sexual activity or abuse (see Chapter 40).

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 **body mass index**, orthostatic pulses, blood pressure, abnormal dentition, anosmia or hyposmia (suggestive of Kallmann syndrome; see Chapter 583.2), parotid enlargement, thyroid gland palpation, hepatosplenomegaly or other abdominal mass, lymphadenopathy, presence or absence of breast tissue (by palpation not inspection) and **SMR** (see Chapter 110). Skin exam should note any lanugo, dry or doughy skin, loss of hair from scalp or eyebrows, striae, acanthosis nigricans, or acne. The genital exam should note SMR and appearance of the vagina which should be pink and moist; thin, dry and reddened mucosa suggests estrogen deficiency. The clitoral width should be <1 cm. In the patient with primary amenorrhea, vaginal patency can be assessed painlessly using a slender saline-moist swab (e.g., a urethral swab) and careful avoidance of the hymen. If physical exam assessment of the cervix and uterus is not tolerated, a pelvic ultrasound is advisable in patients with primary amenorrhea.

LABORATORY STUDIES

Diagnostic tests in the patient presenting with amenorrhea should be tailored to her history and physical exam (Table 116-4). However, a urine pregnancy test, serum levels of prolactin, thyroid-stimulating hormone, and follicle-stimulating hormone (FSH) are reasonable to measure in all patients (Fig. 116-1). 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.

In patients with signs of androgen excess (e.g., severe acne or hirsutism) or physical stigmata associated with PCOS (rapid pubertal weight gain, acanthosis nigricans) consider measuring levels of 17-hydroxyprogesterone (17-OHP) (morning, in the follicular/preovulatory phase), free and total testosterone, dehydroepiandrosterone sulfate (DHEAS), and androstenedione. PCOS affects approximately 5% of premenopausal females; diagnostic criteria for adolescents are controversial but include variations of menstrual irregularity (ranging from amenorrhea to dysfunctional uterine bleeding), polycystic ovarian morphology identified on ultrasound, and physical or biochemical evidence of androgen excess.

With the exceptions of pregnancy, constitutional delay and imperforate hymen, conditions that cause primary amenorrhea limit fertility and diagnosis may cause profound emotional responses in patients and

Table 116-2 Causes of Amenorrhea (Primary or Secondary)

- Pregnancy (regardless of history can cause primary or secondary amenorrhea)
- Functional hypothalamic causes (stress, weight loss, undernutrition, high levels of exercise, energy deficit even at normal weight)
- Female athlete triad (low energy availability, amenorrhea, 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, and autoimmune pituitary hypophysitis)
- Thyroid disease (hyper- or hypo-, although the latter usually 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 mosaicism

Table 116-3 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 and 17α-hydroxylase deficiency)
  - Mixed gonadal dysgenesis (associated with a number of different chromosome patterns)
  - Turner syndrome (resulting from 45X or a variety of mosaic or other abnormal karyotypes)
  - Genetic hypogonadotropic hypogonadism (e.g., X-linked Kallmann syndrome)

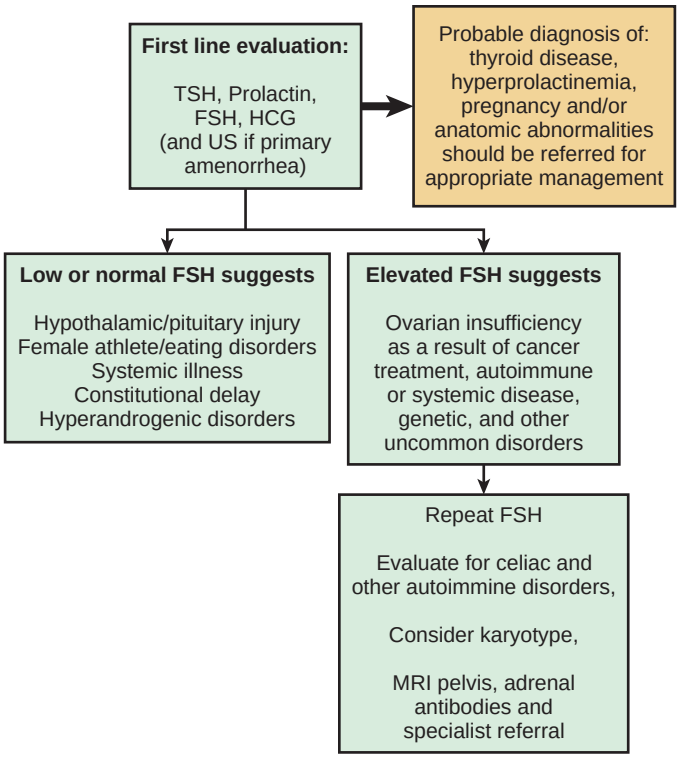


Figure 116-1 Initial diagnostic testing to evaluate amenorrhea

Table 116-4 Laboratory Tests to Evaluate Patients with Abnormal Uterine Bleeding

Complete blood count with platelets
Urine pregnancy test (regardless of history)
Sexually transmitted infections testing
Prothrombin and partial thromboplastin times
Ferritin
von Willebrand factor antigen, ristocetin cofactor, and factor VIII* activities
Liver, kidney, and thyroid function studies
Total and free testosterone†
Pelvic ultrasound (if diagnosis is elusive or anatomic abnormality suspected)

*Any abnormalities should be followed with a ristocetin-induced platelet aggregation and von Willebrand factor multimers. Testing in the 1st 3 days of menses and before any estrogen treatment is started minimizes the chances of false-negative tests. Repeat testing can be warranted in patients for whom there is a high pretest suspicion.

†In patients with signs or symptoms suggestive of PCOS, such as acne, hirsutism, obesity, acanthosis nigricans, and a history of infrequent menses.

families. Thus, 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 with families.

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

TREATMENT

Treatment for amenorrhea varies widely depending upon the underlying cause. Many diagnoses require referral to clinicians in specialties such as endocrinology, adolescent medicine, gynecology, and other surgical subspecialists, and often collaboration with other disciplines such as psychology or nutrition is indicated. For patients with PCOS, the mainstay of treatment is lifestyle modifications and suppression of ovarian androgens (typically with combined oral contraceptive [COC] pills, i.e., estrogen and progestin). Many patients benefit from the addition of metformin and spironolactone as an androgen receptor blocker; all require ongoing monitoring of lipids and periodic screening with an oral glucose tolerance test as a result of the high prevalence of metabolic syndrome in PCOS. For patients with eating disorders or other conditions of energy imbalance that render them hypoestrogenic, normalizing weight and improving nutritional status are the keys to treatment; whether exogenous hormones will adequately protect bone health in these patients is unproven. For females with amenorrhea based on ovarian insufficiency (or absence) exogenous hormones are required for all pubertal development. Experts recommend starting at age 10-12 yr with low-dose transdermal estrogen, progressing to increased doses of estrogen and cyclic progestin, and then continuing maintenance therapy with higher dose combination products such as those found in typical combined hormone contraceptive pills, patches and rings.

For patients with secondary amenorrhea, use of hormones to bring on monthly bleeding (for example with combined hormonal contraception) in the absence of a clear indication (such as PCOS or contraception) is not recommended as doing so will mask the patient's subsequent menstrual pattern. However, in those patients with normal postpubertal estrogen levels progesterone can be useful to periodically (every 4-12 wk) induce shedding of the endometrial lining to avoid build up and subsequent heavy menses. One commonly used regimen is medroxyprogesterone 10 mg daily for the 1st 12 days of the month.

Bibliography is available at Expert Consult.

116.2 Abnormal Uterine Bleeding (AUB)

Gina S. Sucato and Gale R. Burstein

AUB is a broad term used to describe any pattern that is outside what is considered physiologic. Clinicians are encouraged to categorize the abnormal pattern based on the patient's complaint, which will usually be menses that are irregular (AUB/IMB: intermenstrual bleeding) or heavy (AUB/HMB: heavy menstrual bleeding).

IRREGULAR MENSTRUAL BLEEDING

The American Academy of Pediatricians advocates treating menstrual status as a vital sign at routine visits. Although menses are frequently irregular in the early postmenarchal years, further evaluation is necessary when menstrual patterns vary too widely from what is normal for age. Even in the first postmenarchal year, menses should not be less frequent than every 45 days. Menses become increasingly regular with age, and by 3 yr postmenarche are typically 21-35 days long, lasting 3-7 days. An adolescent's personal cycle duration is usually established by age 19 or 20 yr.

Adolescents rarely present with complaints of unusually short or light menses. However, those females, along with those with infrequent menses, should be evaluated similarly to females presenting with secondary amenorrhea. Females whose menses are excessive are much more likely to come to attention for AUB.

In the early postmenarchal years, the most common cause of AUB in adolescents is anovulation because of immaturity of the hypothalamic–pituitary–ovarian axis. In the absence of a midcycle surge of luteinizing hormone 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. Irregular bleeding because of anovulation, in the absence

Bibliography

Connor EL: Adolescent polycystic ovary syndrome, *Adolesc Med* 23:164–177, 2012.

DiVasta AD, Gordon CM: Hormone replacement therapy and the adolescent, *Curr Opin Obstet Gynecol* 22:363–368, 2010.

Emans SJ, DiVasta A: Amenorrhea in the adolescent. In Emans SJ, Laufer MR, editors: *Pediatric and Adolescent Gynecology*, ed 6, Philadelphia, 2012, Wolters Kluwer/Lippincott Williams and Wilkins, pp 138–158.

Gordon CM: Functional hypothalamic amenorrhea, *N Engl J Med* 363:365–371, 2010.

Müllerian agenesis: diagnosis, management, and treatment. Committee Opinion No. 562. American College of Obstetricians and Gynecologists, *Obstet Gynecol* 121:1134–1137, 2013.

Nicandri KF, Hoeger K: Diagnosis and treatment of polycystic ovarian syndrome in adolescents, *Curr Opin Enocrinol Diabetes Obes* 19:497–504, 2012.

Witchel SF: Nonclassic congenital adrenal hyperplasia, *Curr Opin Endocrinol Diabetes Obes* 19:151–158, 2012.

of anatomic, systemic, or endocrinologic disease, is categorized as AUB caused by ovulatory dysfunction (**AUB-O**; previously referred to as dysfunctional uterine bleeding). Although it is the most common cause of abnormal menstrual bleeding in adolescents, AUB-O is a diagnosis of exclusion. In generating a differential diagnosis it is important to remember that most entities that lead to amenorrhea can cause anovulation first, and anovulation is a key risk for heavy irregular bleeding. Table 116-5 lists the causes of AUB.

Breakthrough bleeding while on combined hormonal contraception may occur and is not a reason to discontinue the medication. Compliance, interacting medications (prescribed or over-the-counter: St. John's wort), and smoking may increase the risk of breakthrough bleeding. Unscheduled bleeding is more common with progestin-only contraceptives.

HEAVY AND PROLONGED MENSTRUAL BLEEDING

Irregular bleeding (Table 116-5), particularly that resulting from anovulation, can be long and heavy. However, in patients who have regular, cyclic menses that are long and/or heavy, a hematologic cause should be strongly considered, particularly if menses are heavy from the onset of menarche, or if bleeding is severe enough to warrant hospitalization. In such patients, prevalence estimates for von Willebrand disease (see Chapter 477) and platelet functions disorders (see Chapter 484) range as high as 36% and 44%, respectively. These patients may also report flooding (changing a pad or tampon more than hourly), passing clots larger than an inch in diameter, menses longer than 7 days, a history of hemorrhagic ovarian cysts, excessive bleeding from wounds or postoperatively, and 1st-degree relatives with heavy menses or epistaxis requiring medical treatment.

LABORATORY FINDINGS

Table 116-4 lists laboratory tests to be considered in patients with long heavy bleeding. Females with persistent heavy bleeding despite negative testing should be referred to a hematologist for testing for platelet function disorders, factor deficiencies and other less common disorders. In the initial evaluation, the hemoglobin is the key element as it establishes the **severity of the bleeding: mild** (hemoglobin > 10 g/dL), **moderate** (hemoglobin 8-10 g/dL), or **severe** (hemoglobin < 8 g/dL).

TREATMENT

In **mild** cases, iron supplementation is recommended, and the patient should keep a menstrual calendar to follow the subsequent flow patterns. Nonsteroidal antiinflammatory drugs (e.g., naproxen) are more effective than placebo in treating heavy bleeding and also would help any concurrent dysmenorrhea. Active bleeding typically responds well to cycling with any **COC** (i.e., estrogen and progestin) starting with twice-daily dosing if needed until bleeding stops. Patients with estrogen contraindications can be treated with progestins alone, for example, medroxyprogesterone or norethindrone acetate 10 mg orally per day, either continuously or for 12 days per month. The latter regimen will be followed by monthly bleeding.

Table 116-5 Causes of Irregular Menstrual Bleeding

CAUSES OF AUB	EXAMPLES	FEATURES
Immature hypothalamic–pituitary–ovarian axis (AUB-O)	Patient within 2 yr of menarche; patient more than 2 yr postmenarche but with history of later menarche	Painless, 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 commonly results in lighter, less frequent menses
Endocrinologic causes	Thyroid disease, PCOS	Bleeding typically increases with hypothyroidism and decreases with PCOS and hyperthyroidism
Complication of pregnancy	Threatened abortion, postpartum or postabortal endometritis	History of sexual activity and/or pregnancy
Infection	Cervicitis, condyloma, pelvic inflammatory disease	Bleeding usually not heavy, may occur with sexual intercourse
Trauma	Sexual assault, bicycle accidents	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	von Willebrand disease, platelet function disorder, thrombocytopenia (idiopathic thrombocytopenic purpura, drug induced) hemophilia carriage, clotting factor deficiency, leukemia	Bleeding is heavy and/or long and frequently regular, may present at menarche, may be accompanied by a suggestive family history (hysterectomies or uterine ablation, or cautery for epistaxis) or physical exam (ecchymoses, petechiae)
Medications	Estrogens, progestins, (in pills, patches, rings, injections, implants, and intrauterine devices) androgens, drugs that cause prolactin release (estrogens, phenothiazines, tricyclic antidepressants, metoclopramide), and anticoagulants (heparin, warfarin, aspirin, and nonsteroidal antiinflammatory drugs), and selective serotonin reuptake inhibitors	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	Accompanied by other signs of the condition

With **moderate** anemia, any of the hormonal regimens above can be used. However, it may be necessary to start with 3-4 COC (or 3-4 doses of medroxyprogesterone 10 mg) per day and taper to daily dosing over the next 2 wk. Patients with ongoing rapid bleeding, syncope or lightheadedness, or hemodynamic instability should be treated in the hospital, as should patients with a hemoglobin of <7-8 g/dL.

Patients with severe anemia should be treated with 1 of the hormone tapers described above, in addition to fluid or blood products as indicated; it is advisable to draw necessary laboratory studies prior to transfusion. Patients with emesis or other significant symptoms may be treated initially with conjugated estrogens 25 mg intravenously every 4-6 hr for 1-2 days. A COC or progestin regimen should be added within the 1st day as 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 adult women, is almost never indicated in adolescents.

Hormonal treatment for AUB should continue for at least 3-6 mo—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, depomedroxyprogesterone acetate 150 mg IM every 3 mo, and placement of a levonorgestrel intrauterine device, depending on the patient's concurrent need for long-term contraception. For those patients who choose to avoid (or augment) hormonal therapy, tranexamic acid 1,300 mg orally 3 times daily can be used for up to the 1st 5 days of menses. This medication, new to the United States, has been available in other countries for years. Nonetheless, published data in young adolescents remain sparse, and the clinical significance of the theoretic increased risk of thrombosis when used in conjunction with hormonal treatment is yet to be determined.

For young women with bleeding disorders, formulation of a long-term treatment plan is best done in collaboration with the patient's hematologist. 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 still premenarchal to proactively put a plan in place in the event of acute heavy menstrual bleeding which can occur with a patient's first menstrual period.

Bibliography is available at Expert Consult.

116.3 Dysmenorrhea

Gina S. Sucato and Gale R. Burstein

Dysmenorrhea, painful uterine cramps that precede and accompany menses, occur in up to 93% of adolescent females based on studies from around the world. Dysmenorrhea is severe enough to interfere with school and other activities in approximately 10% of adolescents in the United States. Yet many adolescents undertreat their symptoms, and fewer still seek medical care for relief.

Dysmenorrhea may be primary or secondary. **Primary dysmenorrhea**, characterized by the absence of any specific pelvic pathologic condition, is by far 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 stimulate local vasoconstriction, uterine ischemia and pain, and smooth muscle contraction, explaining both uterine and gastrointestinal symptoms. Because of the association with ovulation, primary dysmenorrhea typically presents at least 12 mo after menarche.

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, most commonly near the fallopian tubes and ovaries. Often there are other family members with endometriosis. Although characteristically there is severe pain at the time of menses, adolescents can present with noncyclic pain as well.

Although primary dysmenorrhea is almost always the cause, a careful history and physical examination is required for adolescents who present with pelvic pain. An internal pelvic exam is not required in females who are not sexually active 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

Table 116-6 Differential Diagnosis of Dysmenorrhea in Adolescents (Red Flags Indicated in Bold)

	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 prior to onset of menstrual flow and last 1-3 days	Normal physical exam; internal exam only for sexually active adolescents. Ultrasound can be reserved for those patients with atypical presentations (e.g., onset at menarche) or those whose pain does not respond to NSAIDs and hormonal therapy
Endometriosis and adenomyosis	**Increasingly severe dysmenorrhea despite adequate therapy;** pain exacerbated during menses can occur acyclically as well. (Adenomyosis is the presence of endometrial tissue within the uterine myometrium)	Increased risk in patients with obstructive anomalies and possibly bleeding disorders; however, most teenagers with endometriosis have normal anatomy and bleeding indices; diagnosis is made visually during surgery. *Found in up to 69% of adolescents who underwent laparoscopy for persistent pelvic pain*
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). *Found in 8% of adolescents who underwent laparoscopy for persistent pelvic pain*
Pelvic inflammatory disease	Abrupt onset of dysmenorrhea more severe than baseline in sexually active adolescent; presentation can range from mild discomfort to acute abdomen	Clinical diagnosis made by findings of uterine or adnexal tenderness on bimanual pelvic examination (see Chapter 120); supporting features include dysuria, **vaginal discharge,** fever, and increased white blood cell count
Pregnancy complication	Coincident pain and bleeding may be misdiagnosed as dysmenorrhea	Urine hCG-positive

hCG, human chorionic gonadotropin; NSAIDs, nonsteroidal antiinflammatory drugs.

Bibliography

American Academy of Pediatrics, American College of Obstetricians and Gynecologists: Menstruation in girls and adolescents: using the menstrual cycle as a vital sign, *Pediatrics* 118:2245–2249, 2006.

American College of Obstetricians and Gynecologists: ACOG committee opinion number 557: management of acute abnormal uterine bleeding in nonpregnant reproductive-aged women, *Obstet Gynecol* 121:891–896, 2013.

Committee on Practice Bulletins—Gynecology: Practice bulletin no. 128: diagnosis of abnormal uterine bleeding in reproductive-aged women, *Obstet Gynecol* 120:197–206, 2012.

Committee on Practice Bulletins—Gynecology: Practice bulletin number 136: management of abnormal uterine bleeding associated with ovulatory dysfunction, *Obstet Gynecol* 122:176–185, 2013.

Gupta J, Kai J, Middleton L, et al: Levonorgestrel intrauterine system versus medical therapy for menorrhagia, *N Engl J Med* 368:128–136, 2013.

Holland-Hall C: Heavy menstrual bleeding in adolescents. Normal variant or a bleeding disorder? *Contemp Pediatr* 24–40, 2012.

James AH: Bleeding disorders in adolescents, *Obstet Gynecol Clin North Am* 36:153–162, 2009.

Lethaby A, Duckitt K, Farquhar C: Non-steroidal anti-inflammatory drugs for heavy menstrual bleeding, *Cochrane Database Syst Rev* (1):CD000400, 2013.

Munro MG, Heikinheimo O, Haththotuwa R, et al: The need for investigations to elucidate causes and effects of abnormal uterine bleeding, *Semin Reprod Med* 29:410–422, 2011.

Revel-Vilk S, Paltiel O, Lipschuetz M, et al: Underdiagnosed menorrhagia in adolescents is associated with underdiagnosed anemia, *J Pediatr* 160:468–472, 2012.

Sokkary N, Dietrich JE: Management of heavy menstrual bleeding in adolescents, *Curr Opin Obstet Gynecol* 24:275–280, 2012.

Table 116-7 Treatment for Dysmenorrhea

	MEDICATION	REGIMEN	COMMENTS
NSAIDs for up to 5 days)	Ibuprofen, 200 mg	2 tablets PO q 4-6 hr	Over-the-counter
	Naproxen sodium, 275 mg	550 mg loading dose then 275 mg PO q 6 hr	Patients may prefer the equivalent 550 mg PO q 12 hr dosing regimen
	Celecoxib (cyclooxygenase [COX]-2 inhibitor)*	400 mg then 200 mg PO q 12 hr prn pain	Can be used for patients with von Willebrand disease
Hormonal contraception	Combined oral contraceptive pills or vaginal ring	Continuous hormone regimens (as opposed to the standard 21 hormone days followed by 7 placebo days) may offer better relief but increase the risk of intermenstrual bleeding	The data favoring rings and pills over the combined hormone patch for this indication are sparse; treatment can be based on patient preference
	Progestin-only methods	DMPA 150 mg IM or 104 mg SC q 3 mo, levonorgestrel intrauterine device for up to 5 yr, etonogestrel implant for up to 3 yr	DMPA has potential side effects of bone loss and weight gain as well as a higher discontinuation rate than the 2 LARC methods
Gonadotropin-releasing hormone agonist	Depot leuprolide	11.25 mg IM q 3 mo	Consider for patients with presumed endometriosis not responsive to hormonal methods; add-back hormones are recommended to prevent bone loss

*FDA-approved for patients older than 18 yr. Should be used with caution in patient with impaired renal or liver dysfunction, heart failure, a history of gastrointestinal bleeding or ulcer. Full prescribing information can be found at: http://www.accessdata.fda.gov/drugsatfda_docs/label/2011/020998s033,021156s003lbl.pdf.

DMPA, depomedroxyprogesterone acetate; IM, intramuscular; LARC, long-acting reversible contraceptive; NSAIDs, nonsteroidal antiinflammatory drugs.

pain with ovulation, occurs at midcycle and can explain what initially appeared to be noncyclic pelvic pain. Table 116-6 lists the red flags for secondary dysmenorrhea. Ovarian cysts, a frequent concern of families, are usually transient and painless.

Treatment for primary dysmenorrhea is aimed at decreasing levels of prostaglandins, preferably before they are produced. Thus, the mainstay of treatment is with prostaglandin synthetase inhibition by either nonsteroidal antiinflammatory drugs, hormonal contraception, or a gonadotropin-releasing hormone agonist (Table 116-7) beginning at, or preferably the day prior to, menstruation. The high doses of around the clock treatment are rarely needed for more than the 1st 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 respond to optimally dosed nonsteroidal antiinflammatory drugs, or who also require contraception, all of the currently available forms of hormonal contraception will improve dysmenorrhea. A number of trials have investigated adjuvant treatments including heat, aromatherapy, acupressure, acupuncture, transcutaneous nerve stimulation, herbal remedies, yoga, and dietary supplements; however, the mainstay second-line treatment is hormones. The mechanisms are not fully delineated but are presumed to include elimination of progesterone production from the corpus luteum for those methods that prevent ovulation, and decreased prostaglandin production from the diminished endometrial lining. Up to 3 cycles may be required to appreciate the full benefit. Methods and regimens that eliminate a placebo interval may provide better relief. Females whose pain persists despite more than 3 mo of adequate hormonal therapy require further evaluation and treatment.

Bibliography is available at Expert Consult.

116.4 Premenstrual Syndrome and Premenstrual Dysphoric Disorder

Gina S. Sucato and Gale R. Burstein

Premenstrual dysphoric disorder (PMDD) is a depressive disorder that is distinguished from other depressive disorders by its timing. Symptoms of anxiety and depressed mood begin in the luteal phase of the menstrual cycle (i.e., in the second half, after ovulation) and improve within a few days after the onset of menses. PMDD causes significant distress and functional impairment and may be accompanied by physical and behavioral symptoms. PMDD occurs in 2-6% of menstruating females worldwide. Based on a large body of scientific evidence, it has been included in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) V (Table 116-8) as a distinct, treatment-responsive, depressive disorder. It is distinguished from premenstrual syndrome (PMS), which has similar timing and occurs in up to 30% of adolescents, by the severity and consequences of the affective symptoms. Premenstrual symptoms are precipitated by ovulation; symptoms recur in the luteal phase and should disappear at the end of menstruation.

Validated tools to screen for severe PMS and PMDD exist; up to half of females who report PMS do not meet diagnostic criteria when symptoms are rated prospectively. Consequently, use of a menstrual calendar to prospectively document symptoms is necessary, as it is important to distinguish PMDD from anxiety, depression, or another mental health disorder the symptoms of which are exacerbated cyclically but occur throughout the cycle.

Treatment success is gauged by improvement in patient symptoms. In mild cases of PMS, adolescents may have adequate relief following education about the relationship of symptoms to the menstrual cycle and instruction on stress management techniques, including exercise. There is not strong evidence supporting the effectiveness of most COC pills for PMS, particularly in adolescents. However, some experts suggest this treatment option for those patients who also have dysmenorrhea or contraceptive needs.

The treatment option with the most supportive evidence is use of selective serotonin reuptake inhibitors, which are first-line therapy for adult women with severe PMS and PMDD. In contrast to the treatment of depression, selective serotonin reuptake inhibitors can be rapidly effective for PMDD, 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 doses used for adults, for example, fluoxetine 10-20 mg orally daily. Among the many dietary supplements that have been studied, the best evidence is for supplementation with calcium 1,200 mg in 3 divided doses to treat both mood and pain symptoms.

Bibliography is available at Expert Consult.

Bibliography

Allen LM, Lam ACN: Premenstrual syndrome and dysmenorrhea in adolescents, *Adolesc Med State Art Rev* 23:139–163, 2012.

Dietrich JE: An update on adenomyosis in the adolescent, *Curr Opin Obstet Gynecol* 22:388–392, 2010.

Harel Z: Dysmenorrhea in adolescents and young adults: an update on pharmacological treatments and management strategies, *Expert Opin Pharmacother* 13:2157–2170, 2012.

Youngster M, Laufer MR, Divasta AD: Endometriosis for the primary care physician, *Curr Opin Pediatr* 25:454–462, 2013.

Bibliography

Allen LM, Nevin Lam AC: Premenstrual syndrome and dysmenorrhea in adolescents, *Adolesc Med* 23:139–163, 2012.

American Psychiatric Association: *Diagnostic and statistical manual of mental health disorders: DSM-5*, ed 5, Washington, DC, 2013, American Psychiatric Publishing.

Marjoribanks J, Brown J, O'Brien PM, et al: Selective serotonin reuptake inhibitors for premenstrual syndrome, *Cochrane Database Syst Rev* (6):CD001396, 2013.

Nevatte T, O'Brien P, Bäckström T, et al: ISPMD consensus on the management of premenstrual disorders, *Arch Womens Ment Health* 16:279–291, 2013.

O'Brien S, Rapkin A, Dennerstein L, et al: Diagnosis and management of premenstrual disorders, *BMJ* 342:d2994, 2011.

Steiner M, Peer M, Palova E, et al: The Premenstrual Symptoms Screening Tool revised for adolescents (PSST-A): prevalence of severe PMS and premenstrual dysphoric disorder in adolescents, *Arch Womens Ment Health* 14:77–81, 2011.

Table 116-8 Criteria for Premenstrual Dysphoric Disorder

A. In the majority of menstrual cycles, at least 5 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 postmenses.
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 5 symptoms when combined with symptoms from criterion B above.
   1. Decreased interest in usual activities (e.g., work, school, friends, 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 physiological 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, Fifth Edition (Copyright 2013). American Psychiatric Association, pp. 171-172.

Chapter 117

Contraception

Tara Jatlaoui and Gale R. Burstein

The untoward consequences of sexual activity (sexually transmitted infections [STIs; see Chapter 120], and early, unintended pregnancy [see Chapter 118]) all too often are experienced by adolescents. Adolescents often do not seek reproductive healthcare for 6-12 mo after initiating sex; many will become pregnant and/or acquire an STI during this interval. Appropriate counseling and educational interventions with adolescents, including the healthcare provider raising the topic of prevention, can decrease sexual risk behavior; youth who plan sexual initiation (as opposed to "it just happened") are 75% more likely to use contraception at sexual debut.

EPIDEMIOLOGY

Sexual Activity

According to the Youth Risk Behavior Surveillance System 2011, almost half (47.4%) of U.S. high school students had ever had sexual intercourse and one-third reported being currently sexually active (had sexual intercourse with at least 1 person during the 3 mo before the survey).

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 as a result of delayed initiation of sexual activity and increased contraceptive use. Despite declines, the U.S. still had the highest 2010 teen birth rate in the Western industrialized world with 34 live births per 1,000 females 15-19 yr old (Fig. 117-1). That is nearly 2 times higher than the 2010 teen birth rate in Ireland, which has the highest rate in Western Europe, and almost 10 times higher than the lowest rate in Switzerland. Of the 750,000 teen pregnancies in the United States in 2008, 31% ended in abortion. More than 80% of these pregnancies are unintended, indicating a remaining unmet need for reliable, effective contraception that teens will consistently use.

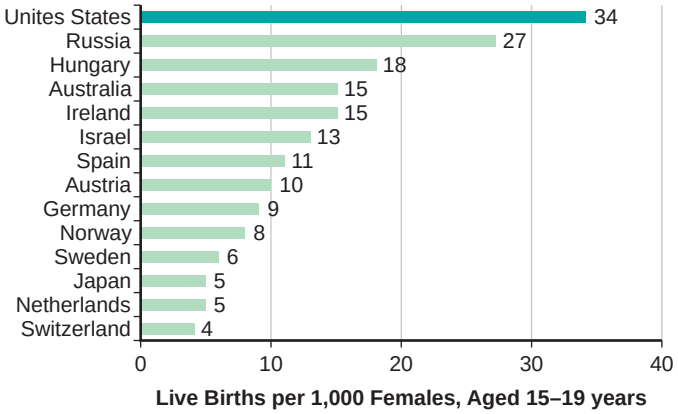


Figure 117-1 Teen birth rates in high income countries. *(From* United Nations Demographic Yearbook 2011, *available at* http://unstats.un.org/unsd/demographic/products/dyb/dyb2011.htm, *and Martin JA, Hamilton BE, Ventura SJ, et al: Births: Final data for 2010. National Vital Statistics Reports; Vol 61, No. 1, Hyattsville, MD: National Center for Vital Statistics, 2012, 1-72.)*

Contraceptive Use

According to the National Survey of Family Growth, 2006-2010, virtually all sexually experienced teens have used some method of contraception in the past. The most commonly used method is the condom, followed by withdrawal and then the pill. Use of contraception at first sex has greatly increased over the last 50 yr and the condom is currently the most common method used at first sex, as reported by more than 75% of males and females. Factors increasing contraception use at first sex include increasing age among teens up to age 17 yr; time in college; and planning their sexual debut (75% more likely to have used contraception than those who did not plan it).

To decrease rates of unintended pregnancy, more teens must use most or moderately effective contraception consistently and correctly.

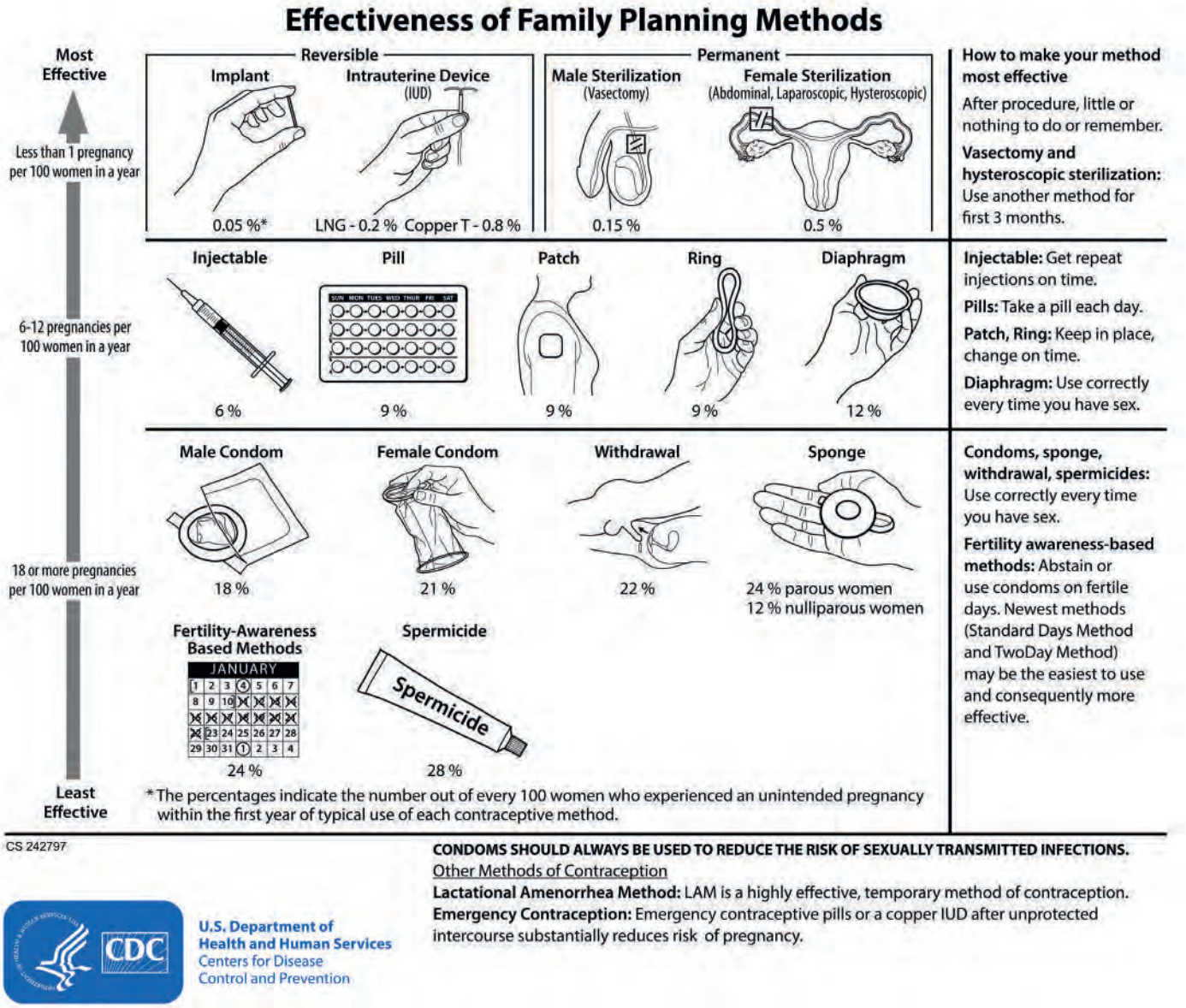


Figure 117-2 Effectiveness of contraceptive methods. *(From Centers for Disease Control and Prevention, Division of Reproductive Health, CS 242797; adapted from World Health Organization.* Comparing typical effectiveness of contraceptive methods. *Geneva, 2007, World Health Organization, and from Trussell J. Contraceptive failure in the United States.* Contraception *83:397–404, 2011.)*

The CDC Effectiveness of Contraceptive Methods Chart illustrates a tiered system of most effective (Tier 1), moderately effective (Tier 2), and least effective (Tier 3) methods (Fig. 117-2). Tier 1 methods include those with failure rates of less than 1 pregnancy per 100 women in a year of typical use. Tier 2 methods have failure rates of 6-12 pregnancies per 100 women in a year of typical use, and Tier 3 methods have failure rates of 18 or more pregnancies per 100 women per year of typical use.

More than half of sexually experienced female teens are currently using most effective or moderately effective contraceptive methods, such as an intrauterine device (IUD) or contraceptive implant, oral contraceptive pills, the contraceptive patch, the vaginal ring, an injectable contraception, or, rarely, sterilization. U.S. teens' use of hormonal methods at last intercourse is less frequent compared to teens in other developed countries: 52% of U.S. teens, 56% of Swedish 18-19 yr olds, 67% of French 15-19 yr olds, 72% of British 16-19 yr olds, and 73% of Canadian 15-19 yr olds use hormonal methods. 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 sexuality, and a positive attitude toward contraception. Condom use should also be encouraged along with effective contraception, preferably Tier 1 or 2, for dual protection against pregnancy and STIs. Only 12% of sexually active female teens who are using a most effective or moderately effective method are using condoms as well.

Contraceptive Counseling

The health screening interview during the adolescent preventive visit offers opportunities to identify and discuss unsafe sexual practices among sexually active adolescents and to identify and reinforce safe sexual behaviors including abstinence (see Chapter 112). Adolescents with medical conditions, either chronic or acute, are particularly vulnerable to having sexual and reproductive health omitted from their visits (see Chapters 42 and 717). Their comorbidities or concurrent medication use may make unintended pregnancy an increased health risk; therefore addressing sexuality and contraceptive issues at visits is imperative.

The goals of counseling with adolescents are to (1) understand adolescent perceptions and misperceptions about pregnancy and use of

contraceptives; (2) help adolescents put unprotected intercourse risk in a personal perspective; (3) educate adolescents regarding the true risks and benefits for the various methods available; and (4) help adolescents choose a safe and effective method that can either be provided on site or be easily obtained by referral. Counseling should include a review of all contraceptive methods available, starting with the most effective methods. The adolescent should be counseled using "**typical use" failure rates,** which reflect the effectiveness of a method for the average person who may not always use the method or use the method correctly (see Fig. 117-2). For example, for oral contraceptive pills, the typical use failure rate is 9% whereas perfect use failure rate is <1%. It is important to ask about use of withdrawal as more than half (58%) of teens have used it for contraception and it has a typical use failure rate of 22%. Abstinence should also be discussed as an option even if teens have engaged in sexual intercourse in the past. Situational abstinence may be the best option if they 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, 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. 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 or effectiveness.

Once an adolescent chooses a method, the provider and teen should discuss clear plans on correct and consistent use of the chosen method and strategies for appropriate follow-up (Table 117-1). Providers

Table 117-1 Contraceptive Methods

METHOD	FAILURE RATE (%)		DOSING	MECHANISM OF ACTION	POTENTIAL SIDE EFFECTS	ADVANTAGES
	Typical Use	Perfect Use				
HORMONAL CONTRACEPTIVES						
Implant (Implanon or Nexplanon)	0.05	0.05	Insertion of implant into upper arm once every 3 yr	Progestin effects: thickening of cervical mucus, inhibition of ovulation, endometrial atrophy	Rare insertion complications, possible weight gain, uterine bleeding changes including amenorrhea	High efficacy, discreteness, relief of dysmenorrhea, reduced risk of ectopic pregnancy, reversibility, high acceptability and continuation rates; no estrogen
Progestin-releasing IUD (Skyla and Mirena)	0.2	0.2	3 or 5 yr Releases 14 or 20 µg/day levonorgestrel	Progestin effects (see above) and IUD effect of preventing sperm from fertilizing ovum	Breakthrough bleeding in 1st 3-6 mo, then hypo-, or amenorrhea	High efficacy, easy to use, long-acting; no estrogen Decrease in: menstrual blood loss, dysmenorrhea, endometriosis pain, PID risk
Progestin-only injection (Depo-Provera)	6	0.2	3 mo (13 wk) 150 mg depot medroxyprogesterone IM	Progestin effects (see above)	Irregular bleeding or amenorrhea, weight gain, breast tenderness, acne, depression, possible decrease in bone density	No estrogen; decrease in menstrual blood loss, dysmenorrhea, PID risk
The patch	9	0.3	Weekly for 3 wk (off on 4th wk) 20 µg ethinyl estradiol 150 µg norelgestromin released daily	Combined hormonal method: thickens cervical mucus, inhibits ovulation, inhibits sperm's ability to fertilize egg, slows tubal mobility, disrupts ovum transport, induces endometrial atrophy	Breakthrough bleeding, nausea, headaches, breast tenderness, skin site reaction, less effective if patient weighs >90 kg (198 lb)	Similar to OCPs but less-frequent dosing
Vaginal ring (NuvaRing)	9	0.3	Monthly (insert for 3 wk of each mo) Serum levels of 15 µg ethinyl estradiol Releases 150 µg norelgestromin daily	Combined hormonal method (see above)	Vaginal irritation, vaginal discharge, headache	Similar to OCs but less-frequent dosing
Combined Oral Contraceptives (OCPs)	9	0.3	Daily Varies 20-50 µg estrogen Varies 0.15-1 µg progestogen	Combined hormonal method (see above)	Breakthrough bleeding, nausea, headaches, breast tenderness	Decrease in PID risk, ectopic pregnancy risk, menstrual blood loss, dysmenorrhea, acne
Progestin-only pills (POPs)	9	0.3	Daily (within 3-hr period) 0.35 mg norethindrone or 0.075 mg norgestrel	Progestin-only hormonal method: inhibits ovulation, thickens and decreases cervical mucus, atrophies endometrium	Irregular bleeding, breast tenderness, depression	No estrogen; effective after 2 days of use

Continued

Table 117-1 Contraceptive Methods—cont'd

METHOD	FAILURE RATE (%) Typical Use	Perfect Use	DOSING	MECHANISM OF ACTION	POTENTIAL SIDE EFFECTS	ADVANTAGES
NONHORMONAL CONTRACEPTIVES						
IUD copper-containing (ParaGard)	0.8	0.6	10 yr 36 × 22 mm, copper wire wound around vertical stem of T	IUD: prevents sperm from fertilizing ova and copper ions may act as spermicide	Heavier menses	Easy to use, long-acting nonhormonal
Male condom	18	2	Every act of intercourse	Barrier method: blocks passage of semen	Latex allergy	Recommended to be used in addition to another contraceptive; only method that decreased STD, HIV risk
Female condom	21	5	Every act of intercourse	Barrier method: lines the vagina fully and perineum partially	Vaginal discomfort, partner penile irritation	Provides some protection against STD, HIV; polyurethane can be used with latex allergy
Spermicides	28	18	Every act of intercourse nonoxynol-9 (in United States). Dose varies by formulation, e.g., gel, suppository, from 52.5-150 mg	Kills sperm by destroying sperm cell membrane	Allergy or sensitivity to ingredients, recurrent urinary tract infections	Recommended to be used in addition to another barrier contraceptive

IUD, intrauterine device; OCs, oral contraceptives; PID, pelvic inflammatory disease; STD, sexually transmitted disease.
From Trussell J: Contraceptive failure in the United States, Contraception *83:397–404, 2011; Hatcher RA, Trussell J, et al, editors:* Contraceptive technology, *New York, 2011, Ardent Media; and As-Sanie S, Gantt A, Rosenthal MS: Pregnancy prevention in adolescents,* Am Fam Physician *70:1517–1524, 2004.*

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. The provider should assess whether the teen understood the information discussed and may confirm by asking the teen to repeat back key concepts. Chapter 112 discusses confidentiality and consent issues related to contraceptive management.

A pelvic examination is only required for placement of an IUD, unless otherwise indicated. STI screening is appropriate once sexual activity has begun; gonorrhea and chlamydia screening via a self-collected or provider-collected vaginal swab or urine sample is recommended unless symptoms require a pelvic exam. Guidelines from the American Congress of Obstetrics and Gynecology (ACOG) recommend that the first female teen visit to a gynecologist occur between the ages of 13 and 15 yr unless necessary at an earlier age. This visit aims to establish rapport, educate the patient and parents or guardian on healthy sexual development, and provide routine preventive services. Pap test for cervical cancer screening is not recommended until age 21 yr.

Bibliography is available at Expert Consult.

117.1 Long-Acting Reversible Contraception

Tara Jatlaoui and Gale R. Burstein

Long-acting reversible contraception (LARC) includes 2 levonorgestrel IUDs, the Copper IUD and the etonogestrel subdermal implant; LARCs are the only Tier 1 methods that are reversible (see Fig. 117-2). Considered forgettable contraception, LARCs do not require frequent office or pharmacy visits and do not depend on user compliance for effectiveness. In the CHOICE project in St. Louis, more than 9,000 women were give the contraception of their choice at no cost and were followed for 2-3 yr. The failure rates among women who use oral contraceptive pills, transdermal patch or vaginal ring was more than 20 times higher than the failure rate for women using a LARC method according to this study. Acceptance, continuation, and satisfaction in this study were also higher among teens using LARC compared to those using non-LARC methods. The ACOG recommends LARC methods as first-line contraceptives for all females. The US Medical Eligibility Criteria, 2010, supports safe use of both IUDs and implants in this population. Implants are considered category 1 for all ages, and IUDs are considered category 2 for women <20 years old and for nulliparous women (see Table 117-2 for explanation of categories of eligibility).

Table 117-2 Categories of Medical Eligibility Criteria for Contraceptive Use

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

Intrauterine Devices

Intrauterine devices (IUDs) are small, flexible, plastic objects introduced into the uterine cavity through the cervix. They differ in size, shape, and the presence or absence of pharmacologically active substances. In the United States, 3 IUDs are currently available: the Copper T380A and 2 levonorgestrel IUDs. The effectiveness of the copper IUD is enhanced by the copper ions released into the uterine cavity with possible mechanisms including inhibition of sperm transport and prevention of implantation; this IUD is effective for at least 10 yr.

The levonorgestrel IUDs also have various actions, from thickening of cervical mucus and inhibiting sperm survival to suppressing the endometrium; these IUDs are effective for at least 3 and 5 yr. All 3 IUDs have typical use failure rates of less than 1% (see Fig. 117-2).

Common misconceptions of IUDs among healthcare providers are that IUDs cause infections, infertility, and generally are not safe for teens or nulliparous women to use; these misconceptions are a barrier

Bibliography

American Academy of Pediatrics Committee on Adolescence: Contraception and adolescents, *Pediatrics* 120:1135–1148, 2007.

American College of Obstetricians and Gynecologists Committee on Gynecologic Practice: Well-woman visit, *Obstet Gynecol* 120:421–424, 2012.

Centers for Disease Control and Prevention: Contraceptive methods available to patients of office-based physicians and title X clinics—United States, 2009-2010, *MMWR Morb Mortal Wkly Rep* 60(1):1–4, 2011.

Centers for Disease Control and Prevention: Sexual experience and contraceptive use among female teens–United States, 1995, 2002, and 2006-2010, *MMWR Morb Mortal Wkly Rep* 61(17):297–301, 2012.

Darroch JE, Singh SS, Frost JJ, et al: Differences in teenage pregnancy rates among five developed countries: the roles of sexual activity and contraceptive use, *Fam Plann Perspect* 33:244–250, 2001.

Durex Network: *The face of global sex 2007. First sex: opportunity of a lifetime*, Cambridge, UK, 2007, SSL International. http://www.durexnetwork.org/en-GB/research/faceofglobalsex/Pages/Home.aspx.

Eaton DK, Kann L, Kinchen S, et al; Centers for Disease Control and Prevention: Youth risk behavior surveillance–United States, 2011, *MMWR Surveill Summ* 61(4):1–162, 2012.

Kirby D: Reducing pregnancy and risky behaviour in teenagers, *BMJ* 339:116–117, 2009.

Kost K, Henshaw S: *U.S. teenage pregnancies, births and abortions, 2008: National Trends by Age, Race and Ethnicity*, 2012, http://www.guttmacher.org/pubs/USTPtrends08.pdf.

Santelli JS, Lindberg LD, Finer LB, et al: Explaining recent declines in adolescent pregnancy in the United States: the contribution of abstinence and improved contraceptive use, *Am J Public Health* 97:1541–1548, 2007.

Trussell J: Contraceptive failure in the United States, *Contraception* 83:397–404, 2011.

to teens accessing these highly effective and acceptable methods. These IUDs does not increase risk of infertility, and the IUD may be inserted safely in teens as well as nulliparous women (see Table 117-2).

Although early studies suggested an increased risk for upper genital tract infection, theoretically as a result of the presence of a foreign body in the cervix, newer work has refuted these earlier concerns. Therefore, clinicians are encouraged to consider use of IUDs in adolescents despite relatively high prevalence rates of STIs in this population. Teens should be screened for gonorrhea and chlamydia at the time of or before IUD placement, although placement should not be delayed if results have not returned and there are no signs of infection. If STI testing returns positive with an IUD in place, the patient may be treated without removing the IUD if she wishes to continue the method.

Implants

There is currently 1 contraceptive implant available in the United States. Originally FDA-approved in 2006, 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 3 yr and primarily works to inhibit ovulation. Similarly 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. 117-2). 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. Common side effects include amenorrhea, irregular bleeding, or infrequent bleeding, and, less often, prolonged or frequent bleeding. 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 tend to resolve without treatment.

Bibliography is available at Expert Consult.

117.2 Other Progestin-Only Methods

Tara Jatlaoui and Gale R. Burstein

Several progestin-only methods are available and include the levonorgestrel IUDs and implant (see Chapter 117.1), 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 (Table 117-3) and are considered generally safe for use in teens (see Table 117-2). Progestins thicken cervical mucus to block sperm entry into the uterine cavity as well as induce an atrophic endometrium leading to either amenorrhea or less menstrual blood loss; the implant and injectable additionally suppress ovulation. Teens should be provided anticipatory counseling regarding bleeding irregularities that may normally occur in the 1st 3-6 mo of hormonal contraception use.

Table 117-3 Conditions Classified as U.S. MEC Category 3 and 4 for Combined Hormonal Contraceptive Use

CATEGORY 4
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
Hypertension (blood pressure above 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 prior or with moderately or severely impaired cardiac function)
Postpartum <21 days
History of cerebrovascular accident
Systemic lupus erythematosus with positive antiphospholipid antibodies
Thrombogenic mutations
Viral hepatitis (acute or flare)
CATEGORY 3
Past breast cancer with no evidence of disease for 5 yr
Breastfeeding and <1 mo postpartum
Deep venous thrombosis/pulmonary embolism (history of deep venous thrombosis/pulmonary embolism with lower risk recurrence)
Gall bladder disease (current, medically treated)
Migraine without aura (if worsens or first starts while using combined hormonal contraceptives)
History of malabsorptive bariatric surgery
History of cholestasis and past combined oral contraceptive-related
Hypertension (adequately controlled or blood pressure less than 160/100 mm Hg)
Peripartum cardiomyopathy with mild impairment or >6 months
Postpartum 21-42 days with other risk factors for venous thromboembolism
Drug interactions (Ritonavir-boosted protease inhibitors; certain anticonvulsants; rifampin or rifabutin)

From Centers for Disease Control and Prevention: U.S medical eligibility criteria for contraceptive use, 2010, MMWR Recomm Rep *59(RR-4):1–86, 2010.*

DEPO-PROVERA

An *injectable progestin,* medroxyprogesterone acetate (Depo-Provera, DMPA), is a Tier 2 contraceptive method available as a deep intramuscular injection (150 mg), or as a subcutaneous injection (104 mg) with typical-use failure rates of 6% (see Fig. 117-2). Both preparations must be readministered every 3 mo (13 wk) and act to inhibit ovulation. DMPA is particularly attractive for adolescents who have difficulty with compliance, are intellectually or physically impaired, and are chronically ill or have a condition for which estrogen use is not recommended. After 1 yr 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, or for those with impairments that make hygiene difficult. Although concern has been directed toward the potential for loss in bone mineral density in adolescents, thereby potentially increasing their risk for osteoporosis later in life, subsequent studies have found that bone density is recovered after discontinuation of the method and is considered safe for use in this population (see Table 117-2). Healthcare providers may want to consider a contraceptive containing estrogen in teens who are already at high risk for low bone density, such as those on chronic corticosteroids or those with eating disorders (see Chapter 707). Although a black box warning was issued in 2004, the American Academy of Pediatrics and ACOG do not recommend limiting DMPA use to 2 yr for all women and do not recommend routine bone mineral density screening for females using DMPA. There is also concern for weight gain in women using DMPA. A systematic review found 2 studies indicating early weight gain may be predictive of progressive gain over time; thus, those teens gaining weight in the 1st 3-6 mo should consider another method.

PROGESTIN-ONLY PILLS

Progestin-only oral contraceptives are available for the adolescent in whom the use of estrogen is potentially deleterious, such those with active liver disease, replaced cardiac valves, or hypercoagulable states (see Table 117-3). These agents ("mini-pills") are less reliable in inhibiting ovulation, are associated with a typical use failure rate of 9%, and

Bibliography

Ahmed S, Li Q, Liu L, et al: Maternal deaths averted by contraceptive use: an analysis of 172 countries, *Lancet* 380:111–124, 2012.

American Academy of Pediatrics Committee on Adolescence: Contraception and adolescents, *Pediatrics* 120:1135–1148, 2007.

Berenson AB, Tan A, Hirth J, et al: Complications and continuation of intrauterine device use among commercially insured teenagers, *Obstet Gynecol* 121:951–958, 2013.

Centers for Disease Control and Prevention: U.S. selected practice recommendations for contraceptive use, 2013, *MMWR Recomm Rep* 62(RR-05):1–60, 2013.

Centers for Disease Control and Prevention: U.S. medical eligibility criteria for contraceptive use, 2010, *MMWR Recomm Rep* 59(RR-4):1–86, 2010.

Centers for Disease Control and Prevention: Sexual experience and contraceptive use among female teens–United States, 1995, 2002, and 2006–2010, *MMWR Morb Mortal Wkly Rep* 61:297–301, 2012.

Cleland J, Conde-Agudelo A, Peterson H, et al: Contraception and health, *Lancet* 380:149–156, 2012.

Hatcher RA, Trussell J, Nelson A, et al: *Contraceptive technology*, ed 20, Atlanta, 2011, Ardent Media Inc.

Kost K, Henshaw S: *US Teenage pregnancies, births and abortions, 2010: National trends by age, race, ethnicity*. 2014. http://www.guttmacher.org/pubs/USTPtrends10.pdf.

The Medical Letter: FDA warning about drospirenone in oral contraceptives, *Med Lett Drugs Ther* 54:33–34, 2012.

The Medical Letter: A new low-dose levonorgestrel-releasing IUD (Skyla), *Med Lett Drugs Ther* 55:21–22, 2013.

Mestad R, Secura G, Allsworth JE, et al: Acceptance of long-acting reversible contraceptive methods by adolescent participants in the Contraceptive CHOICE Project, *Contraception* 84:493–498, 2011.

O'Brien RE, Werner L: AAP Committee on Adolescence 2010–2011: Condom use by adolescents, *Pediatrics* 132:973–981, 2013.

Peipert JF, Zhao Q, Allsworth JE, et al: Continuation and satisfaction of reversible contraception, *Obstet Gynecol* 117:1105–1113, 2011.

Peterson HB, Curtis KM: Long-acting methods of contraception, *N Engl J Med* 353:2169–2175, 2005.

Rosenstock JR, Peipert JF, Madden T, et al: Continuation of reversible contraception in teenagers and young women, *Obstet Gynecol* 120:1298–1305, 2012.

Secura GM, Allsworth JE, Madden T, et al: The Contraceptive CHOICE Project: reducing barriers to long-acting reversible contraception, *Am J Obstet Gynecol* 203:115.e1–e7, 2010.

Winner B, Peipert JF, Zhao Q, et al: Effectiveness of long-acting reversible contraception, *N Engl J Med* 366:1998–2007, 2012.

Product Information

http://labeling.bayerhealthcare.com/html/products/pi/Mirena_PI.pdf.

http://labeling.bayerhealthcare.com/html/products/pi/Skyla_PI.pdf.

http://www.merck.com/product/usa/pi_circulars/n/nexplanon/nexplanon_pi.pdf.

http://hcp.paragard.com/images/ParaGard_info.pdf.

are considered Tier 2 or moderately effective contraceptives (see Fig. 117-2). Acceptance by adolescents is limited by the necessity of taking the pill daily and bleeding irregularities, including amenorrhea and breakthrough bleeding. Progestin-only pills are quickly effective after 2 days of initiation in thickening cervical mucus. Effects, however, are short-lived and pill-taking must be punctual, which may be difficult for teens. If a pill is more >3 hr late from normal time, an unintended pregnancy may occur.

Bibliography is available at Expert Consult.

117.3 Combined Hormonal Contraceptives

Tara Jatlaoui and Gale R. Burstein

Combined hormonal contraceptives (CHCs) are methods that include an estrogenic substance in combination with a progestin; methods available in the United States include several formulations of combined oral contraceptives (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, as a result, to inhibit ovulation. Additional effects to the reproductive tract include thickening of the cervical mucus in such a way that 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 9%.

CHCs are also considered similarly in the U.S. Medical Eligibility Criteria, and recommendations mostly are concerned with estrogen exposure for a given condition or characteristic (see Table 117-3). Thrombophlebitis, hepatic adenomas, myocardial infarction, and carbohydrate intolerance are some of the more serious potential complications of exogenous estrogen use. These disorders are exceedingly rare in adolescents. Even though teenage smokers who use oral contraceptives have more than twice the risk of myocardial infarction, the likelihood of its occurrence is very small, and thus clinically insignificant, compared to the risk of dying from other pregnancy-related complications.

COMBINED ORAL CONTRACEPTIVES

Oral contraceptive pills can be either COCs or progestin-only pills 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 oral contraceptive pills 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 given is associated with higher continuation rates. However, most health plans will not cover costs for more than 3 pill packs dispensed at 1 time. Advanced provision of emergency contraceptive pills is also recommended should patients miss pills and have unprotected sex. The effectiveness of COCs is dependent on compliance, and unfortunately adolescents may forget to take a pill each day. Figures 117-3 and 117-4 list the rules for missed pills or following vomiting or diarrhea.

COCs contain 50, 35, 30, 25, or 20 μg of estrogenic substance, typically ethinyl estradiol, and as many as 10 progestins have been available

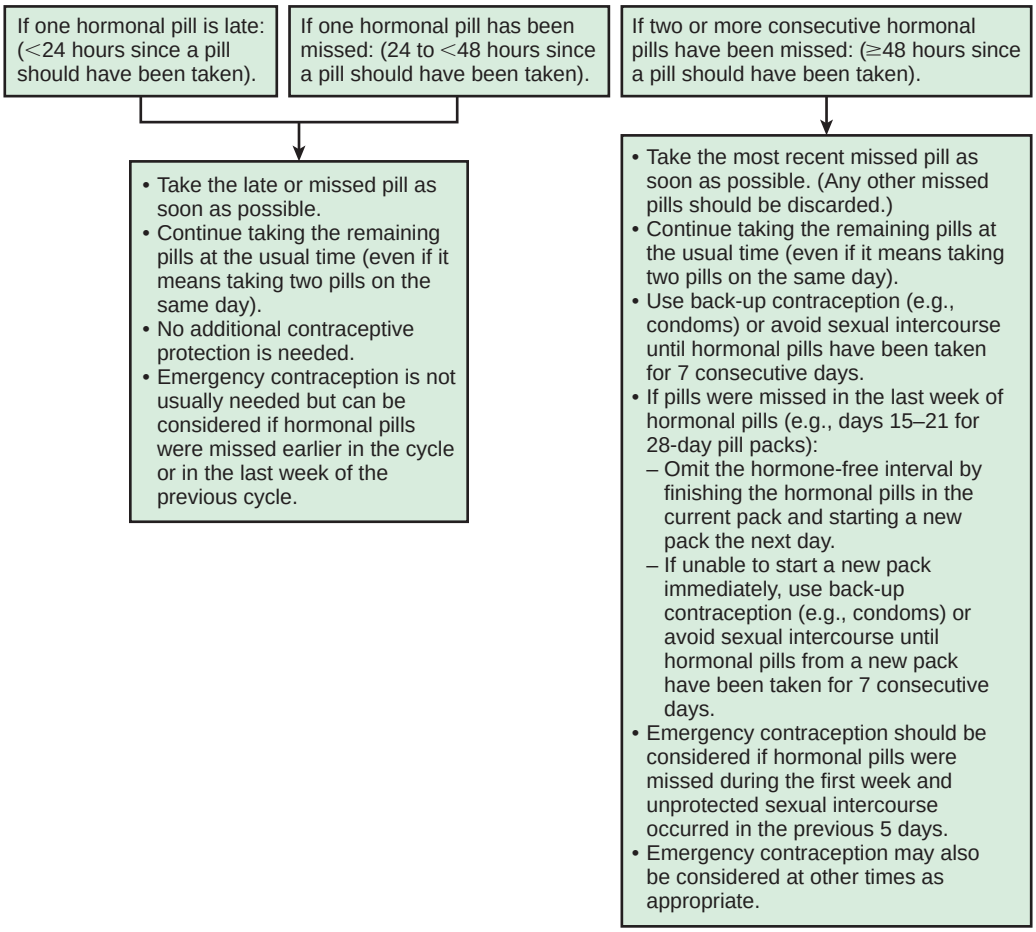


Figure 117-3 Recommended actions after late or missed combined oral contraceptives. *(From Centers for Disease Control and Prevention: US Selected Practice Recommendations for Contraceptive Use, 2013,* MMWR Recomm Rep *2013;62(RR-5):1–60, Fig. 2, p. 27).*

Bibliography

American Academy of Pediatrics Committee on Adolescence: Contraception and adolescents, *Pediatrics* 120:1135–1148, 2007.

Bachrach LK, Sills IN: and the Section on Endocrinology: Bone densitometry in children and adolescents, *Pediatrics* 127(1):189–194, 2011.

Bateson D, McNamee K, Briggs P: Newer non-oral hormonal contraception, *BMJ* 346:f341, 2013.

Centers for Disease Control and Prevention: US Selected Practice Recommendations for Contraceptive Use, 2013, *MMWR Recomm Rep* 62(RR-5):1–60, 2013.

Centers for Disease Control and Prevention: U.S. medical eligibility criteria for contraceptive use, 2010, *MMWR Recomm Rep* 59(RR-4):1–86, 2010.

Cromer BA, Scholes D, Berenson A, et al: Depot medroxyprogesterone acetate and bone mineral density in adolescents—the Black Box Warning: a position paper of the Society for Adolescent Medicine, *J Adolesc Health* 39:296–301, 2006.

Depot medroxyprogesterone acetate and bone effects. ACOG Committee Opinion No.415. American College of Obstetricians and Gynecologists, *Obstet Gynecol* 112:727–730, 2008.

FDA Talk Paper: *Black box warning added concerning long-term use of Depo-Provera contraceptive injection*, November 17, 2004. http://www.fda.gov/bbs/topics/ANSWERS/2004/ANS01325.html.

Hatcher RA, Trussell J, Nelson A, et al: *Contraceptive technology*, ed 20, Atlanta, GA, 2011, Ardent Media, Inc.

Steenland MW, Zapata LB, Brahmi D, et al: Appropriate follow up to detect potential adverse events after initiation of select contraceptive methods: a systematic review, *Contraception* 87(5):611–624, 2013.

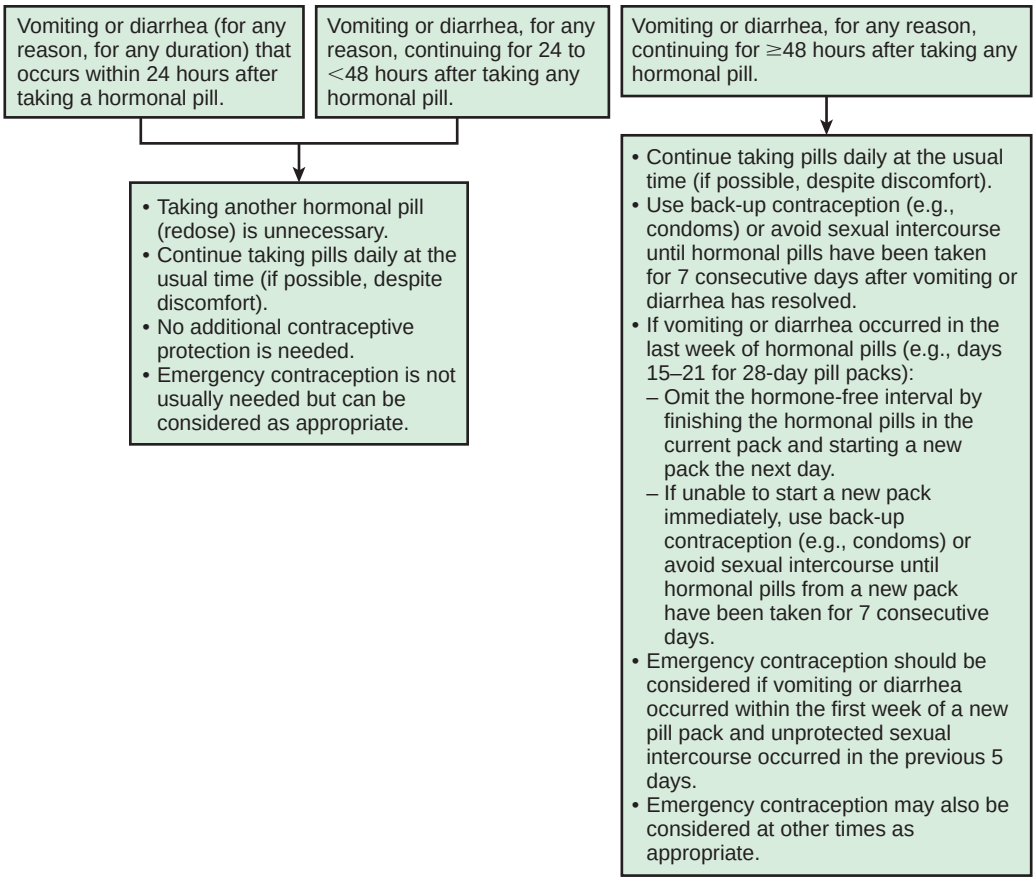


Figure 117-4 Recommended steps after vomiting or diarrhea while using combined oral contraceptives. *(From Centers for Disease Control and Prevention: US Selected Practice Recommendations for Contraceptive Use, 2013,* MMWR Recomm Rep *2013;62(RR-5):1–60, Fig. 5, p. 30).*

in the United States for combined pills. Multiple preparations are available to help select the formulation with which an individual patient will be satisfied with minimal side effects.

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 yr such 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 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 oral contraceptive pills is intermenstrual bleeding and/or spotting with the total days of bleeding over the 1st yr 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 contains 7 placebo pills. Multiphasic formulations are not available for extended cycle use.

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 overshadowed 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 116). Acne (see Chapter 669) may be worsened by some and improved by other oral contraceptive preparations. The pills with nonandrogenic progestins are particularly effective in reducing acne and hirsutism. 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 on certain medications.

As of 2011, the FDA has concluded that drospirenone-containing oral contraceptives may be associated with a higher risk of blood clots compared to other progestin-containing pills. Although no studies have provided consistent estimates of the comparative risk of blood clots between birth control pills that contain drospirenone and those that do not, nor have studies accounted for patient characteristics that may affect blood clot risk, there has been a 3-fold increased risk of blood clots reported for drospirenone, as compared to products containing levonorgestrel or other progestins. As a result, the FDA is requiring that labeling be revised for the oral contraceptives marketed under the Beyaz, Safyral, Yasmin, and Yaz brands. Despite the risk of blood clots with all oral contraceptives, the risk still remains lower than the risk of developing blood clots during pregnancy or the postpartum period.

TRANSDERMAL PATCH

The *transdermal patch* (Ortho Evra) releases 20 μg ethinyl estradiol and 150 μg norelgestromin daily and is applied to the lower abdomen, buttocks, or upper body. It is worn continuously for 1 wk and changed weekly for a total of 3 wk; then no patch is worn for the fourth wk at which time bleeding occurs (see Table 117-1). It should not be applied to the breast. Limited studies in adolescents suggest higher rates of partial or full detachment compared to adults, with high patient satisfaction and 50-83% continuation rates from 3-18 mo of use (Fig. 117-5). Like other combined hormonal methods, the patch is a Tier 2 or moderately effective contraceptive.

VAGINAL RING

The *vaginal contraceptive ring* (NuvaRing) is a flexible, transparent, colorless vaginal ring that measures about 2.1 inches in diameter and

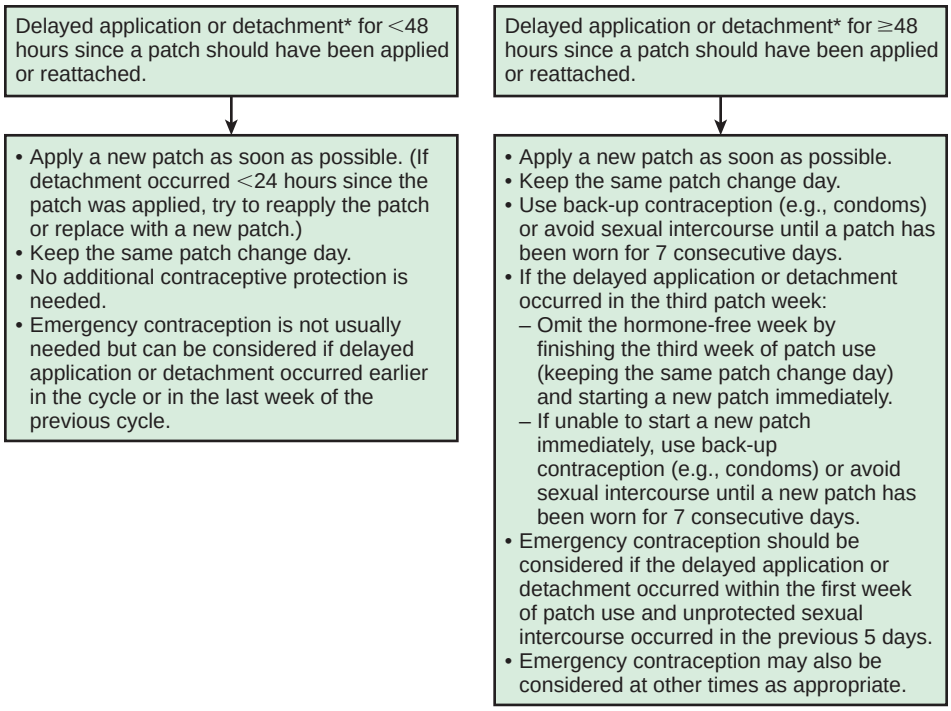


Figure 117-5 Recommended actions after delayed application or detachment with combined hormonal patch. *(From Centers for Disease Control and Prevention: US Selected Practice Recommendations for Contraceptive Use, 2013,* MMWR Recomm Rep *2013;62(RR-5):1–60, Fig. 3, p. 28).*

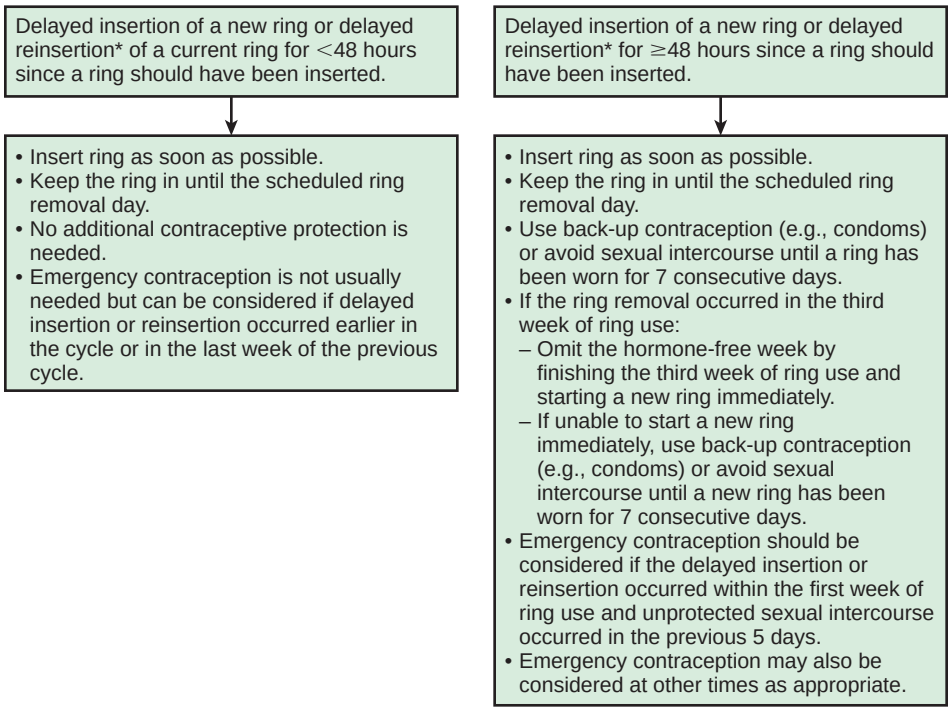


Figure 117-6 Recommended actions after delayed insertion or reinsertion with combined vaginal ring. *(From Centers for Disease Control and Prevention: US Selected Practice Recommendations for Contraceptive Use, 2013,* MMWR Recomm Rep *2013;62(RR-5):1–60, Fig. 4, p. 29).*

is inserted into the vagina by the patient. It releases 15 µg ethinyl estradiol and 120 µg etonogestrel per day and remains in place for 3 wk, during which time these hormones are absorbed. If the ring is accidentally expelled or removed for intercourse, it should be reinserted; however, if it is out of place ≥48 hr, a backup method of contraception should be used (Fig. 117-6). Like other combined hormonal methods, the vaginal ring is a Tier 2 or moderately effective contraceptive.

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. Medical Eligibility Criteria, 2010 (see Table 117-3): current breast cancer, severe cirrhosis, acute deep venous thrombosis/pulmonary embolism or history of deep venous thrombosis/pulmonary embolism with higher risk for recurrence, major surgery with prolonged immobilization, diabetes with nephropathy, retinopathy or neuropathy, migraines with 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 days, complicated solid organ transplantation, history of cerebrovascular accident, systemic lupus erythematosus with positive antiphospholipid antibodies, thrombogenic mutations and complicated valvular heart disease. The initial history taken before prescribing CHCs should specifically address these risks. The U.S. Medical Eligibility Criteria provides contraceptive safety guidance with more than 1,800 recommendations for more than 120 medical conditions or characteristics (see Table 117-3).

Bibliography is available at Expert Consult.

117.4 Emergency Contraception

Tara Jatlaoui and Gale R. Burstein

Unprotected intercourse at midcycle carries a pregnancy risk of 20-30%. At other times during the cycle, the risk is 2-4%. The risk may be reduced or eliminated by interventions known collectively as emergency contraception (EC) as soon as possible after unprotected intercourse or contraceptive failure with a "window" up to 120 hr. Table 117-4 lists the indications for use of EC. Methods that can be used after unprotected intercourse for EC include the Copper IUD and various emergency contraceptive pills, which include ulipristal acetate, levonorgestrel and COCs following the Yuzpe method. Although the mechanism of action of the Copper IUD as EC is unclear, all emergency contraceptive pills work to delay ovulation and are effective only for intercourse that occurs prior to 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 cause an abortion or have teratogenic effects on the fetus.

Table 117-4 Potential Indications for Use of Emergency Contraception

- Lack of contraceptive use during coitus
- Mechanical failure of male condom (breakage, slippage, or leakage)
- Dislodgment, breakage, or incorrect use of diaphragm, cervical cap, or female condom
- Failure of spermicide tablet or film to melt before intercourse
- Error in practicing withdrawal (coitus interruptus)
- Missed combined oral contraceptives (any 2 consecutive pills)
- Missed progestin-only oral contraceptive (1 or more)
- Expulsion or partial expulsion of an IUD
- Exposure to potential teratogen (such as isotretinoin or thalidomide while not using effective contraception)
- Late injection of injectable contraceptive (>2 wk late of a progestin-only formulation such as depot medroxyprogesterone acetate)*
- 2 or more days late starting new vaginal ring or patch cycle
- Rape

*The usual interval for use of depot medroxyprogesterone acetate as contraception is every 12 wk; the interval for the combined monthly injectable formulation is every 28 to 30 days.

Adapted from Allen RH, Goldberg AB: Emergency contraception: a clinical review, Clin Obstet Gynecol *50:927–936, 2007.*

Teens can access EC information through a ***hotline at 1-888-NOT-2-LATE*** to obtain EC pills over the counter. The American Academy of Pediatrics recommends advance provision of EC pills for teens who are or may become sexually active. A follow-up appointment is also 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 initiate continuing contraception when appropriate. Pap smear screening is not initiated until 21 yr of age.

COPPER IUD

The Copper T380A is FDA approved for EC and has been shown to be more than 99% effective if used within 5 days (120 hr) after unprotected sex. The additional benefit of using the Copper IUD for EC is it also provides long-term reversible contraception.

ULIPRISTAL ACETATE

This is the newest formulation available for EC and was FDA approved in 2010 for use up to 120 hr after unprotected sex. It is available only by prescription regardless of age. It has been shown in a few studies to be more effective than levonorgestrel at and beyond 72 hr.

LEVONORGESTREL

In 2009, the FDA approved the emergency contraceptive drug Plan B as an over-the-counter option for women age 17 yr and older. Experience in adolescent women demonstrates more effective use of EC with advance provision and is not associated with more frequent unprotected intercourse or less condom or pill use. Nausea and vomiting are uncommon side effects, and in a recent comparison, levonorgestrel proved more effective at preventing pregnancy than the Yuzpe method.

The **Yuzpe method** has been replaced by the more effective levonorgestrel pills but may be useful for women who already have COCs at home and are in need of EC. For EC, pills consist of COCs totaling 200 µg ethinyl estradiol and 2.0 mg norgestrel or 1.0 mg levonorgestrel. 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 oral contraceptives.

Bibliography is available at Expert Consult.

117.5 Dual Protection

Tara Jatlaoui and Gale R. Burstein

Dual protection is the protection against STIs/HIV as well as effective contraception. Although condoms can provide both, providers should encourage more highly effective contraceptive methods along with condoms for each act of intercourse.

CONDOMS

This method prevents sperm from being deposited in the vagina. There are no major side effects associated with the use of a condom. The risk of HIV may have increased the use of condoms among adolescents, with 46.2% of high school students in 1991 reporting using a condom at last sexual intercourse increasing to 60.2% in 2011. The main advantages of condoms are their low price, availability without prescription, little need for advance planning, and, most important for this age

Bibliography

American Academy of Pediatrics Committee on Adolescence: Contraception and adolescents, *Pediatrics* 120:1135–1148, 2007.

American Academy of Pediatrics Committee on Adolescence: Emergency contraception, *Pediatrics* 130:1174–1182, 2012.

American Society for Reproductive Medicine: Practice Committee: Hormonal contraception: recent advances and controversies, *Fertil Steril* 90:S103–S113, 2008.

Centers for Disease Control and Prevention: Update to CDC's medical eligibility criteria for contraceptive use, 2010: revised recommendations for the use of hormonal contraception among women at high risk for HIV infection or infected with HIV, *MMWR Morb Mortal Wkly Rep* 61(24):449–452, 2012.

Centers for Disease Control and Prevention: U.S. Selected Practice Recommendations for Contraceptive Use, 2013, *MMWR Recomm Rep* 62(RR-5):1–60, 2013.

Centers for Disease Control and Prevention: Supplement to US Selected Practice Recommendations for Contraceptive Use, 2013, *MMWR* 62(No. RR-5):2013.

Centers for Disease Control and Prevention: U.S. medical eligibility criteria for contraceptive use, 2010, *MMWR Recomm Rep* 59(RR-4):1–86, 2010.

Dunn N: Oral contraceptives and venous thromboembolism, *BMJ* 339:521–524, 2009.

FDA Drug Safety Communication: *Updated information about the risk of blood clots in women taking birth control pills containing drospirenone*, http://www.fda.gov/Drugs/DrugSafety/ucm299305.htm.

Gupta N, Corrado S, Goldstein M: Hormonal contraception in the adolescent, *Pediatr Rev* 29:386–396, 2008.

Hatcher RA, Trussell J, Nelson A, et al: *Contraceptive technology*, ed 20, Atlanta, GA, 2011, Ardent Media, Inc.

Mantha S, Karp R, Raghavan V, et al: Assessing the risk of venous thromboembolic events in women taking progestin-only contraception: a meta-analysis, *BMJ* 345:e4944, 2012.

Practice Committee of the American Society for Reproductive Medicine: Hormonal contraception: recent advances and controversies, *Fertil Steril* 90:S103–S113, 2008.

The Medical Letter: Quartette: an ascending-dose extended-cycle oral contraceptive, *Med Lett Drugs Ther* 55:54, 2013.

Trenor CC III, Chung RJ, Michelson AD, et al: Hormonal contraception and thrombotic risk: a multidisciplinary approach, *Pediatrics* 127:347–357, 2011.

Bibliography

American College of Obstetricians and Gynecologists: Clinical management guidelines—emergency contraception, *Obstet Gynecol* 106:1443–1452, 2005.

Centers for Disease Control and Prevention: U.S. medical eligibility criteria for contraceptive use, 2010, *MMWR Recomm Rep* 59(RR-4):1–86, 2010.

Centers for Disease Control and Prevention: US Selected Practice Recommendations for Contraceptive Use, 2013, *MMWR Recomm Rep* 62(RR-5):1–60, 2013.

Cleland K, Zhu H, Goldstuck N, et al: The efficacy of intrauterine devices for emergency contraception: a systematic review of 35 years of experience, *Hum Reprod* 27:1994–2000, 2012.

Hatcher RA, Trussell J, Nelson A, et al: *Contraceptive technology*, ed 20, Atlanta, GA, 2011, Ardent Media, Inc.

Prabakar I, Webb A: Emergency contraception, *BMJ* 343:d6972, 2011.

Prine L: Emergency contraception, myths and facts, *Obstet Gynecol Clin North Am* 34:127–136, 2007.

Zhang L, Chen J, Wang Y, et al: Pregnancy outcome after levonorgestrel-only emergency contraception failure: a prospective cohort study, *Hum Reprod* 24:1605–1611, 2009.

group, their effectiveness in preventing transmission of STIs, including HIV and human papillomavirus. The typical use failure rate for male condoms is 18%. For most effective dual protection, male latex condoms are recommended as protection against STIs, and should be used with an effective contraceptive method for adolescents such as a LARC. According to the National Survey of Family Growth, only 12% of females used a highly effective method along with a condom in the mo that they were interviewed.

A female condom is available over-the-counter in single-size disposable units. It is a second choice over the male latex condom because of the complexity of properly using the device, its high typical use failure rate of 21%, and the lack of studies in humans demonstrating its effectiveness against STIs. Most adolescents would require intensive education and hands-on practice to use it effectively.

Bibliography is available at Expert Consult.

117.6 Other Barrier Methods

Tara Jatlaoui and Gale R. Burstein

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 12%. The cervical cap and sponge have lower failure rates in nulliparous women while the diaphragm has similar rates among nulliparous or parous women. Adolescents tend to object to the messiness of the jelly or to the fact that the insertion of a diaphragm may interrupt the spontaneity of sex, or they may express discomfort about touching their genitals.

117.7 Other Methods

Tara Jatlaoui and Gale R. Burstein

SPERMICIDES

A variety of agents containing the spermicide nonoxynol-9 are available as foams, jellies, creams, films, or effervescent vaginal suppositories. They must be placed in the vaginal cavity shortly before intercourse and reinserted before each subsequent ejaculation in order to be effective. Rare side effects consist of contact vaginitis. There has been some concern regarding the vaginal and cervical mucosal damage observed with nonoxynol-9, and the overall impact on HIV transmission is unknown. The finding that nonoxynol-9 is gonococcicidal and spirocheticidal has not been substantiated in randomized clinical trials. Spermicides should be used in combination with other barrier methods as their typical use failure rate alone is 28%.

WITHDRAWAL

The pregnancy risk for use of withdrawal as a contraceptive method is probably underestimated in adolescents, and high typical use failure rate of 22% should be specifically addressed with young adolescents; especially since over half (58%) of teens have used withdrawal for contraception.

FERTILITY AWARENESS–BASED METHODS

These include the standard days method, basal body temperature method, billings method and may also include combinations as well. Since these are based on regular ovulatory cycles, which are less common in teens, these should be used with caution.

LACTATIONAL AMENORRHEA METHOD

The lactational amenorrhea method may be a highly effective temporary contraceptive method if all of the following criteria are met: (a) no return of menses, (b) the infant is <6 mo old, and (c) exclusively breastfeeding.

Bibliography is available at Expert Consult.

Bibliography

Calderoni ME, Coupey SM: Combined hormonal contraception, *Adolesc Med* 16:517–537, 2005.

Eaton DK, Kann L, Kinchen S, et al; Centers for Disease Control and Prevention: Youth Risk Behavior Surveillance–United States, 2011, *MMWR Surveill Summ* 61(4):1–162, 2012.

Centers for Disease Control and Prevention: U.S. medical eligibility criteria for contraceptive use, 2010, *MMWR Recomm Rep* 59(RR-4):1–86, 2010.

Guttmacher Institute: *Facts on American Teens' Sexual and Reproductive Health*, 2013. http://www.guttmacher.org/pubs/FB-ATSRH.html.

Winer RL, Hughes JP, Feng Q, et al: Condom use and the risk of genital human papillomavirus infection in young women, *N Engl J Med* 354:2645–2654, 2006.

Bibliography

Centers for Disease Control and Prevention: Sexual experience and contraceptive use among female teens–United States, 1995, 2002, and 2006–2010, *MMWR Morb Mortal Wkly Rep* 61(17):297–301, 2012.

Centers for Disease Control and Prevention: Youth Risk Behavior Surveillance–United States, 2011, *MMWR Surveill Summ* 61(4):1–162, 2012.

Hatcher RA, Trussell J, Nelson A, et al: *Contraceptive technology*, ed 20, Atlanta, GA, 2011, Ardent Media, Inc.

Trussell J: Contraceptive failure in the United States, *Contraception* 83:397–404, 2011.

Chapter 118

Adolescent Pregnancy

Dianne S. Elfenbein and Marianne E. Felice

EPIDEMIOLOGY

In 1960, the teen birth rate in the United States was recorded as 89.1 births per 1,000 females 15-19 yr of age; by 2011, the rate had decreased to 31.3 births per 1,000 females 15-19 yr of age. Despite increases in the rates in 1990 and 2006, there has been a steady decline over the last half century (Fig. 118-1). The most dramatic decreases have been in African-American and Hispanic adolescents. Pregnancy rates, which include births, miscarriages, stillbirths, and induced abortions, have also decreased since the 1990s. In 1990, the pregnancy rate was 116.9 per 1,000 females age 15-19 yr of age; in 2008, the pregnancy rate was 67.8, indicating that the decline in birthrates was not attributable to an increase in pregnancy terminations. The improvement in U.S. female teen birth rates is attributed to 3 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.

In spite of the decrease in female teen births in the last 2 decades, the United States continues to have female teen birth rates markedly higher than those in most other industrialized nations. For comparison, in 2009 the United States birth rate to female teens age 15-19 yr was 37.9 per 1,000 compared to a rate of 22 among all industrialized nations. The Russian Federation reported a rate of 30.2, the UK a rate of 25.0, and Australia a rate of 16.5. Japan's rate was 5.1 births per 1,000 female teens. Among developing countries the estimated rate was 56 and among the least-developed nations, 123. Globally, the estimated rate was 52 births per 1,000 female teens. Globally, teen pregnancy rates declined from 1990 to 2000 but have leveled off since then.

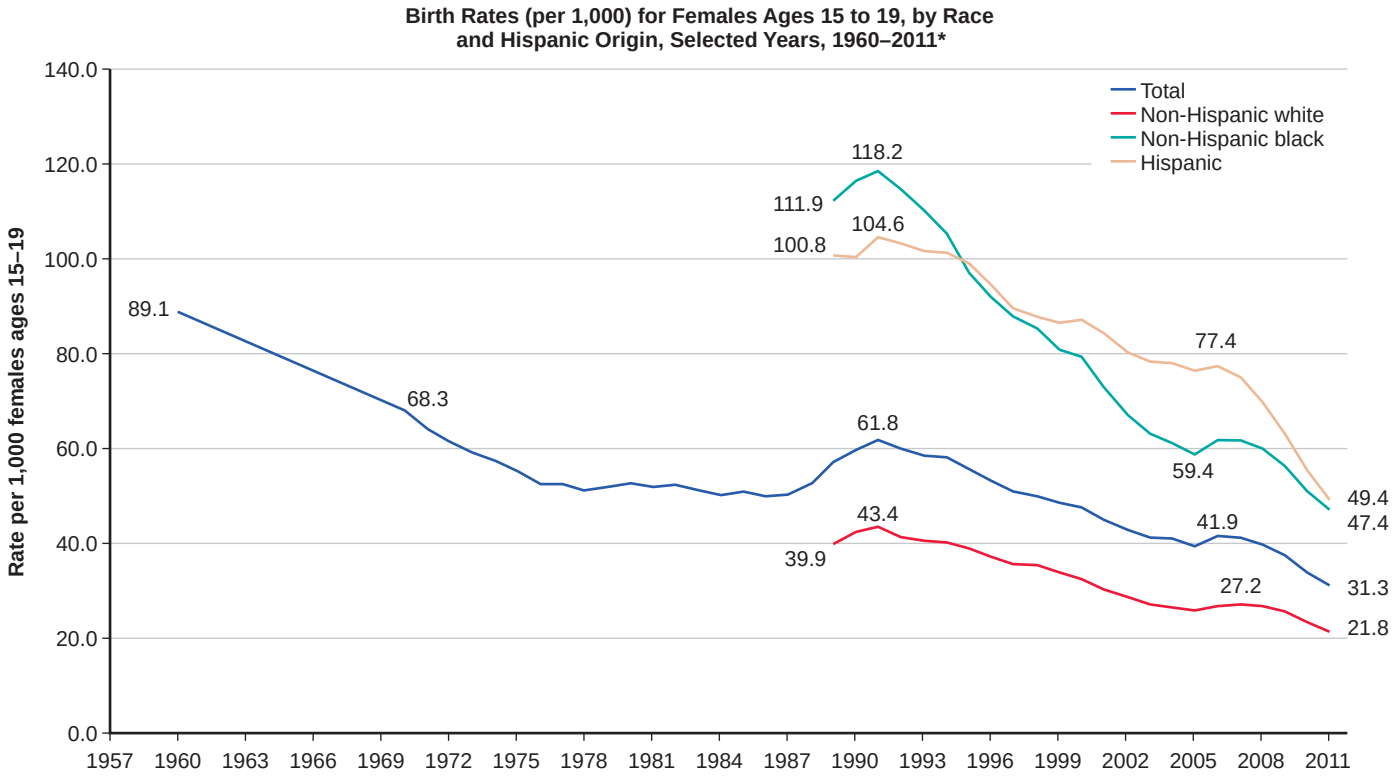
ETIOLOGY

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 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-adolescents, 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 an adolescent presents with **secondary amenorrhea.**



*Data for 2011 are preliminary

Figure 118-1 Teen birth rates (births per 1,000 females) in the United States. *(Child Trends, 2013. Teen births. Available at: http://www.childtrends.org/?indicators=teen-births. Sources: Data for 1960 from National Center for Health Statistics.* Health, United States, 2001 with urban and rural health chartbook. *Hyattsville, MD, 2001, Table 3; Data for 1970-2011 from Martin JA, Hamilton BE, Ventura JS, et al: Births: final data for 2011. Natl Vital Stat Rep 62(1). Hyattsville, MD: National Center for Health Statistics, 2013.)*

DIAGNOSIS

Table 118-1 provides information regarding 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 repeated in 1-4 wk if there is a heightened suspicion of pregnancy.** The most sensitive pregnancy detection test is a serum **quantitative** βhCG radioimmunoassay in which results are reliable 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 generally used when serial measurements are necessary in clinical management.

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

Table 118-1 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

PREGNANCY COUNSELING AND INITIAL MANAGEMENT

After the diagnosis of pregnancy is made, it is important to begin addressing the psychosocial, as well as 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 (a) releasing the child to an adoptive family, (b) electively terminating the pregnancy, and (c) 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. 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 insuring 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 119) should 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 pregnancies should be referred as soon as possible to an adolescent-friendly obstetric provider.

CHARACTERISTICS OF TEEN PARENTS

Young women who become parents as teenagers often come from economically disadvantaged families. Although birthrates among African-American and Hispanic teens have decreased in the past 2 decades, their rates are more than double those for non-Hispanic whites. Parenting teens frequently have poor school performance prior to becoming pregnant, and they often have a family history of low educational attainment. Learning disabilities are not uncommon. Teen mothers frequently come from single-parent families where their own mother gave birth during adolescence. A large majority (84%) of teen mothers have a baby outside of marriage. They may view pregnancy as having a positive social value and as not interfering with their long-term goals.

Teenage men who become fathers as adolescents also have poorer educational achievement than their age-matched peers. They are more likely than 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 yr older than the mother; 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 119).

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 1985-1988 at 41-46%, decreasing since then to approximately 30% in 2008. As expected, 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, as compared with 20-39 yr 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 yr after birth. The highest rates of these poor outcomes occur in the youngest and most economically deprived mothers. Gastroschisis, although very rare, has a markedly 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 birth weights of their infants. Poor maternal weight gain also has correlated strongly with teens' late entrance into prenatal care and with inadequate utilization 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 from 1991 to 1999, homicide was the second leading cause of injury-related deaths in pregnant and postpartum women. Women ages 19 yr and younger had the highest pregnancy-related homicide rate (see Chapter 113).

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 the presence of an intrauterine contraceptive device. 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 (which may be suggestive of a 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 <3000 mIU/mL) with no definitive diagnosis by sonography, serial βhCG testing should be performed every 48 hr. In a normal uterine pregnancy, βhCG levels should increase approximately 50% every 48 hr; 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-, or more often multiple-, dose 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 375), possibly because of less use of the supine sleep position, and are at higher risk of both intentional and unintentional injury (see Chapter 40). One study shows the risk of homicide to be 9-10 times

Table 118-2 2012 American Academy of Pediatrics Clinical Guidelines: Care of Adolescent Parents and Their Children

Create a medical home for adolescent parents and their children	Involve both adolescent mothers and coparenting father Emphasize anticipatory guidance, parenting, and basic child care–giving skills, especially for teen dads
Provide comprehensive, multidisciplinary care	Access community resources such as special Supplemental Nutrition Program for Women, Infants, and Children Provide medical and developmental services to low-income parents and children Facilitate coordination of services
Contraceptive counseling	Emphasize condom use Encourage long-acting contraceptive methods
Encourage breastfeeding	Support breastfeeding in home, work, and school settings
Encourage high school completion	
Assess risk of domestic violence	
Encourage adolescent parenting	Work with other involved adults such as grandparents to encourage developmental growth of adolescent as parent as well as optimize infant developmental outcomes
Adapt counseling to developmental level of adolescent	Utilize school-, home-, and office-based interventions Consider use of support groups
Awareness and monitoring of developmental progression of infant and adolescent parent	Advocate for high-quality community resources for adolescents, including developmental resources, child care, and parenting classes Facilitate access to Head Start and education resources for individuals with disability

Data from Pinzon JL, Jones VF, Committee on Adolescence and Committee on Early Childhood, Care of adolescent parents and their children, Pediatrics 130(6):e1743–1755, 2012.

higher if a child born to a teen mother is not the mother's firstborn as compared with the risk to a firstborn of a woman age 25 yr 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 teenaged 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

Teenage mothers often do poorly in school and drop out prior to becoming pregnant. After childbirth many choose to defer completion of their education for some time. High school graduation or an equivalency degree is generally achieved eventually. Mothers who have given birth as teens generally remain 2 yr behind their age-matched peers in formal educational attainment at least through their 3rd decade. Maternal lack of education limits the income of many of these young families (see Chapter 1).

Substance Use

See also Chapter 114.

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 mo 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 yr) 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 include those who do not initiate long-acting contraceptives after the index birth, those who do not return to school within 6 mo of the index birth, those who are married or living with the infant's father, 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 (Table 118-2). Healthcare providers should remember to provide positive reinforcement for teen parenting successes (i.e., compliment teen parents when they are doing a good job).

Behavioral, Educational, and Social Outcomes of 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 utilizing life skills training, medical care, and psychosocial support demonstrate higher employment rates, higher income, and less welfare dependency in adolescents exposed to the programs.

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

Table 118-3	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 (young men or young women; cultural groups; younger or older teens; etc.).

Adapted from: Suellentrop K: What works 2011-2012: Curriculum-based programs that help prevent teen pregnancy. The National Campaign to Prevent Teen and Unplanned Pregnancy: Washington, DC. http://www.c-hubonline.org/sites/default/files/resources/main/What_Works_0.pdf.

insufficient to address the problem fully. Family and community involvement are essential elements for teen pregnancy prevention. Strategies for primary prevention (preventing first births) are different from the strategies needed for secondary prevention (preventing second or more births). Over the last 30 yr, many models of teen pregnancy prevention programs have been implemented and evaluated. Table 118-3 lists the common components of many 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 that have comprehensive sex education components generally have lower rates of pregnancy than those teenagers who have exposure solely to abstinence-only programs or no sex education at all.

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

Secondary prevention programs are fewer in number. In the United States, some communities have tried to "pay" young mothers to not 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 of these latter types of 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 117). 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.

Bibliography is available at Expert Consult.

Bibliography

Beers LAS, Hollo RE: Approaching the adolescent-headed family: a review of teen parenting, *Curr Probl Pediatr Adolesc Health Care* 39:215–234, 2009.

Centers for Disease Control and Prevention: Prepregnancy contraceptive use among teens with unintended pregnancies resulting in live births–pregnancy risk assessment monitoring system (PRAMS), 2004–2008, *MMWR Morb Mortal Wkly Rep* 61:25–28, 2012.

Centers for Disease Control and Prevention: Vital signs: Teen pregnancy–United States, 1991-2009, *MMWR Morb Mortal Wkly Rep* 60:414–420, 2011.

Centers for Disease Control and Prevention: Vital sign: repeat births among teens–United States, 2007-2010, *MMWR Morb Mortal Wkly Rep* 62:249–256, 2013.

Chang J, Berg CJ, Saltzman LE, et al: Homicide: a leading cause of injury deaths among pregnant and postpartum women in the United States, 1991–1999, *Am J Public Health* 95:471–477, 2005.

Crochet JR, Bastian LA, Chireau MV: Does this woman have an ectopic pregnancy? *JAMA* 309:1722–1728, 2013.

Dodson NA, Gray SH, Burke PJ: Teen pregnancy prevention on a LARC: an update on long-acting reversible contraception for the primary care provider, *Curr Opin Pediatr* 24:439–445, 2012.

Gibbs CM, Wendt A, Peters S, et al: The impact of early age at first childbirth on maternal and infant health, *Paediatr Perinat Epidemiol* 26(S1):259–284, 2012.

Grimes DA, Raymond EG: Medical abortion for adolescents, *BMJ* 342:d2185, 2011.

Hoffman SD, Maynard RA, editors: *Kids having kids: economic costs and social consequences of teen pregnancy*, ed 2, Washington, DC, 2008, Urban Institute Press.

Jurkovic D, Wilkinson H: Diagnosis and management of ectopic pregnancy, *BMJ* 342:d3397, 2011.

Kohler PK, Manhart LE, Lafferty WE: Abstinence-only and comprehensive sex education and the initiation of sexual activity and teen pregnancy, *J Adolesc Health* 42:344–351, 2008.

Kost K, Henshaw S: *U.S. Teenage Pregnancies, Births and Abortions, 2008: National Trends by Age Race and Ethnicity*, http://www.guttmacher.org/pubs/USTPtrendsState08.pdf. Downloaded April 6, 2013.

Lachance C, Burns B, Scott AR: Building an evidence base to inform interventions for pregnant and parenting adolescents: a call for rigorous evaluation, *Am J Public Health* 102(10):1826–1832, 2012.

Lavin C, Cox JE: Teen pregnancy prevention: current perspectives, *Curr Opin Pediatr* 24:462–469, 2012.

Lohan M, Cruise S, O'Halloran P, et al: Adolescent men's attitudes in relation to pregnancy and pregnancy outcomes: a systematic review of the literature from 1980–2009, *J Adolesc Health* 47:327–345, 2010.

Meade CS, Kershaw TS: The intergenerational cycle of teenage motherhood: an ecological approach, *Health Psychol* 27:419–429, 2008.

Newbatt E, Beckles Z, Ullman R, et al: Ectopic pregnancy and miscarriage: summary of NICE guidelines, *BMJ* 345:e8136, 2012.

Pinzon JL, Jones VF: Committee on Adolescence and Committee on Early Childhood: Care of adolescent parents and their children, *Pediatrics* 130(6):e1743–e1756, 2012.

Rosengard C: Confronting the intendedness of adolescent rapid repeat pregnancy, *J Adolesc Health* 44:5–6, 2009.

Ruedinger E, Cox JE: Adolescent childbearing: consequences and interventions, *Curr Opin Pediatr* 24:446–452, 2012.

Suellentrop K: *What works 2011-2012: Curriculum-based programs that help prevent teen pregnancy. The National Campaign to Prevent Teen and Unplanned Pregnancy: Washington, DC.* http://www.c-hubonline.org/sites/default/files/resources/main/What_Works_0.pdf.

Chapter 119

Adolescent Rape

Christine E. Barron and Marianne E. Felice

Rape is an act of violence, not an act of sex. Rape is coercive sexual intercourse involving physical force or psychological manipulation of a female or a male. Rape is defined as penetration of any genital, oral, or anal orifice by a part of the assailant's body or any object.

EPIDEMIOLOGY

Exact figures on the incidence of rape are unavailable because many rapes are not reported. Females exceed males as reported rape victims by 8:1 to 10:1, but male rape may be more underreported than female rape. In the United States, the annual rates of sexual victimization per 1,000 persons were reported in 2010 by the U.S. Department of Justice, National Crime Victimization Survey to be 4.1 for ages 12-17 yr, and 3.7 for ages 18-34 yr. The highest annual rate of sexual victimization has continued to be among 16-19 yr old adolescents. 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 account for 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 stop the unwanted actions; and (3) young adolescents may be naïve and more trusting than they should be (see Chapter 110). Many teens are computer competent, which gives sexual perpetrators access to unsuspecting vulnerable populations who were previously beyond their reach. Chat rooms and online dating sites represent a major risk for adolescents, resulting in 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 119-1).

TYPES OF RAPE

Acquaintance rape (by a person known to the victim) is the most common form of rape for victims 16-24 yr of age. The acquaintance may be a neighbor, classmate, or friend of the family. The victim–assailant relationship may cause conflicting loyalties in families, and the teen's report may be received with disbelief and/or skepticism by the teen's family. Adolescent acquaintance rape differs from adult acquaintance rape because weapons are less-often used, and victims are less likely to sustain physical injuries. Victims of acquaintance rape are also more likely to delay seeking medical care, may never report the crime (males greater than females), and are less likely to proceed with criminal prosecution even after reporting the incident(s).

Date rape (by a person dating the victim) is often drug facilitated and is prevalent in adolescent populations. Date rape drugs are pharmaceuticals administered in a clandestine manner to potential victims. γ-Hydroxybutyric acid (GHB), flunitrazepam (Rohypnol), and ketamine hydrochloride are the leading agents used for these illegal purposes, but may also include alcohol, benzodiazepines, stimulants, barbiturates, opiates, and other drugs (see Chapter 114). The pharmacologic properties of these drugs make them suitable for this use as they have simple modes of administration, are easily concealed

Table 119-1 Adolescents at High Risk of Rape Victimization

MALE AND FEMALE ADOLESCENTS
Drug and alcohol users
Runaways
Those with intellectual disability or developmental delay
Street youths
Transgender youth
Youths with a parental 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)
Young male homosexuals

(colorless, odorless, tasteless), have rapid onsets of action with resulting induction of anterograde amnesia, and have rapid eliminations as a result of short half-lives. Detection of these drugs requires a high index of suspicion and medical evaluation within 8-12 hr, prompting specific testing because routine toxicology screening is insufficient.

Date rape victims are often new to a specific environment (college freshman, newcomer to a town) and lack strong social support. Victims may not be assertive in establishing boundaries or limits with their dates and may be intoxicated when the incident takes place. The date rape assailant may engage in more sexual activities than other men his age and often has a history of aggressive behavior toward women. He may interpret passivity as assent and deny the charge of coercion or force; he may also be intoxicated at the time of the assault.

A date rape victim often experiences long-term issues of trust, self-blame, and guilt. She may lose confidence in her judgment concerning men in the future. She is nearly always ashamed of the incident and is less likely to report the rape. She is reluctant to talk about the rape to family, friends, or a counselor and may never heal from the psychological scars that ensue.

Male rape generally refers to same-sex rape of male teens by other males. Specific subgroups of young men are at high risk of being victims of rape (see Table 119-1). Male rape is most prevalent within institutional settings. Male rape that occurs outside of institutional settings typically involves coercion of the male teen by someone considered an authority figure, either male or female. Male rape victims often experience conflicted sexual identity about whether or not they are homosexual. Issues of loss of control and powerlessness are particularly bothersome for male rape victims, and these young men commonly have symptoms of anxiety, depression, sleep disturbance, and suicidal ideation. Males are less likely than females to report rape and less likely to seek professional help.

Gang rape usually occurs when a group of young men rape a solitary female victim. This type of rape may be part of a ritualistic activity or rite of passage for some male group (gangs, college fraternity) or be displaced rage on the part of the assailants.

Female victims of gang rape may find it difficult to return to the environment in which the rape occurred for fear of confrontation with the assailants (college setting or place of employment) and may insist on moving away from the locale entirely.

Statutory rape refers to sexual activity between an adult and an adolescent under the age of legal consent, as defined by individual state law. Statutory rape laws are based on the premise that below a certain age, an individual is not legally capable of giving consent to engage in sexual intercourse. In some states in the United States, statutory rape laws apply to sexual contact or intercourse occurring between a minor and another individual with a specific age difference even when both are minors and both assert that the sexual act was voluntary (an 18 yr old male who has sexual intercourse with a 14 yr old female). The intent of such laws is to protect youths from being victimized, but they may inadvertently lead a teenager to withhold pertinent sexual information from a clinician for fear that her sexual partner will be reported to the law. A clinician must be familiar with the laws of the state or province in which the clinician is practicing medicine.

Stranger rape occurs less frequently within the adolescent population and is most similar to adult rape. Such rapes frequently occur with an abduction, use of weapons, and increased risk of physical injuries. These rapes are more likely to be reported and prosecuted.

CLINICAL MANIFESTATIONS

The adolescent's acute presentation following a rape may vary considerably, from histrionics to near-mute withdrawal. Even if they do not seem to be afraid, most victims are extremely fearful and very anxious about the incident, the rape report, 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, are often faced with 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, including acquaintance rape.

When adolescents do not report a rape, they may present at a future date with symptoms of posttraumatic stress disorder (see Chapters 25 and 39), 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 the possibility of sexual abuse at nearly all health examination visits.

INTERVIEW AND PHYSICAL EXAMINATION

Although many teens delay seeking medical care, others present to a medical facility within 72 hr (or up to 96 hr depending on the protocol used) of the rape, at which time forensic evidence collection should be completed. 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, to obtain the history in a nonjudgmental manner, to conduct a complete examination without retraumatizing the victim, and to collect forensic evidence. The clinician must complete laboratory testing, administer prophylaxis treatment for sexually transmitted infections (STIs) and emergency contraception, arrange for counseling services, and file a report to appropriate authorities. It is not the clinician's responsibility to decide whether a rape has occurred; the legal system will make that determination.

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 did it happen; (3) when did it happen; and (4) who did it. After obtaining a concise history including details of the physical contact that occurred between the victim and the assailant, the clinician should conduct a thorough and complete physical examination and document all injuries. 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. 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 the **forensic evidence collection** kit prior to initiating the examination. In the United States, each state's forensic evidence kit is different, but most include

Table 119-2 Laboratory Data for Evaluation of Rape Victims

WITHIN 8-12 HR (IF INDICATED BY HISTORY)
Urine and blood for date rape drugs (GHB, Rohypnol, and ketamine)
Comprehensive toxicology screen (for other classes of drugs)
WITHIN 72 HR (OR UP TO 96 HR DEPENDING ON THE PROTOCOL USED)
Forensic evidence kit
Urinalysis
Pregnancy test
Hepatitis B screen
Syphilis (rapid plasma reagin [RPR], Venereal Disease Research Laboratory [VDRL])
Herpes simplex virus titers (I and II)
HIV
Wet mount for the detection of spermatozoa, *Trichomonas vaginalis*, and bacterial vaginosis
Cultures obtained based on history of physical contact for:
Oropharynx: *Neisseria gonorrhoeae*
Rectal: *N. gonorrhoeae* and *Chlamydia*
Urethral (male): *N. gonorrhoeae* and *Chlamydia*
Endocervical (female): *N. gonorrhoeae* and *Chlamydia*

Table 119-3 Prophylaxis Treatment for Rape Victims

*Neisseria gonorrhoeae**	Ceftriaxone 250 mg IM × 1 dose If positive for gonorrhea, treatment is: Ceftriaxone 20 mg IM × 1 dose **plus** Azithromycin 1 g PO × 1 dose *or* doxycycline 10 mg PO bid × 7 days
*Chlamydia trachomatis**	Azithromycin 1 g PO × 1 dose or Doxycycline 100 mg PO bid × 7 days
Trichomonas vaginalis and bacterial vaginosis*	Metronidazole 2 g PO × 1 dose
HIV†	Combivir 1 tab PO bid × 28 days or Truvada 1 tab PO qd x 28 days
Hepatitis B	Complete immunizations
Human papillomavirus	Complete immunizations
Emergency contraception‡	Ovral 2 tabs (0.05 mg ethinyl estradiol, 0.50 mg norgestrel) and 2nd dose in 12 hr Plan B 1 tab (0.75 mg levonorgestrel) and 2nd dose in 12 hr, or both pills together as 1 dose

*Prophylaxis is recommended for all 3 STIs.
†HIV postexposure prophylaxis 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, follow-up must be arranged.
‡Provided for patients with negative urine pregnancy screen for patients receiving emergency contraception medication other than Plan B. In addition, provide antiemetic (Compazine, Zofran) for patients receiving emergency contraception medication other than Plan B.

some or all of the following components: forensic evidence of semen deposits detected by a fluorescent lamp with a wavelength near 490 nm (many Woods lamps are inadequate); swabs of bite mark impressions to collect genetic markers (DNA, ABO group); swabs of any penetrated orifice; and documentation of acute cutaneous injuries using body diagram charts and/or photographs with visible standard measurements. Areas of restraint should be carefully inspected for injuries; these areas include extremities, neck, and the inner aspect of the oral mucosa where a dentition impression may be seen.

The genital examination of a female rape victim should be undertaken with the patient in the lithotomy position. The genital examination of a male rape victim should be undertaken with the patient in supine position. The clinician's examination should include careful inspection of the entire pelvic, genital, and perianal areas. The clinician should document any acute injuries such as edema, erythema, petechiae, 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. Additionally, a colposcope may be used to provide magnification and photodocumentation of injuries.

LABORATORY DATA

The forensic evidence kit should be completed when clinically indicated and if the patient is evaluated within 72-92 hr of sexual assault. Table 119-2 lists additional laboratory studies required during initial evaluation. Follow-up evaluations should be scheduled to repeat these laboratory studies.

TREATMENT

Medical treatment includes prophylaxis treatment for STIs (see Chapter 120) and emergency contraception (see Chapter 117). The Centers for Disease Control and Prevention estimates that the risk for acquiring STIs following a sexual assault in adults is 6-12% for *Neisseria gonorrhoeae,* 4-17% for *Chlamydia trachomatis,* and 0.5-3.0% for syphilis. Antimicrobial prophylaxis is recommended for adolescent rape victims because of the risk of acquiring an STI and the risk of pelvic inflammatory disease (Table 119-3). HIV postexposure prophylaxis should be considered and consultation with an infectious disease specialist sought 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. Clinicians should review the importance for patient's compliance with medical and psychological treatment and follow-up.

At the time of presentation, the clinician should address the need for follow-up care, including psychological 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. 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.

PREVENTION

Primary prevention may be accomplished through education of preadolescents and adolescents on the issues of rape, healthy relationships, Internet dangers, and drug-facilitated rape. Prevention messages should be targeted to both males and females 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 (use of drugs or alcohol) should be discouraged. **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 rape and they are particularly vulnerable to long-term consequences.

Bibliography is available at Expert Consult.

Bibliography

American College of Obstetricians and Gynecologists: ACOG Committee opinion no. 554: reproductive and sexual coercion, *Obstet Gynecol* 121(2 Pt 1):411–415, 2013.

Bach PB: Gardasil: from bench, to bedside, to blunder, *Lancet* 375:963–964, 2010.

Bass JK, Annan J, Murray SM, et al: Controlled trial of psychotherapy for Congolese survivors of sexual violence, *N Engl J Med* 368:2182–2190, 2013.

Blythe MJ, Fortenberry JD, Temkit M, et al: Incidence and correlates of unwanted sex in relationships of middle and late adolescent women, *Arch Pediatr Adolesc Med* 160:591–595, 2006.

Bullock CM, Beckson M: Male victims of sexual assault: phenomenology, psychology, physiology, *J Am Acad Psychiatry Law* 39(2):197–205, 2011.

Buzi RS, Tortolero SR, Ross MW, et al: The impact of a history of sexual abuse on high-risk sexual behaviors among females attending alternative schools, *Adolescence* 38:595–605, 2003.

Catalano S, Smith E, Snyder H, et al: *Female Victims of Violence*, Washington, DC, 2009, U.S. Department of Justice, Office of Justice Programs, Bureau of Justice Statistics.

Centers for Disease Control and Prevention: Sexually transmitted diseases. Treatment guidelines 2010, *MMWR Recomm Rep* 59(RR-12):1–110, 2010.

Centers for Disease Control and Prevention: Discordant results from reverse sequence syphilis screening—five laboratories, United States, 2006–2010, *MMWR Morb Mortal Wkly Rep* 60(5):133–137, 2011.

Centers for Disease Control and Prevention: Update to CDC's Sexually Transmitted Diseases Treatment Guidelines, 2010: Oral Cephalosporins No Longer a Recommended Treatment for Gonococcal Infections, *MMWR Morb Mortal Wkly Rep* 61(31):590–594, 2012. Available at http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6131a3.htm?s_cid=mm6131a3_w.

Foshee VA, Bauman KE, Greene WF, et al: The safe dates program: 1-year follow-up results, *Am J Public Health* 90:1619–1622, 2000.

Giuliano AR, Nyitray AG, Albero G: Male circumcision and HPV transmission to female partners, *Lancet* 377:183–184, 2011.

Giuliano AR, Palefsky JM, Goldstone S, et al: Efficacy of quadrivalent HPV vaccine against HPV infection and disease in male, *N Engl J Med* 364:401–411, 2011.

Irwin CE Jr, Rickert VI: Coercive sexual experiences during adolescence and young adulthood: a public health problem, *J Adolesc Health* 36:359–361, 2005.

Jenny C, Lowen DE, Pierce MC, et al, editors: *Child abuse and neglect: diagnosis, treatment, and evidence*, St. Louis, 2011, Elsevier Saunders.

Kalwij S, Macintosh M, Baraitser P: Screening and treatment of *Chlamydia trachomatis* infections, *BMJ* 340:c1915, 2010.

Kaufman M: Committee on Adolescence: Care of the adolescent sexual assault victim, *Pediatrics* 122:462–470, 2008.

Lehrer JA, Lehrer VL, Lehrer EL, et al: Prevalence of and risk factors for sexual victimization in college women in Chile, *Int Fam Plan Perspect* 33:168–175, 2007.

Macdowall W, Gibson LJ, Tanton C, et al: Lifetime prevalence, associated factors, and circumstances of non-volitional sex in women and men in Britain: findings from the third national survey of sexual attitudes and lifestyles (Natsal-3), *Lancet* 382:1845–1854, 2013.

Nofzigen S, Stein RE: To tell or not to tell: lifestyle impacts on whether adolescents tell about violent victimization, *Violence Vict* 21:371–382, 2006.

Planty M, Langston L, Krebs C, et al: *Female Victims of Sexual Violence, 1994–2010*, Washington, DC, 2013, U.S. Department of Justice. Office of Justice Programs, Bureau of Justice Statistics.

Rand MR: *Criminal victimization survey, 2008, Bureau of Justice Statistics Bulletin*, Washington, DC, 2009, U.S. Department of Justice.

Sheringham J: Screening for chlamydia, *BMJ* 240:c1698, 2010.

Silverman JG, Raj A, Clements K: Dating violence and associated sexual risk and pregnancy among adolescent girls in the United States, *Pediatrics* 114:e220–e225, 2004.

Silverman JG, Raj A, Mucci LA, et al: Dating violence against adolescent girls and associated substance use, unhealthy weight control, sexual risk behavior, pregnancy, and suicidality, *JAMA* 286:572–579, 2001.

Smith DK, Grohskopf LA, Black RJ, et al: Antiretroviral postexposure prophylaxis after sexual, injection-drug use, or other nonoccupational exposure to HIV in the United States: recommendations from the U.S. Department of Health and Human Services, *MMWR Recomm Rep* 54(RR-2):1–20, 2005.

Steiner B, Benner MT, Sondorp E, et al: Sexual violence in the protracted conflict of DRC programming for rape survivors in South Kivu, *Confl Health* 3:3, 2009.

Taylor CA, Sorenson SB: Injunctive social norms of adults regarding teen dating violence, *J Adolesc Health* 34:468–479, 2004.

U.S. Department of Justice, Office on Violence Against Women: *A national protocol for sexual assault medical forensic examinations: adults/adolescents*, ed 2. 2013. https://www.ncjrs.gov/pdffiles1/ovw/241903.pdf.

Chapter 120

Sexually Transmitted Infections

Gale R. Burstein

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 at-risk for acquiring an STI. Not all adolescents are at equal risk; physical, behavioral, and social factors contribute to the adolescent's higher risk (Table 120-1). Adolescents who initiate sex at a younger age, youth residing in detention facilities, youth attending sexually transmitted diseases clinics, young men having sex with men, and youth who are injecting-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. Although all 50 states and the District of Columbia explicitly allow minors to consent for their own sexual health services, many adolescents encounter multiple obstacles to accessing this care. Adolescents who are victims of sexual assault may not consider themselves "sexually active," given the context of the encounter, and need reassurance, protection, and appropriate intervention when these circumstances are uncovered (see Chapter 119).

EPIDEMIOLOGY

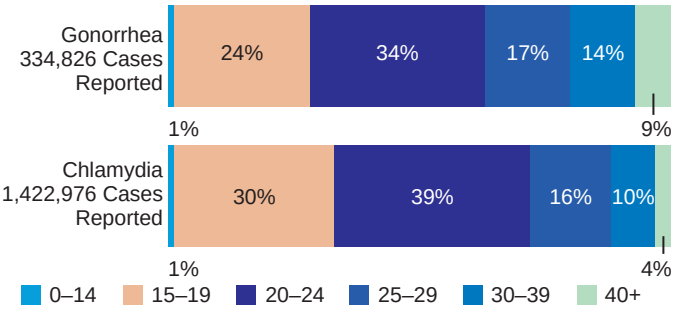
STI prevalence varies by age, gender, and race/ethnicity. In the United States, although adolescents and young adults ages 15-24 yr represent 25% of the sexually experienced population, this age group accounts for nearly 50% of all incident STIs each year. Adolescents and young adults <25 yr of age have the highest reported prevalence of gonorrheal (see Chapter 192) and chlamydial (see Chapter 226) infection; among females and males, rates are highest in the 15-24 yr old age groups (Fig. 120-1). In 2012, females 20-24 yr of age had the highest reported chlamydia rate (3,696 per 100,000 population), followed by females 15-19 yr of age (3,293 per 100,000 population). The reported 2012 chlamydia rate for 15-19 yr old females was more than 4 times higher than for 15-19 yr old males. Chlamydia is common among all races and ethnic groups; Blacks, Native American/Alaska Native, and Hispanic females are disproportionately affected. In 2011, non-Hispanic black females 20-24 yr of age had the highest chlamydia rate of any group (7,863), followed by black females 15-19 yr of age (7,719). Data from the 2007-2008 National Health and Nutrition Examination Survey estimated the prevalence of chlamydia among the U.S. population was highest among African-Americans (Fig. 120-2).

Reported rates of other bacterial STIs are also high among adolescents and young adults. In 2012, 20-24 yr old females had the highest (579 per 100,000 population) and 15-19 yr old females had the second highest gonorrhea rates (521 per 100,000 population) compared to any other age/sex group (see Chapter 192). Following a period of decreasing gonorrhea rates among 20-24 yr old, rates have increased for the past 3 yr. Primary and secondary syphilis rates among 15-19 yr old

Table 120-1 Circumstances Contributing to Adolescents' Susceptibility to Sexually Transmitted Infections

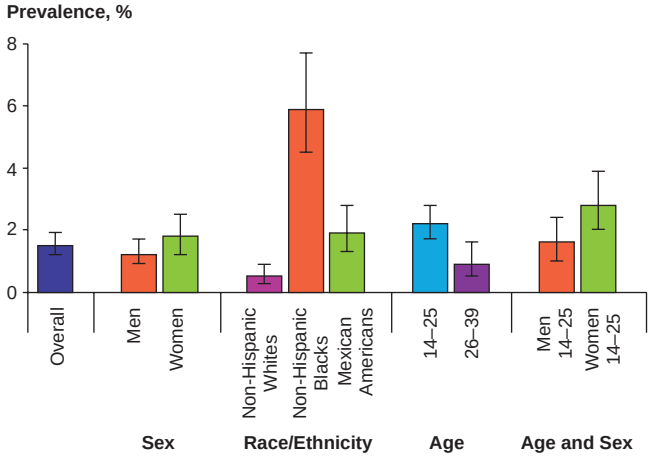
PHYSICAL
Younger age at puberty
Cervical ectopy
Smaller introitus leading to traumatic sex
Asymptomatic nature of sexually transmitted infection
Uncircumcised penis
BEHAVIOR LIMITED BY COGNITIVE STAGE OF DEVELOPMENT
Early adolescence: have not developed ability to think abstractly
Middle adolescence: develop belief of uniqueness and invulnerability
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 and violence
Homelessness
Young adolescent females with older male partners

From Shafii T, Burstein G: An overview of sexually transmitted infections among adolescents, Adolesc Med Clin *15:207, 2004.*



Percentages may not equal 100 because ages were unknown for a small number of cases.

Figure 120-1 Most reported chlamydia and gonorrhea infections occur among 15-24-year-olds. *(Adapted from Centers for Disease Control and Prevention: Reported STD in the United States. http://www.cdc.gov/nchhstp/newsroom/docs/STD-Trends-508.pdf.)*



NOTE: Error bars indicate 95% confidence intervals.

Figure 120-2 Chlamydia–prevalence among persons 14-39 yr of age by sex and survey cycle, National Health and Nutrition Examination Survey, 1999-2008. *(Adapted from Centers for Disease Control and Prevention: Sexually Transmitted Disease Surveillance 2012. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6338a3.htm.)*

females have decreased annually since 2009 from 3.3 cases per 100,000 population to 2.3 per 100,000 population in 2012 (see Chapter 218). Rates among females have been the highest each year in the 20-24 yr age group (3.9 cases per 100,000 population in 2012). Primary and secondary syphilis rates among 15-19 yr old males are much lower than those in older males, although rates among males age 20-24 yr have increased consecutively since 2002, from 5.2 cases per 100,000 males to 23.4 cases in 2011. Males age 20-24 yr also have had the highest rate of primary and secondary syphilis among males of any age group since 2008. Pelvic inflammatory disease (PID) rates are highest in females age 15-24 yr when compared to older women.

Adolescents also suffer from a large burden of viral STIs. Young people in the United States are at persistent risk for HIV infection (see Chapter 278). In 2009, youths age 13-24 yr, who represented 21% of the U.S. population, comprised 7% of persons living with HIV. In 2010, 26% of the estimated 47,500 new HIV infections were among 13-24 yr olds. Of those new infections, 57% were among blacks, 20% among Hispanic/Latinos, and 20% among whites. Nearly 75% of the 12,200 new HIV infections among youths were attributable to male-to-male sexual contact. Only a low percentage of youths have been tested for HIV, and 60% of youths with HIV are unaware of their infection.

The STI with the highest estimated incidence in the United States is human papillomavirus (HPV). The 2003-2006 National Health and Nutrition Examination Survey (NHANES) found a third of females age 14-24 yr old were actively infected with HPV. The highest HPV infection prevalence was among females age 20-24 yr (54%; 95% confidence interval [CI], 46-62%; see Chapter 266). Although HPV infection is common, studies suggest approximately 90% of infections clear within 2 yr.

Herpes simplex virus-2 (HSV-2) is the most prevalent viral STI (see Chapter 252). HSV-2 prevalence rates among adolescents in the United States and young adults appear to be decreasing. The 2005-2008 NHANES estimated that 1.4% (95% CI, 1.0-2.0) of adolescents age 14-19 yr are infected with HSV-2, which is about a 76% decrease observed from the 1988-1994 NHANES and 10.5% (95% CI, 9.0-12.3) of 20-29 yr olds are HSV-2 seropositive, which is a 39% decrease compared to the 1988-1994 NHANES.

Pathogenesis

During puberty, increasing levels of estrogen cause the vaginal epithelium to thicken and cornify and the cellular glycogen content to rise, 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 284). The transformation of the vaginal cells leaves columnar cells on the ectocervix, forming a border of the 2 cell types on the ectocervix, known as the squamocolumnar junction. The appearance is referred to as **ectopy** (Fig. 120-3). With maturation, this tissue involutes. Prior to involution, it represents a unique vulnerability to infection for adolescent females. A 15 yr old sexually active female with endocervical colonization has a 1:8 chance of developing PID compared to the 1:80 chance for a 24 yr old. As a result of these physiologic changes, gonococcal infection becomes primarily cervical and susceptibility to ascending infection is greatest during menses, when the pH is 6.8-7.0. 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.

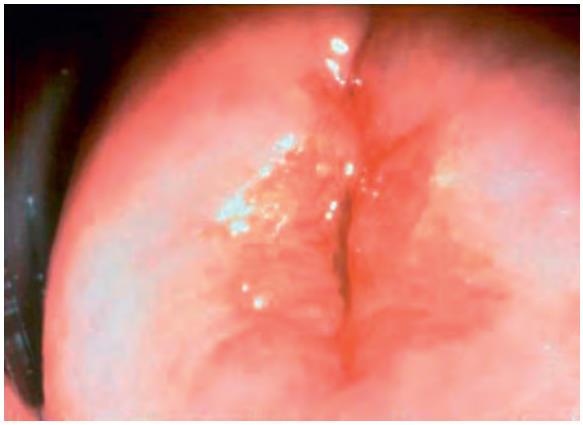


Figure 120-3 Cervical ectopy. *(From the Seattle STD/HIV Prevention Training Center at the University of Washington, Claire E. Stevens.)*

Sexually Transmitted Infection Screening

Early detection and treatment are the 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%. Although federal and professional medical organizations recommend annual chlamydia screening for sexually active females 25 yr and younger, according to the National Center for Quality Assurance, in 2012 approximately 40% of commercially insured and 54% of Medicaid insured 16-20 yr old sexually active females were tested for chlamydia during the previous year. The lack of a dialog about STIs or the provision of STI services at annual preventive service visits to adolescents who are sexually experienced are missed opportunities for screening and education. Comprehensive, confidential, reproductive health services, including STI screening, should be offered to all sexually experienced adolescents (Table 120-2).

Definitions, Etiology, and Clinical Manifestations

STI syndromes are generally characterized by the location of the manifestation (vaginitis) 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. 120-4). If no discharge is evident on exam, providers may attempt to 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 NGU, but the prevalence varies. HSV-1, HSV-2, and Epstein-Barr virus 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, although commercial diagnostic tests are not available for males. Noninfectious causes of urethritis include urethral trauma or foreign body. Unlike in females, urinary tract infections 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

Table 120-2 Routine Laboratory Screening Recommendations for Sexually Transmitted Infections in Sexually Active Adolescents and Young Adults

Chlamydia trachomatis and *Neisseria gonorrhoeae* • Routinely screening for *C. trachomatis* of all sexually active females aged ≤25 yr is recommended annually • Consider screening for C. trachomatis of sexually active adolescent and young adult males annually who have a history of multiple partners in settings with high prevalence rates, such as jails or juvenile corrections facilities, national job training programs, STD clinics, high school clinics, or adolescent clinics • Routinely screening for *N. gonorrhoeae* of all sexually active females age <25 yr is recommended annually • Routinely screen sexually active adolescent and young adult MSM for rectal and urethral chlamydia and gonorrhea annually if they engage in receptive anal or insertive intercourse, respectively, and for routine gonorrhea if they engage in receptive oral sex. More frequent STD screening (i.e., at 3-6 mo intervals) is indicated for MSM who have multiple or anonymous partners or who have sex in conjunction with illicit drug use
HIV • HIV screening should be discussed and offered to all adolescents ≥15 yr in healthcare settings, unless identified at an earlier age with HIV risk factors
SYPHILIS • Syphilis screening should be offered to sexually active adolescents reporting risk factors • The majority of U.S. syphilis cases occurring among young MSM and many early syphilis cases are identified from correctional facilities • Providers should consult with their local health department regarding local syphilis prevalence and associated risk factors that are associated with syphilis acquisition
HEPATITIS C VIRUS • Screening adolescents for hepatitis C virus who report risk factors, i.e., injection drug use, MSM, received blood products or organ donation before 1992, received clotting factor concentrates before 1987, long-term hemodialysis, or high prevalence setting, i.e., correctional facilities or STD clinics

HAV, hepatitis A virus; HBV, hepatitis B virus; HIV, human immunodeficiency virus; HPV, human papillomavirus; MSM, men who have sex with men; STD, sexually transmitted diseases.

From Centers for Disease Control and Prevention: Sexually transmitted diseases treatment guidelines, 2014, MMWR *http://www.cdc.gov/std/treatment/update.htm.*



Figure 120-4 Gonococcal urethral discharge. *(From the Seattle STD/HIV Prevention Training Center at the University of Washington, Connie Celum and Walter Stamm.)*

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 diagnosis (see Chapter 545). 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 a vaginal discharge, with or without vulvar involvement (see Chapter 549). **Bacterial vaginosis, vulvovaginal candidiasis**, and trichomoniasis are the predominant infections associated with vaginal discharge. Bacterial vaginosis is replacement of the normal H_2O_2–producing *Lactobacillus* sp. vaginal flora by an overgrowth of anaerobic microorganisms as well as *Gardnerella vaginalis, Ureaplasma*, and *Mycoplasma*. Although bacterial vaginosis is not categorized as an STI, sexual activity is associated with increased frequency of vaginosis. Vulvovaginal candidiasis, usually caused by *C. albicans*, can trigger vulvar pruritus, pain, swelling, and redness and dysuria. Findings on vaginal exam 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 1 pathogen.

Cervicitis

The inflammatory process in cervicitis involves the deeper structures in the mucous membrane of the cervix uteri. Vaginal discharge can be a manifestation of cervicitis, however, cervicitis frequently is asymptomatic, Patients also commonly 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. 120-5), commonly referred to as 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 over diagnosis of inflammation (Fig. 120-6; see Fig. 120-3). The pathogens identified most commonly with cervicitis are *C. trachomatis* and *N. gonorrhoeae,* although no pathogen is identified in the majority of cases. HSV is a less-common pathogen associated with ulcerative and necrotic lesions on the cervix.



Figure 120-5 Mucopurulent cervical discharge positive swab test. *(From Seattle STD/HIV Prevention Training Center at the University of Washington, Claire E. Stevens and Ronald E. Roddy. Available at:* http://www2a.cdc.gov/stdtraining/ready-to-use/pid.htm.*)*



Figure 120-6 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.*)*

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, although PID should be approached as multiorganism etiology, including pathogens such as anaerobes, *G. vaginalis*, *Haemophilus influenzae*, enteric Gram-negative rods, and *Streptococcus agalactiae.* In addition, cytomegalovirus (see Chapter 255), *Mycoplasma hominis*, *U. urealyticum*, and *M. genitalium* (see Chapter 224) may be associated with PID.

PID is difficult to diagnose because of the wide variation in the 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 and/or abdominal pain.

The clinical diagnosis of PID is based on the presence of at least 1 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 which PID is typically diagnosed and thus should have a low threshold for initiating empiric treatment. In addition, the majority of females with PID have either mucopurulent cervical discharge or evidence of white blood cell (WBC) 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.

Genital Ulcer Syndromes

An ulcerative lesion in a mucosal area exposed to sexual contact is the unifying characteristic of infections associated with these syndromes. These 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.

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 men who have sex with men, 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, the majority of 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 most often has ruptured spontaneously, leaving a shallow, painful ulcer (Fig. 120-7*A*) although recurrences are generally less intense and painful (Fig. 120-7*B*). Up to 50% of first genital herpes episodes are caused by HSV-1, but 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. Lymphogranuloma venereum caused by *C. trachomatis* serovars L1-L3 is uncommon, although outbreaks do occur in men who have sex with men (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.

Clinical characteristics differentiating the lesions of the most common infections associated with genital ulcers are presented in Table 120-3, along with the required laboratory diagnosis to identify the causative agent accurately. The differential diagnosis includes Behçet disease (see Chapter 161), Crohn disease (see Chapter 336), aphthous ulceration, and **acute genital ulcers** caused by cytomegalovirus (see Chapter 255) or Epstein-Barr virus (see Chapter 254). Acute genital ulcers often follow a flu or mononucleosis-like illness in an immunocompetent female and is 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 Epstein-Barr virus 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. Genital HPV types are classified according to their association with cervical 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

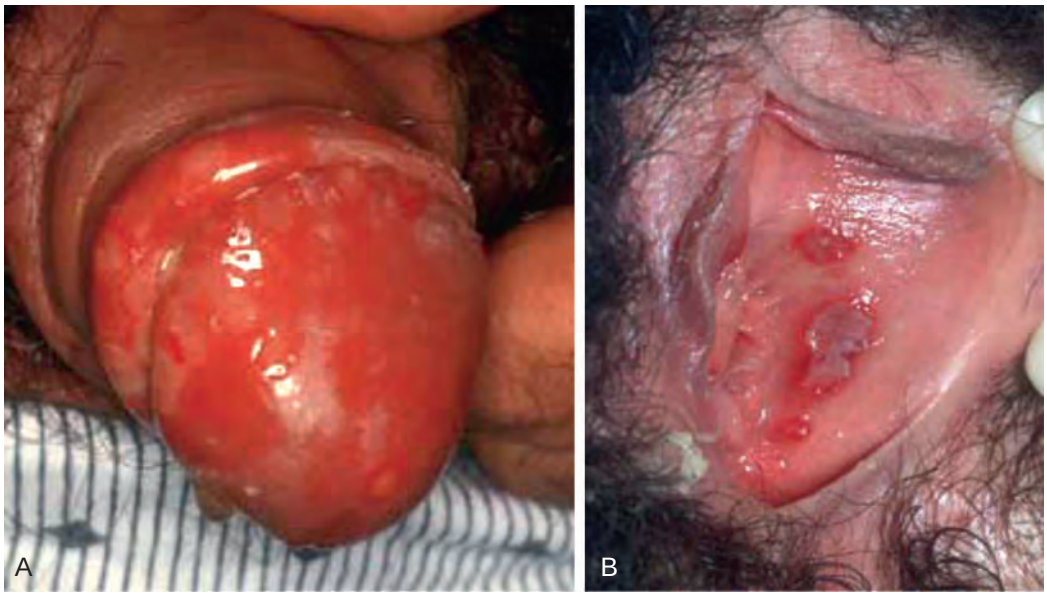


Figure 120-7 *A,* Initial herpes infection showing multiple erosions with polycyclic outlines surrounded by an erythematous halo and associated with intense pain. *B,* Erosions surrounded by an erythematous halo. Clinical signs and symptoms of recurrences are usually less intense than those of initial infection. *(From Martín JM, Villalón G, Jordá E. Update on treatment of genital herpes.* Actas Dermosifiliogr *100:22–32, 2009. Figs 1 & 2.)*

Table 120-3 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)	Unindurated 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 serology test	Early syphilis: a typical chancre plus a reactive nontreponemal test (RPR, VDRL) and no history of syphilis or a 4-fold increase in a quantitative nontreponemal test in a person with a history of syphilis; positive treponemal EIA with reactive nontreponemal test (RPR, VDRL) and no prior history of syphilis treatment	Exclusion of other causes of ulcers in the presence of (a) typical ulcers and lymphadenopathy, (b) a typical Gram stain and a history of contact with a high-risk individual (prostitute) or living in an endemic area
Definitive diagnosis	Detection of HSV by culture or PCR from ulcer scraping or aspiration of vesicle fluid	Identification *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 1 of the other organisms responsible for genital ulcers.

DFA, direct fluorescent antibody; EIA, enzyme immunoassay; HSV, herpes simplex virus; PCR, polymerase chain reaction test: RPR, rapid plasma reagin; VDRL, Venereal Disease Research Laboratory.

Data from Centers for Disease Control and Prevention: Sexually transmitted diseases treatment guidelines, 2014, MMWR *http://www.cdc.gov/std/treatment/update.htm.*

respiratory papillomatosis. High-risk HPV types can cause cervical, anal, vulvar, vaginal, and 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 lata 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 668).

HIV Disease and Hepatitis B

HIV and hepatitis B present as an asymptomatic, unexpected occurrences in most infected adolescents. High vaccination coverage rates among infants and adolescents have resulted in substantial declines in acute hepatitis B 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 276 and 358).

Diagnosis

Most commonly, adolescents infected with viral and bacterial STI pathogens do not report symptoms suggestive of infection. With the increased use of very sensitive, noninvasive chlamydia and gonorrhea **NAAT**, providers are finding that most genital infections in females as well as 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 a sexually transmitted disease 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 (a) observing urethral mucopurulent discharge, (b) ≥2 WBC per high-power field on microscopic examination Gram stain urethral secretions, (c) urine microscopic findings of ≥10 WBCs per high power field of first-void urine specimen, or (d) a positive urine leucocyte esterase test of a (first-void urine) 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 chlamydia and gonorrhea tests available and are licensed for use with urine, urethral, vaginal, and cervical specimens. Many of the chlamydia NAATs are approved by the 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 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, which include most commercial laboratories.

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, newer CLIA-waived point-of-care vaginitis tests are available. Using pH paper, an elevated pH (i.e., >4.5) is common with bacterial vaginosis or trichomoniasis. 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% potassium hydroxide (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. The yeast or pseudohyphae of *Candida* species are more easily identified in the KOH specimen (Fig. 120-8). The

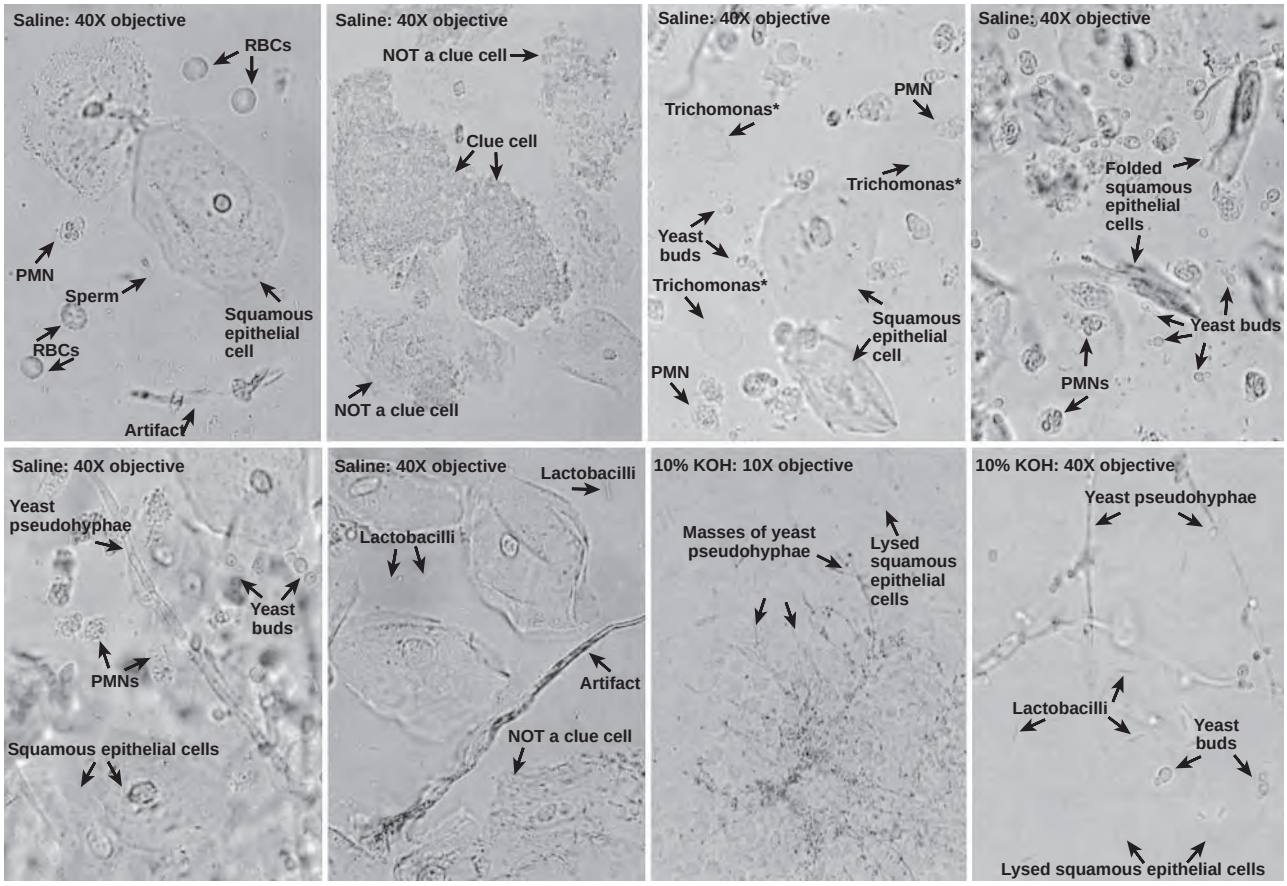


Figure 120-8 Common normal and abnormal microscopic findings during examination of vaginal fluid. KOH, potassium hydroxide solution; PMN, polymorphonuclear leukocyte; RBC, red blood cell. *(From* Adolescent medicine: state of the art reviews, *vol 14, no 2, Philadelphia, 2003, Hanley & Belfus, pp 350–351.)*

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 that reports an 83% sensitivity; and the OSOM BVBLUE Test (Sekisui Diagnostics, Lexington, MA), which detects elevated vaginal fluid sialidase activity, an enzyme produced by bacterial pathogens associated with bacterial vaginosis including *Gardnerella*, *Bacteroides*, *Prevotella,* and *Mobiluncus*, that reports a 90% sensitivity. Both of these tests are CLIA-waived with results are available within 10 minutes.

Clinical laboratory-based vaginitis tests are also available. The Affirm VPIII (Becton Dickenson, San Jose, CA), a nucleic acid probe test that evaluates for *T. vaginalis*, *G. vaginalis*, and *C. albicans*, is a moderate complexity laboratory test, has a sensitivity >83% and a specificity >97%, with results are available within 45 min. Some gonorrhea and chlamydia NAATs also offer an assay for *T. vaginalis* testing of female specimens tested for *N. gonorrhoeae* and *C. trachomatis*, which are considered the gold standard for trichomonas testing.

Objective signs of vulvar inflammation in the absence of vaginal pathogens, along with a minimal amount of discharge, suggest the possibility of mechanical, chemical, allergic, or other noninfectious irritation of the vulva (Table 120-4).

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 specificity of diagnosis, such as transvaginal ultrasonography, can be considered (Table 120-5).

Cell culture and PCR are the preferred HSV tests. Viral culture sensitivity is low and false negatives do occur as a consequence of intermittent viral shedding. 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 relied on.

Accurate type-specific HSV serologic assays are based on the HSV-specific glycoprotein G2 (HSV-2) and glycoprotein G1 (HSV-1). Both laboratory-based and point-of-care tests are available. Because nearly 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 Laboratory (VDRL), and treponemal testing, such as fluorescent treponemal antibody absorbed tests, the *T. pallidum* passive particle agglutination (TP-PA) assay, 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). 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, such as an RPR or VDRL to guide patient management decisions. If EIA/CIA and nontreponemal test (e.g., RPR or VDRL) test 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. 120-9).

Table 120-4 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 *328:1306–1308, 2004.*

Table 120-5 Evaluation for Pelvic Inflammatory Disease

2014 CENTERS FOR DISEASE CONTROL AND PREVENTION 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 white blood cells 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)
- GI: appendicitis, constipation, diverticulitis, gastroenteritis, inflammatory bowel disease, irritable bowel syndrome
- GYN: 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

*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.

ESR, erythrocyte sedimentation rate; GI, gastrointestinal; GYN, gynecologic; WBC, white blood cell.

Adapted from Centers for Disease Control and Prevention: Sexually transmitted diseases treatment guidelines, 2014, MMWR *http://www.cdc.gov/std/treatment/update.htm*.

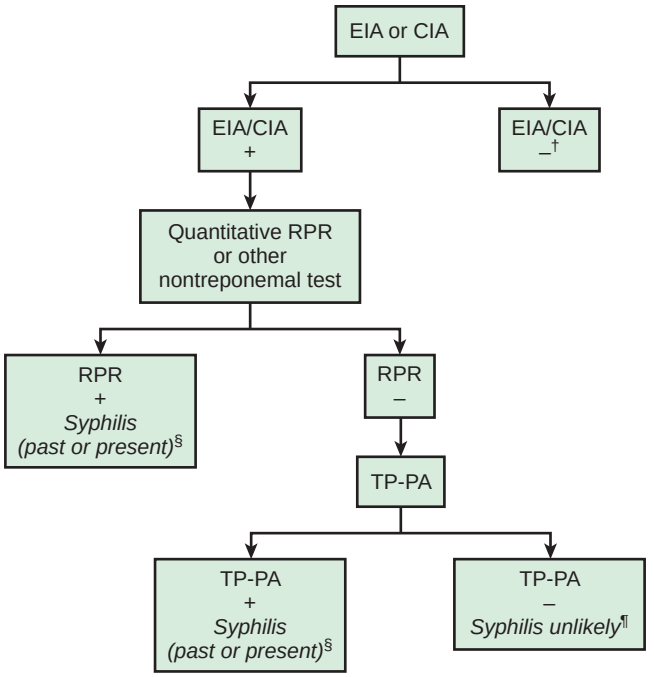


Figure 120-9 This figure shows the recommended algorithm for reverse sequence syphilis screening (treponemal test screening followed by nontreponemal test confirmation). The CDC recommends that a specimen with reactive EIA/CIA results be tested reflexively with a quantitative nontreponemal test (e.g., RPR or VDRL). If test results are discordant, the specimen should be tested reflexively using the TP-PA test as a confirmatory treponemal test. EIA/CIA, enzyme immunoassay/chemiluminescence immunoassay; RPR, rapid plasma reagin; TP-PA, *Treponema pallidum* particle agglutination. *Despite these recommendations for reverse sequence screening, CDC continues to recommend the traditional algorithm with reactive nontreponemal tests confirmed by treponemal testing. †If incubating or primary syphilis is suspected, treat with benzathine penicillin G 2.4 million units intramuscularly in a single dose. §Evaluate clinically, determine whether treated for syphilis in the past, assess risk for infection, and administer therapy according to CDC's *STD Treatment Guidelines* (available at http://www.cdc.gov/std/treatment/update.htm). ¶If at risk for syphilis, repeat RPR in several weeks. *(Adapted from CDC: Discordant results from reverse sequence syphilis screening–five laboratories, United States, 2006-2010,* MMWR Morb Mortal Wkly Rep *60:133–137, 2011.)*

HIV screening should be discussed and offered in healthcare settings to all adolescents >15 yr and to younger adolescents with HIV risk factors. Rapid HIV testing with the availability of results in 10-20 min can be useful in settings in which the likelihood of adolescents returning for their results is low. Point-of-care, CLIA-waived tests for whole blood fingerstick and oral fluid specimen 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.

Treatment

See Part XVII for chapters on the treatment of specific microorganisms and Tables 120-6 to 120-8. Treatment regimens using nonprescription products for candida vaginitis and pediculosis reduce financial and access barriers to rapid treatment for adolescents, but there are potential risks for inappropriate self-treatment and complications from untreated more serious infections that must be considered before using this approach. Minimizing noncompliance with treatment, finding 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 mo after treatment, regardless of whether they believe that their sex partners were treated or whenever persons next present for medical care in the 12 mo following initial treatment. 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 after both patient and partner are treated. A test for pregnancy should be performed for all females with suspected PID as the test outcome will affect management. Repeat testing 3 mo after treatment is recommended for *Trichomonas* infection.

Diagnosis and therapy are often necessarily 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 HIPAA-exempt and will not violate confidentiality. The health department's role is to assure that treatment and case finding have been accomplished and that sexual partners have been notified of their STI exposure. **Expedited partner therapy (EPT),** where the patient, preferably, delivers the medication, or a prescription for the medication if medication itself is not possible to the partner for treatment without a

Table 120-6 Management Guidelines for Uncomplicated Bacterial STIs in Adolescents and Adults

PATHOGEN	RECOMMENDED REGIMENS	ALTERNATIVE REGIMENS AND SPECIAL CONSIDERATIONS
Chlamydia trachomatis	Azithromycin 1 g orally once *or* Doxycycline 100 mg orally twice daily for 7 days	For pregnancy: Azithromycin 1 g orally once Alternative regimens: Erythromycin base 500 mg orally 4 times a day for 7 days *or* Erythromycin ethylsuccinate 800 mg orally 4 times a day for 7 days *or* Levofloxacin 500 mg orally once daily for 7 days *or* Ofloxacin 300 mg orally twice a day for 7 days
Neisseria gonorrhoeae (cervix, urethra, and rectum)	Ceftriaxone 250 mg IM in a single dose *or* Single-dose injectable cephalosporin *plus* Azithromycin 1 g orally once	Alternative if unable to offer IM: Cefixime 400 mg orally in a single dose *plus* Azithromycin 1 g orally once If azithromycin is not available or if patient is allergic to azithromycin, doxycycline 100 mg orally twice daily for 7 days may be substituted for azithromycin as the second antimicrobial Severe cephalosporin allergy: contact infectious disease specialist

Table 120-6 Management Guidelines for Uncomplicated Bacterial STIs in Adolescents and Adults—cont'd

PATHOGEN	RECOMMENDED REGIMENS	ALTERNATIVE REGIMENS AND SPECIAL CONSIDERATIONS
Neisseria gonorrhoeae (pharynx)	Ceftriaxone 250 mg IM in a single dose *plus* Azithromycin 1 g orally once	No alternative therapy available Patients treated with an alternative regimen should return 14 days after treatment for a test of cure using either culture or NAAT. If the NAAT is positive, every effort should be made to perform a confirmatory culture
Treponema pallidum (primary and secondary syphilis or early latent syphilis, i.e., infection <12 mo)	Benzathine penicillin G 2.4 million units IM in 1 dose	Penicillin allergy: doxycycline 100 mg orally twice daily for 14 days. Limited data suggest ceftriaxone 1-2 g daily either IM or IV for 10-14 days.
Treponema pallidum (late latent syphilis or syphilis of unknown duration)	Benzathine penicillin G 7.2 million units total, administered as 3 doses of 2.4 million units IM each at 1 wk intervals	Penicillin allergy: doxycycline 100 mg orally twice daily for 28 days with close serologic and clinical follow-up
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 twice a day for 3 days *or* Erythromycin base 500 mg orally 3 times a day for 7 days	
Chlamydia trachomatis serovars L1, L2, or L3 (lymphogranuloma venereum)	Doxycycline 100 mg orally twice daily for 21 days	Alternative: erythromycin base 500 mg orally 4 times a day for 21 days *or* Azithromycin 1 g orally once a week for 3 wk

IM, intramuscular; IV, intravenous; NAAT, nucleic acid amplification test.
Adapted for Centers for Disease Control and Prevention: Sexually transmitted diseases treatment guidelines, 2014 MMWR http://www.cdc.gov/std/treatment/update.htm.

Table 120-7 Management Guidelines for Uncomplicated Miscellaneous Sexually Transmitted Infections in Adolescents and Adults

PATHOGEN	RECOMMENDED REGIMENS	ALTERNATIVE REGIMENS AND SPECIAL CONSIDERATIONS
Trichomonas vaginalis	Metronidazole 2 g orally in a single dose *or* Tinidazole 2 g orally in a single dose	Metronidazole 500 mg orally twice daily for 7 days
Phthirus pubis (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 PO, repeat in 2 wk
Sarcoptes scabiei (scabies)	Permethrin 5% cream applied to all areas from the neck down, washed off after 8-14 hr or Ivermectin 200 µg/kg orally, repeated in 2 wk 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 in 8 hr

Adapted from Centers for Disease Control and Prevention: Sexually transmitted diseases treatment guidelines, 2014 MMWR http://www.cdc.gov/std/treatment/update.htm.

clinical assessment, is a strategy to reduce further transmission of infection, particularly for male partners of women with gonorrhea and/or chlamydia who are otherwise unlikely to seek care for STI exposure. 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 cefixime. Transient gastrointestinal side effects are more common but rarely result in severe morbidity. Many states expressly permit EPT or may potentially allow its practice. Resources for information regarding EPT and state laws are available at the Centers for Disease Control and Prevention website (http://www.cdc.gov/std/ept/).

Prevention

Healthcare providers should integrate 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. The U.S. Preventative Task Force recommends high-intensity behavioral counseling to prevent STIs for all sexually active adolescents. The HPV vaccine, either bivalent or quadrivalent, is recommended for 11 and 12 yr old female routine immunization. Catch-up vaccination is recommended for females age 13-26 yr who

Table 120-8 Management Guidelines for Uncomplicated Genital Warts and Genital Herpes in Adolescents and Adults

PATHOGEN	RECOMMENDED REGIMENS	
Human papillomaviruses external genital warts	Patient-applied: 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 4 cycles. *or* Imiquimod 3.75% cream or 5% cream self-applied to warts at bedtime 3 times wkly for up to 16 wk; wash off after 6-10 hr *or* Sinecatechins 15% ointment self-applied 3 times daily for up to 16 wk. Do not wash off after use Provider-administered: Cryotherapy with liquid nitrogen or cryoprobe. Repeat applications every 1-2 wk *or* Trichloroacetic acid (TCA) or bichloracetic acid (BCA) 80-90%. A small amount should be applied only to the warts and allowed to dry, at which time a white "frosting" develops. Can be repeated weekly *or* Surgical removal either by tangential scissor excision, tangential shave excision, curettage, or electrosurgery	
Human papillomaviruses Cervical warts	Refer to specialist for oncologic evaluation	
Human papillomaviruses Vaginal warts	**Cryotherapy** with liquid nitrogen. Avoid cryoprobe use *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 *or* Surgical removal	
Human papillomaviruses Urethral meatal warts	Cryotherapy with liquid nitrogen *or* Surgical removal	
Human papillomaviruses Anal warts	Cryotherapy with liquid nitrogen *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 *or* Surgical removal	Warts on the rectal mucosa should be managed in consultation with a specialist. Persons with anal warts should have rectal mucosa inspected by digital examination, standard anoscopy, or high-resolution anoscopy
Herpes simplex virus (genital herpes): First clinical episode	Treat for 7-10 days with 1 of the following: Acyclovir 400 mg orally 3 times daily *or* Acyclovir 200 mg orally 5 times daily *or* Valacyclovir 1 g orally twice daily *or* Famciclovir 250 mg orally 3 times daily	Consider extending treatment if healing is incomplete after 10 days of therapy

Table 120-8 Management Guidelines for Uncomplicated Genital Warts and Genital Herpes in Adolescents and Adults—cont'd

PATHOGEN	RECOMMENDED REGIMENS	
Herpes simplex virus (genital herpes): Episodic therapy for recurrences	Acyclovir 400 mg orally 3 times daily for 5 days *or* Acyclovir 800 mg orally twice daily for 5 days *or* Acyclovir 800 mg orally 3 times daily for 2 days *or* Valacyclovir 500 mg orally twice daily for 3 days *or* Valacyclovir 1,000 mg orally once daily for 5 days *or* Famciclovir 125 mg orally twice daily for 5 days *or* Famciclovir 1,000 mg orally twice daily for 1 day *or* Famciclovir 500 mg orally once then 250 mg twice daily for 2 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
Herpes simplex virus (genital herpes): Suppressive therapy to reduce frequency of recurrences	Acyclovir 400 mg orally twice daily *or* Valacyclovir 500 mg orally once daily or 1 g orally once daily *or* Famciclovir 250 mg orally twice daily	All patients should be counseled regarding suppressive therapy availability, regardless of number of outbreaks per year. Since the frequency of recurrent outbreaks diminishes over time in many patients, providers should periodically discuss the need to continue therapy Valacyclovir 500 mg once a day might be less effective than other valacyclovir or acyclovir dosing regimens in patients who have very frequent recurrences (i.e., ≥10 episodes per year).

Adapted from Centers for Disease Control and Prevention: STD Treatment Guidelines 2014, MMWR *59 In press.*

have not yet received or completed the vaccine series. The routine use of quadrivalent HPV vaccine is recommended in males age 11 or 12 yr. The CDC's Advisory Committee on Immunization Practices also recommends vaccination with quadrivalent HPV vaccine for males age 13 through 21 yr who have not yet received or completed the vaccine series; males age 22 through 26 yr may be vaccinated.

Bibliography is available at Expert Consult.

Bibliography

Ali H, Donovan B, Wand H, et al: Genital warts in young Australians five years into national human papillomavirus vaccination programme: national surveillance data, *BMJ* 346:f2032, 2013.

American Academy of Pediatrics: Statement of endorsement—expedited partner therapy for adolescents diagnosed with chlamydia or gonorrhea, *Pediatrics* 124:1264, 2009.

American Academy of Pediatrics: Adolescents and HIV Infection: The Pediatrician's Role in Promoting Routine Testing, *Pediatrics* 128:1023–1029, 2011.

Association of Public Health Laboratories: Laboratory diagnostic testing for *Chlamydia trachomatis* and *Neisseria gonorrhoeae* Expert Consultation Summary Report, Atlanta, GA, 2009.

Bachmann LH, Johnson RE, Cheng H, et al: Nucleic acid amplification tests for diagnosis of *Neisseria gonorrhoeae* oropharyngeal infections, *J Clin Microbiol* 47:902–907, 2009.

Bachmann LH, Johnson RE, Cheng H, et al: Nucleic acid amplification tests for diagnosis of *Neisseria gonorrhoeae* and *Chlamydia trachomatis* rectal infections, *J Clin Microbiol* 48:1827–1832, 2010.

Bartlett EC, Levison WB, Munday PE: Pelvic inflammatory disease, *BMJ* 346:f3189, 2013.

Barton S, O'Mahony C: HPV vaccination—reaping the rewards of the appliance of science, *BMJ* 346:f2184, 2013.

Blake DR: Approaches to chlamydia screening, *Arch Pediatr Adolesc Med* 163:585–586, 2009.

Bradley H, Markowitz FE, Gibson T, et al: Seroprevalence of herpes simplex virus types I and 2—United States. 1999-2010, *J Infect Dis* 209:325–333, 2014.

Brotherton JML: Safety of the quadrivalent human papillomavirus vaccine, *BMJ* 347:f5631, 2013.

Centers for Disease Control and Prevention: *Advantages and disadvantages of different types of FDA-approved HIV immunoassays used for screening by generation and platform*. http://www.cdc.gov/hiv/pdf/testing_Advantages&Disadvantages.pdf.

Centers for Disease Control and Prevention: CDC grand rounds: the growing threat of multidrug-resistant gonorrhea, *MMWR* 62:103–106, 2013.

Centers for Disease Control and Prevention: Discordant results from reverse sequence syphilis screening—five laboratories. United States. 2006-2010, *MMWR* 60:133–137, 2011.

Centers for Disease Control and Prevention: *Expedited partner therapy in the management of sexually transmitted diseases*, Atlanta, GA, 2006, US Department of Health and Human Sciences.

Centers for Disease Control and Prevention: *HIV among youth*. http://www.cdc.gov/hiv/risk/age/youth/.

Centers for Disease Control and Prevention: Human papillomavirus vaccination coverage among adolescent girls, 2007-2012, and post-licensure vaccine safety monitoring, 2006-2013—United States, *MMWR* 62:591–595, 2013.

Centers for Disease Control and Prevention: Recommendations for the laboratory-based detection of *Chlamydia trachomatis* and *Neisseria gonorrhoeae*—2014, *MMWR* 63(RR–2), 2014.

Centers for Disease Control and Prevention: Recommendations on the use of quadrivalent human papillomavirus vaccine in males—Advisory Committee on Immunization Practices (ACIP), 2011, *MMWR* 60:1705–1708, 2011.

Centers for Disease Control and Prevention: Repeat syphilis infection and HIV co-infection among men who have sex with men–Baltimore, Maryland, 2010-2011, *MMWR* 62:649–650, 2013.

Centers for Disease Control and Prevention: *Sexually transmitted diseases treatment guidelines 2014, MMWR*. http://www.cdc.gov/std/treatment/update.htm.

Centers for Disease Control and Prevention: *Sexually transmitted disease surveillance 2012*, Atlanta, 2013, U.S. Department of Health and Human Services. http://www.cdc.gov/std/stats12/surv2012.pdf.

Datta SD, Sternberg M, Johnson RE, et al: Gonorrhea and chlamydia in the United States among persons 14 to 39 yr of age, 1999 to 2002, *Ann Intern Med* 147:89–96, 2007.

Datta SD, Torrone E, Kruszon-Moran D, et al: *Chlamydia trachomatis* trends in the United States among persons 14 to 39 years of age, 1999–2008, *Sex Transm Dis* 39:92–96, 2012.

Dobson SRM, McNeil S, Dionne M, et al: Immunogenicity of 2 doses of HPV vaccine in younger adolescents vs 3 doses in young women, *JAMA* 309: 1793–1802, 2013.

Eckert LO: Acute vulvovaginitis, *N Engl J Med* 355:1244–1252, 2006.

Farhi D, Wendling J, Molinari E, et al: Non-sexually related acute genital ulcers in 13 pubertal girls, *Arch Dermatol* 145:38–45, 2009.

Garland SM, Steben M, Sings HL, et al: Natural history of genital warts: analysis of the placebo arm of 2 randomized phase III trials of a quadrivalent human papillomavirus (types 6, 11, 16, and 18) vaccine, *J Infect Dis* 199:805–814, 2009.

Gupta R, Warren T, Wald A: Genital herpes, *Lancet* 370:2127–2137, 2007.

Hariri S, Unger ER, Sternberg M, et al: Prevalence of genital human papillomavirus among females in the United States, the National Health and Nutrition Examination Survey, 2003-2006, *J Infect Dis* 204:566–573, 2011.

Irwin CE Jr, Adams SH, Park MJ, et al: Preventive care for adolescents: Few get visits and fewer get services, *Pediatrics* 123:e565–e572, 2009.

Ison CA, Town K, Obi C, et al: Decreased susceptibility to cephalosporins among gonococci: data from the Gonococcal Resistance to Antimicrobials Surveillance Programme (GRASP) in England and Wales, 2007-2011, *Lancet* 9:762–768, 2013.

Johnston C, Saracino M, Kuntz S, et al: Standard-dose and high-dose daily antiviral therapy for short episodes of genital HSV-2 reactivation: three randomized, open-label, cross-over trials, *Lancet* 379:641–646, 2012.

Katz AR, Komeya AY, Soge OO, et al: *Neisseria gonorrhoeae* with high-level resistance to azithromycin: case report of the first isolate identified in the United States, *Clin Infect Dis* 54:841–843, 2012.

Kirkcaldy RD, Bolan GA, Wasserheit JN: Cephalosporin-resistant gonorrhea in North America, *JAMA* 309:185–186, 2013.

Kirkcaldy RD, Zaidi A, Hook EW III, et al: *Neisseria gonorrhoeae* antimicrobial resistance among men who have sex with men and men who have sex exclusively with women: the Gonococcal Isolate Surveillance Project, 2005-2010, *Ann Intern Med* 158:321–328, 2013.

Lowe NK, Neal JL, Ryan-Wenger NA: Accuracy of the clinical diagnosis of vaginitis compared with a DNA probe laboratory standard, *Obstet Gynecol* 113:89–95, 2009.

Markowitz LE, Dunne EF, Saraiya M, et al: Quadrivalent human papillomavirus vaccine recommendations of the Advisory Committee on Immunization Practices (ACIP), *MMWR Recomm Rep* 56(RR02):1–24, 2007.

Marrazzo JM, Thomas KK, Fiedler TL, et al: Relationship of specific vaginal bacteria and bacterial vaginosis treatment failure in women who have sex with women, *Ann Intern Med* 149:20–28, 2008.

Schoeman SA, Stewart CMW, Booth RA, et al: Assessment of best single sample for finding chlamydia in women with and without symptoms: a diagnostic test study, *BMJ* 345:e8013, 2012.

Seña AC, Lensing S, Rompalo A, et al: *Chlamydia trachomatis, Mycoplasma genitalium*, and *Trichomonas vaginalis* infections in men with nongonococcal urethritis: predictors and persistence after therapy, *J Infect Dis* 206:357–365, 2012.

Sobel JD: Vulvovaginal candidosis, *Lancet* 369:1961–1971, 2007.

Stewart CMW, Schoeman SA, Booth RA, et al: Assessment of self-taken swabs versus clinician taken swab cultures for diagnosing gonorrhea in women: single centre diagnostic accuracy study, *BMJ* 345:e8107, 2012.

US Preventive Services Task Force: Behavioral counseling to prevent sexually transmitted infections: U.S. preventive services task force recommendation statement, *Ann Intern Med* 149:491–496, 2008.

U.S. Preventive Services Task Force: *Screening for Cervical Cancer: U.S. Preventive Services Task Force recommendation statement. AHRQ Publication No. 11-05156-EF-2*, 2012. http://www.uspreventiveservicestaskforce.org/uspstf11/cervcancer/cervcancerrs.htm.

U.S. Preventive Services Task Force: *Screening for HIV: Final Recommendation Statement. AHRQ Publication No. 12-05173-EF-3*. Available at http://www.uspreventiveservicestaskforce.org/uspstf13/hiv/hivfinalrs.htm.

Wheeler CM, Kjaer SK, Sigurdsson K, et al: The impact of quadrivalent human papillomavirus (HPV; types 6, 11, 16, and 18) L1 virus-like particle vaccine on infection and disease due to oncogenic nonvaccine HPV types in sexually active women aged 16–26 years, *J Infect Dis* 199:936–944, 2009.

Wright TC Jr, Massad LS, Dunton CJ, et al: 2006 consensus guidelines for the management of women with abnormal cervical cancer screening tests, *Am J Obstet Gynecol* 197:346–355, 2007.

Chapter 121

Chronic Fatigue Syndrome

James F. Jones and Hal B. Jenson

Chronic fatigue syndrome (CFS) describes a complex, diverse, and debilitating illness characterized by chronic or intermittent fatigue accompanied by selected symptoms of >3 mo (young children) or >6 mo duration (adolescents or adults). The combination of fatigue and symptoms interferes significantly with usual daily activities and has no apparent medical explanation. The fatigue does not require exertion by the patient, nor does rest relieve it. Post-exertion malaise (i.e., worsening of fatigue and sickness symptoms after mental or physical exertion lasting more than 24 hr) is considered by some to be characteristic of CFS. A definitive causal agent or process has not been identified, although the differential diagnosis includes many infectious and inflammatory diseases. The understanding of this condition is largely from studies among adults and adolescents, with limited descriptions of chronic fatiguing illness among younger children.

This illness was formally defined in 1988 as *chronic fatigue syndrome* because persistent and unexplained fatigue was considered the principal and invariable physical symptom. A variety of names have been used to describe the syndrome (chronic mononucleosis, chronic Epstein-Barr virus infection, myalgic encephalomyelitis, post-infection syndrome, immune dysfunction syndrome), and several case definitions are in use in both clinical and research settings. Some of the more widely used definitions are the 1994 International Research Case Definition (an update of the 1988 version), the Oxford (UK) Guidelines for research, the Myalgic Encephalomyelitis/Chronic Fatigue Syndrome: Clinical working case definition, diagnostic and treatments protocols, also commonly referred to as the Canadian Consensus Criteria for CFS/ME (2003), and the 2011 International Consensus Criteria for Myalgic Encephalomyelitis (ME). In 2006, the International Association of Chronic Fatigue Syndrome Pediatric Case Definition Working group developed a case definition specifically for children and adolescents with ME/CFS, utilizing the 3-mo duration of fatigue. In the UK, pediatric practitioners adhere to guidelines in the National Institute for Health and Clinical Excellence (NICE); Chronic fatigue syndrome/Myalgic encephalomyelitis (or encephalopathy); Diagnosis and Management (2007), which includes the 3-mo duration criterion.

The Institute of Medicine (IOM) of the National Academy of Science was commissioned by the Department of Health and Human Services (HHS) to conduct a study to evaluate existing diagnostic criteria and to develop evidence-based diagnostic criteria for use by clinicians. Their recommendations were published in February 2015. The IOM case definition is intended to apply to all ages, and the report includes a special focus on pediatrics. The IOM suggested new diagnostic criteria and a new name, *systemic exertion intolerance disease*, in part to emphasize the post-exertion malaise criterion and bring greater understanding about the illness.

EPIDEMIOLOGY

Between 0.2% and 2.3% of children or adolescents suffer from CFS based on worldwide studies. Most epidemiology studies utilize the 1994 definition. CFS is more prevalent in adolescents than in younger children. The large variation in the CFS prevalence estimates may be

due to variation in study methodology, such as the study population composition (special clinic versus general practice or general population) and data collection procedures (parent/self-reporting vs. clinical evaluation; the choice of case definition and method of applying case definition). Sex/gender distribution differs from that in adults with a more equal distribution in children less than 15 yr of age, while remaining 2- to 3-fold higher in females ages 15-18 yr. Few studies have reported the incidence of CFS among children <10 yr of age, leading to uncertainty in this age group. In adolescents in the Netherlands, the pediatrician-diagnosed incidence of CFS/ME was reported to be 0.01%, while in the UK the incidence was 0.5%.

PATHOGENESIS

Although the cause of CFS is unknown, some patients correlate the onset with a recent episode of a viruslike illness such as infectious mononucleosis (10-12%) (see Chapter 254). A potentially pathophysiologic relationship of CFS to infection is suggested because the sickness or illness behaviors elicited by the nonspecific or innate host responses in infections in general are present in CFS. CFS-like illness after infectious mononucleosis is not predicted by viremia or an altered host response to Epstein-Barr virus infection, but is associated with the severity of the primary infection. There have been a wide variety of other candidate infections associated with postinfection fatigue syndromes, particularly in adults or teenagers older than 16 yr. Efforts continue to determine if infections with these or other agents may produce the illness.

Similarities between CFS symptoms and those experienced by patients with autoimmune and other inflammatory disorders raises the issue of primary perturbations in the immune system in the pathogenesis of CFS. Immunologic alterations (hypogammaglobulinemia or hypergammaglobulinemia, immunoglobulin subclass deficiencies, elevated levels of circulating immune complexes, mild increased helper/suppressor lymphocyte ratios, natural killer cell dysfunction, and monocyte dysfunction) have been reported in adult patients with CFS. These findings have not been consistent among studies. While CFS patients as a group appear to differ from healthy controls, in most studies the laboratory values of the immune parameters are not outside the normal range.

Autonomic nervous system changes are suggested by the orthostatic intolerance experienced by some CFS patients. Orthostatic intolerance (OI) syndromes with circulatory dysfunction including neutrally mediated hypotension, instantaneous orthostatic hypotension, and postural tachycardia syndrome have been observed in some patients with CFS and could contribute to the syndrome. The pathophysiology of these manifestations among adolescents with CFS is unclear, but in postinfection states, they could be associated with failure to replenish mineral and fluid losses that accompany infections or to immune-mediated injury (auto-antibodies directed against the autonomic nervous system).

Because the widespread musculoskeletal pain in CFS is similar to that in fibromyalgia (Chapter 168.3), and fibromyalgia and CFS are often considered overlapping syndromes, they may share similarities in pathogenesis. Fibromyalgia pain is thought to be due to neurochemical imbalances in the central nervous system. Neurochemical changes represent another area for research into the origins of development and persistence of CFS.

A variety of other hypotheses for the biologic basis of this illness are being investigated. These include alterations in energy metabolism (particularly as related to exercise and post-exertion malaise), in sleep, as well as in stress response and the hypothalamic-pituitary-axis. Understanding CFS has proved so challenging because it represents more than one underlying pathophysiology. Current studies are attempting to stratify or subgroup patients to address this possibility.

CLINICAL MANIFESTATIONS

The dominant symptoms expressed by adolescents are similar to those observed in adults and include fatigue and an increased level of illness after physical or mental activity. In younger children, who frequently do not spontaneously describe symptoms, exertion induces behavioral changes manifested by a lack of their usual energy. In adolescents, the fatigue and post-exertional malaise may lead to reduced participation in school activities and time spent with friends. Cognitive problems and difficulties in concentrating are common and are indicated by a decreased ability to keep up with homework and a drop in grades. Sleep complaints include difficulty falling or staying asleep, daytime sleepiness, frequent awakening, and intense and vivid dreaming. While nonrestorative nighttime sleeping is common, diagnosed sleep disorders, such as restless legs or sleep apnea, are not. Myalgias and arthralgias may accompany fatigue and altered sleep. Sore throat and lymph node tenderness occur in some children but may be part of an inciting illness. Adolescents also have increased complaints of headaches, abdominal pain, nausea, and hypersensitivity to touch and noise.

Patients diagnosed with CFS in primary care practices are more likely to report an abrupt onset to their symptoms, often as part of an initial virus-like illness, whereas gradual onset is more common in those identified in population-based studies. School absenteeism is a major problem. In one study two thirds of adolescents missed >2 wk of school over a 6-week observation period and one third required a home tutor. Unlike school phobia, inactivity due to CFS persists on the weekends and during holidays as it does during the school week.

Although fatigue and accompanying symptoms are subjective, the magnitude of impairment of each component can be measured by questionnaires addressing pain and function or, in the case of suspected orthostatic instability, by recording routine or supine/standing heart rate and blood pressure. Fatigue should not be dismissed as a minor ailment. It is generally manifested as lassitude, profound tiredness, intolerance of exertion with easy fatigability, and general malaise.

Abnormal physical examination findings are conspicuously absent, providing reassurance and consternation to both the patient and the physician. The presence of unusual symptoms such as chest palpitations, visual blurring, paresthesias, dry eyes and mouth, diarrhea, cough, night sweats, and rash) should suggest a diagnosis other than CFS. Weight loss, as seen in chronic infections or inflammatory conditions, is uncommon in CFS.

DIAGNOSIS

There are no pathognomonic signs or diagnostic tests for CFS. The diagnosis is clinically defined based on inclusion and exclusion criteria (Fig. 121-1). The diagnostic criteria are applicable to adults and adolescents >11 yr of age because of the current requirement for a self-generated history. The 3- or 6-mo criterion in CFS case definitions does not mean that evaluation and symptom management should wait until that criterion is met before intervention can begin.

CFS is difficult to diagnose in children, who have trouble describing their symptoms and articulating their concerns. Sole reliance on parental history for diagnosis is fraught with confusion because of the inaccuracy of the historical information. A combination of child and parent reports is most effective. It is important to document the child's activity levels and worsening symptoms after physical or mental endeavors. Changes in participation in hobbies and social activities can help identify illness effects on daily activities.

The diagnosis of CFS can be established only after alternative medical and psychiatric causes of fatigue and illness, many of which are treatable, have been excluded. These include any medical condition that may explain the presence of a chronic illness, such as untreated hypothyroidism, respiratory and/or food allergies, sleep apnea, narcolepsy, drug abuse, an adverse effect of medication, or severe obesity. A previously diagnosed medical condition with uncertain resolution that may explain chronic fatigue should be clarified, such as unresolved cases of hepatitis B or C virus infection.

Certain illnesses, for example, fibromyalgia and depression, share similar symptoms with CFS, but are not exclusionary diagnoses. They should be considered in the differential diagnosis in selected cases. There is concern that CFS might be mistaken for readily identifiable psychiatric disorders, but evidence supports differences in clinical

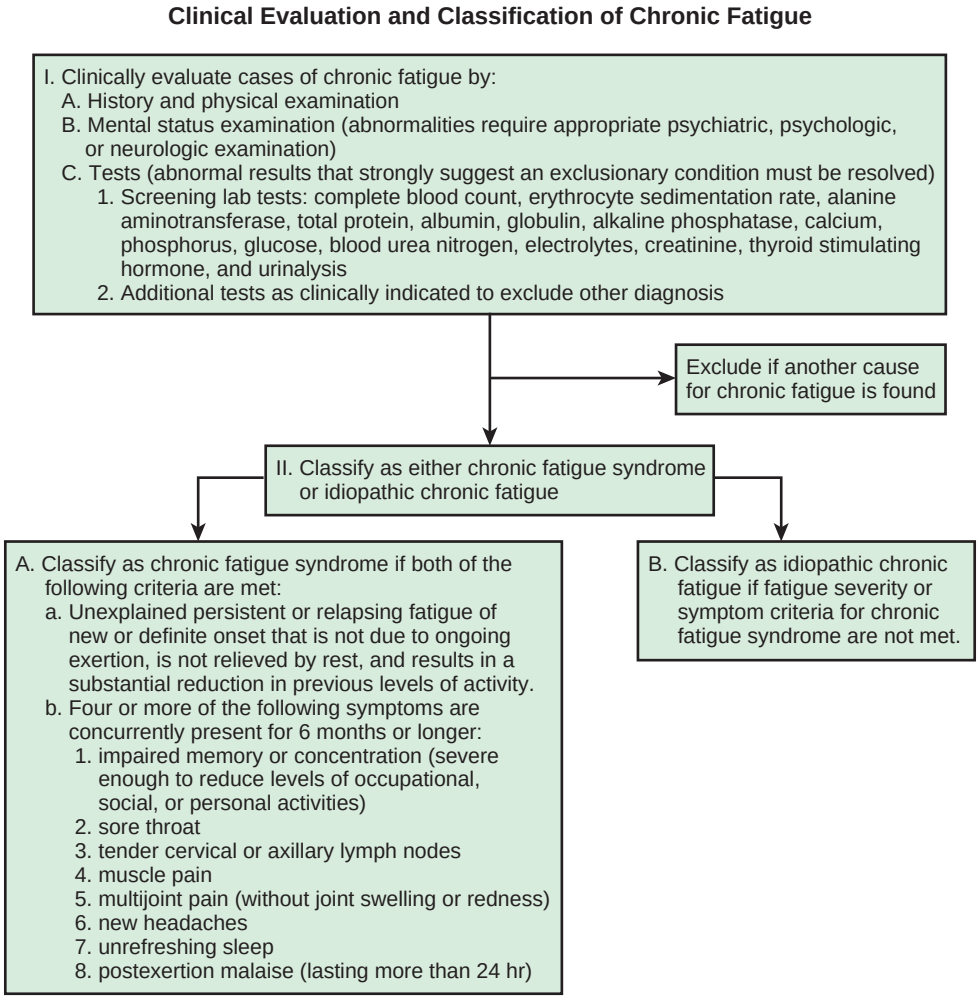


Figure 121-1 The clinical evaluation and classification of unexplained chronic fatigue. The case definition for chronic fatigue syndrome was proposed in 1988 (*Holmes GP, Kaplan JE, Gantz NM, et al. Chronic fatigue syndrome: a working case definition; 108:387–389*), and refined and simplified by an international working group in 1994 (*Fukuda K, Straus SE, Hickie I, et al. The chronic fatigue syndrome: a comprehensive approach to its definition and study. 1994. Ann Intern Med; 121:953–959).*

presentation between CFS and mood/anxiety disorders. CFS should not be diagnosed in persons with prior diagnoses of a major depressive disorder with psychotic or melancholic features, bipolar affective disorders, schizophrenia of any subtype, delusional disorders of any subtype, dementias of any subtype, anorexia nervosa, bulimia nervosa, or alcohol or other substance abuse within 2 yr before the onset of the chronic fatigue or at any time afterward.

Although evaluation of each patient should be individualized, initial laboratory evaluation should be limited to screening laboratory tests to provide reassurance of the lack of significant medical illnesses (see Fig. 121-1). Further tests should be directed primarily toward excluding treatable diseases that may be suggested by the symptoms or physical findings that are present in specific patients.

MANAGEMENT

Management of CFS is based on relief of the core and most disruptive symptoms in the individual patient (Fig. 121-1). The diagnostic criterion of 3-6 mo duration of illness should not delay evaluation and symptom management, as these may be initiated as soon as the child or adolescent presents with a CFS-like picture. Problems with sleep can be addressed by encouraging patients to adopt good sleep habits using standard sleep hygiene techniques. It may be beneficial to refer the patient to a specialist for identification and treatment of sleep disorders and disturbances. Once pain is found not to be related to specific diseases or illnesses, it is best addressed through nonpharmacologic treatment (see Chapter 62).

One of the nonpharmacologic approaches to pain management, cognitive behavioral therapy (CBT), may also assist patients in coping with CFS. Through explanation and changes in perception of the origins of the illness, CBT may help patients and their families develop coping skills and provide emotional support. Improved methods of coping may allow some improved function while living with the illness. Comorbid psychiatric disorders require appropriate intervention.

While the overall goal is to help CFS patients tolerate activity, children with CFS should avoid physical or mental efforts that result in aggravated CFS symptoms. Return to school should be initiated gradually but systematically to resume normal attendance. Home tutoring may be an interim alternative. Parents can work with teachers and administrators to redefine expectations of activity and performance for children with CFS. Because of the crucial importance of learning socialization skills during childhood and adolescence, even brief periods of attendance during lunch or favorite after-school activities should be encouraged. Complete bed rest and physical inactivity perpetuates immobility and leads to deconditioning. Activities benefit children with certain chronic illnesses in ways other than overcoming deconditioning; however, rapid remobilization usually exacerbates symptoms and should be avoided.

Continued empathy and support by the treating physician are important in maintaining a physician-patient relationship conducive to managing this illness. Careful attention must be directed to the family dynamics to identify and resolve family problems or psychopathology that may be contributing to a child's perceptions of his or her

symptoms. Periodic medical reevaluation is warranted for early detection of other identifiable causes of chronic fatigue and other symptoms, especially with interval development of new symptoms. No data suggest relief of symptoms or cure of CFS by dietary or vitamin supplements.

PROGNOSIS

The clinical course of CFS is highly variable and patients should be informed that their symptoms will likely wax and wane. Children and adolescents with CFS appear to have a more optimistic outcome than adults, typically with an undulating course of gradual but substantial symptomatic improvement, or full recovery, 1-4 yr after diagnosis. Overall, a good functional outcome has been reported in up to 80% of cases. Poor prognostic factors include a gradual onset, increasing school absenteeism, lower socioeconomic status, chronic maternal health problems, and untreated comorbid individual or family psychiatric disorders. Favorable prognostic factors include patient control of their individual rehabilitation program with continued support from health professionals and family members and improvement in orthostatic factors.

Bibliography is available at Expert Consult.

Bibliography

Afari N, Buchwald D: Chronic fatigue syndrome: a review, *Am J Psychiatry* 160:221–236, 2003.

Brouwers FM, van der Werf S, Bleijenberg G, et al: The effect of a polynutrient supplement on fatigue and physical activity of patients with chronic fatigue syndrome: a double-blind randomized controlled trial, *QJM* 95:677–683, 2002.

Cairns R, Hotopf M: A systematic review of describing the prognosis of chronic fatigue syndrome, *Occup Med* 55:20–31, 2005.

Carruthers BM, Jain AK, DeMeirleir KL, et al: Myalgic encephalomyelitis/chronic fatigue syndrome: Clinical working case definition, diagnostic and treatments protocols, *J Chronic Fatigue Syndr* 11:7–115, 2003.

Carruthers BM, van de Sande MI, DeMeirleir KL, et al: Myalgic encephalomyelitis: International Consensus Criteria, *J Intern Med* 270:327–338, 2011.

Chalder T, Deary V, Husain K, et al: Family-focused cognitive behavior therapy versus psycho-education for chronic fatigue syndrome in 11- to 18-year-olds: a randomized controlled treatment trial, *Psychol Med* 40:1269–1279, 2010.

Clauw DJ, Arnold LM, McCarberg BH: The science of fibromyalgia, *Mayo Clin Proc* 86:907–911, 2011.

Crawley E: The epidemiology of chronic fatigue syndrome/myalgic encephalitis in children, *Arch Dis Child* 99:171–174, 2014.

Crawley E, Sterne JA: Association between school absence and physical function in paediatric chronic fatigue syndrome/myalgic encephalopathy, *Arch Dis Child* 94:752–756, 2009.

Crawley EM, Emond AM, Sterne JA: Unidentified chronic fatigue syndrome/myalgic encephalomyelitis (CFS/ME) is a major cause of school absence: surveillance outcomes from school-based clinics, *BMJ Open* 1(2):e000252, 2011. doi: 10.1136/bmjopen-2011-000252.

Dantzer R, O'Connor JC, Freund GG, et al: From inflammation to sickness and depression: when the immune system subjugates the brain, *Nat Rev Neurosci* 9:46–57, 2008.

Davies S, Crawley E: Chronic fatigue syndrome in children aged 11 years old and younger, *Arch Dis Child* 93:419–421, 2008.

Fukuda K, Straus SE, Hickie I, et al: The chronic fatigue syndrome: a comprehensive approach to its definition and study, *Ann Intern Med* 121:953–959, 1994.

Garralda ME, Rangel L: Chronic fatigue syndrome of childhood. Comparative study with emotional disorders, *Eur Child Adolesc Psychiatry* 14:424–430, 2005.

Harrison NA, Brydon L, Walker C, et al: Neural origins of human sickness in interoceptive responses to inflammation, *Biol Psychiatry* 66:415–422, 2009.

Haywood KL, Collin SM, Crawley E: Assessing severity of illness and outcomes of treatment in children with chronic fatigue syndrome/myalgic encephalomyelitis (CFS/ME): a systematic review of patient-reported outcome measures (PROMs), *Child Care Health Dev* 40(6):806–824, 2014.

Heim C, Nater UM, Maloney E, et al: Childhood trauma and risk for chronic fatigue syndrome: Association with neuroendocrine dysfunction, *Arch Gen Psychiatry* 66:72–80, 2009.

Hickie I, Davenport T, Wakefield D, et al: Dubbo Infection Outcomes Study Group. Post-infective and chronic fatigue syndromes precipitated by viral and non-viral pathogens: prospective cohort study, *BMJ* 333:575, 2006.

Holmes GP, Kaplan JE, Gantz NM, et al: Chronic fatigue syndrome: a working case definition, *Ann Intern Med* 108:387–389, 1988.

Institute of Medicine (IOM): *Beyond myalgic encephalomyelitis/chronic fatigue syndrome: redefining an illness*, Washington, DC, 2015, The National Academies Press.

Jason LA, Jordan K, Miike T, et al: A pediatric case definition for myalgic encephalomyelitis and chronic fatigue syndrome, *J Chronic Fatigue Syndrome* 13:1–44, 2006.

Johnston S, Brenu EW, Staines DR, et al: The adoption of chronic fatigue syndrome/myalgic encephalomyelitis case definitions to assess prevalence: a systematic review, *Ann Epidemiol* 23:371–376, 2013.

Katz BZ, Jason LA: Chronic fatigue syndrome following infections in adolescents, *Curr Opin Pediatr* 25:95–102, 2013.

Katz BZ, Shiraishi Y, Mears CJ, et al: Chronic fatigue syndrome after infectious mononucleosis in adolescents, *Pediatrics* 124:189–193, 2009.

Kempke S, Luyten P, Claes S, et al: The prevalence and impact of early childhood trauma in chronic fatigue syndrome, *J Psychiatr Res* 47:664–669, 2013.

Lievesley K, Rimes KA, Chalder T: A review of the predisposing, precipitating and perpetuating factors in chronic fatigue syndrome in children and adolescents, *Clin Psychol Rev* 34:233–248, 2014.

Lloyd S, Chalder T, Rimes KA: Family-focused cognitive behavior therapy versus psycho-education for adolescents with chronic fatigue syndrome: long-term follow-up of an RCT, *Behav Res Ther* 50:719–725, 2012.

Lorusso L, Mikhaylova SV, Capelli E, et al: Immunological aspects of chronic fatigue syndrome, *Autoimmun Rev* 8:287–291, 2009.

May M, Emond A, Crawley E: Phenotypes of chronic fatigue syndrome in children and young people, *Arch Dis Child* 95:245–249, 2010.

National Institute for Health and Clinical Excellence: *Chronic fatigue syndrome/myalgic encephalomyelitis (or encephalopathy); diagnosis and management*, London, 2007, National Institute for Health and Clinical Excellence.

Nijhof SL, Maijer K, Bleijenberg G, et al: Adolescent chronic fatigue syndrome: prevalence, incidence, and morbidity, *Pediatrics* 127:1169–1175, 2011.

Nijhof SL, Priesterbach LP, Bleijenberg G, et al: Functional improvement is accompanied by reduced pain in adolescent chronic fatigue syndrome, *Pain Med* 14:1435–1438, 2013.

Osnes LT, Nakken B, Bodolay E, et al: Assessment of intracellular cytokines and regulatory cells in patients with autoimmune diseases and primary immunodeficiencies—novel tool for diagnostics and patient follow-up, *Autoimmun Rev* 12:967–971, 2013.

Reeves WC, Lloyd A, Vernon SD, et al: Identification of ambiguities in the 1994 chronic fatigue syndrome research case definition and recommendations for resolution, *BMC Health Serv Res* 3:25, 2003.

Rimes KA, Goodman R, Hotopf M, et al: Incidence, prognosis, and risk factors for fatigue and chronic fatigue syndrome in adolescents: A prospective community study, *Pediatrics* 119:e603–e609, 2007.

Rowe PC, Barron DF, Calkins H, et al: Orthostatic intolerance and chronic fatigue syndrome associated with Ehlers-Danlos syndrome, *J Pediatr* 135:494–499, 1999.

Sharpe MC, Archard LC, Banatvala JE, et al: A report-chronic syndrome: guidelines for research, *J R Soc Med* 84:118–121, 1991.

Sulheim D, Hurum H, Helland IB, et al: Adolescent chronic fatigue syndrome; a follow-up study displays concurrent improvement of circulatory abnormalities and clinical symptoms, *Biopsychosoc Med* 6:10, 2012.

Van Cauwenbergh D, De Kooning M, Ickmans K, et al: How to exercise people with chronic fatigue syndrome: evidence-based practice guidelines, *Eur J Clin Invest* 42:1136–1144, 2012.

White PD, Goldsmith KA, Johnson AL, et al: Comparison of adaptive pacing therapy, cognitive behavior therapy, graded exercise therapy, and specialist medical care for chronic fatigue syndrome (PACE): a randomized trial, *Lancet* 377:823–836, 2011.