

Shalea Piteau  
*Editor*

# Update in Pediatrics

 Springer

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ISBN 978-3-319-58026-5      ISBN 978-3-319-58027-2 (eBook)  
<https://doi.org/10.1007/978-3-319-58027-2>

Library of Congress Control Number: 2017964312

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Printed on acid-free paper

This Springer imprint is published by the registered company Springer International Publishing AG part of Springer Nature  
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

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## Preface

Pediatrics is evolving with new advancements in knowledge, research, and technology, making it challenging to keep up-to-date with current information. This concise and comprehensive volume provides a review of the latest advances and current literature in Pediatrics, so health professionals can get a summarized overview of the different subspecialties in Pediatrics. Update in Pediatrics includes chapters ranging from traditional disciplines such as Infectious Disease and Cardiology, to more current disciplines such as Adolescent Medicine and Child Maltreatment. The target audience for this book includes any practitioner who cares for children, including pediatricians, family doctors, nurses and nurse practitioners, allied health professionals, and health researchers. My hope is that Update in Pediatrics will serve as a valuable resource for the busy clinician who wishes to stay up-to-date with the latest advances in the field.

ON, Canada

Shalea Piteau

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# Contents

<b>1 Update in Adolescent Medicine</b> . . . . .	1
Raina V. Voss and Emily Ruedinger	
<b>2 Update in Pediatric Allergy</b> . . . . .	39
Amanda Ciccolini, Shannon French, Mark Tenn, and Anne K. Ellis	
<b>3 Update in Pediatric Cardiology</b> . . . . .	61
Jane Lougheed and Jenna Ashkanase	
<b>4 Update in Child Maltreatment</b> . . . . .	83
Michelle G.K. Ward, Amy E. Ornstein, Tanya Deurvorst Smith, and Karla Wentzel	
<b>5 Update in Pediatric Critical Care</b> . . . . .	117
Lisa A. DelSignore, Traci A. Wolbrink, and Niranjan Kissoon	
<b>6 Update in Development: Section A—Infant Development</b> . . . .	133
Madhavi Moharir and Chaya Kulkarni	
<b>7 Update in Development: Section B—Autism Spectrum Disorder</b> . . . . .	207
R.G. Smith and D. Samdup	
<b>8 Update in Pediatric Emergency Medicine: Pediatric Resuscitation, Pediatric Sepsis, Interfacility Transport of the Pediatric Patient, Pain and sedation in the Emergency Department, Pediatric Trauma</b> . . . . .	223
Tania Principi, Deborah Schonfeld, Laura Weingarten, Suzan Schneeweiss, Daniel Rosenfield, Genevieve Ernst, Suzanne Schuh, and Dennis Scolnik	
<b>9 Update in Pediatric Endocrinology</b> . . . . .	251
Seth D. Marks and Brandy A. Wicklow	
<b>10 Update in Pediatric Gastroenterology, Hepatology and Nutrition</b> . . . . .	267
A. Jay Freeman, Tatyana Hofmekler, John-Paul Berauer, and Sirish Palle	

<b>11 Update in Pediatric Hematology</b> .....	313
Ziad Solh, Anthony K.C. Chan, and Mihir D. Bhatt	
<b>12 Update in Pediatric Hospital Medicine</b> .....	331
Elizabeth J.N. Davis and Ricardo Quinonez	
<b>13 Update in Pediatric Infectious Disease</b> .....	349
Archana Chatterjee and Maya Gogoi	
<b>14 Update in Clinical Genetics and Metabolics</b> .....	369
Christine M. Armour and Matthew A. Lines	
<b>15 Update in Pediatric Nephrology</b> .....	391
Darcy Weidemann and Martin Bitzan	
<b>16 Update in Neonatology</b> .....	415
Faiza Khurshid and Imtiaz Ahmad	
<b>17 Update in Pediatric Neurology</b> .....	439
Andrea Andrade and Asuri N. Prasad	
<b>18 Update in Pediatric Oncology: Section A—New Developments in the Treatment of Pediatric Acute Lymphoblastic Leukemia</b> .....	461
Shannon L. Maude and Stephen P. Hunger	
<b>19 Update in Pediatric Oncology: Section B—Solid Tumors of Childhood</b> .....	485
Allison F. O’Neill	
<b>20 Update in Pediatric Psychiatry</b> .....	513
Sabina Abidi	
<b>21 Update in Pediatric Rheumatology</b> .....	537
Roberta A. Berard and Ronald M. Laxer	
<b>Index</b> .....	553

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# Update in Adolescent Medicine

# 1

Raina V. Voss and Emily Ruedinger

## Introduction

Adolescence is a time of enormous physical, cognitive, social and emotional transformation recognized as a distinct developmental stage across cultures. This period of rapid change is perhaps rivaled only by the changes that occur in infancy. Chronologically, it can be difficult to definitively define, but roughly occurs from around the age of onset of secondary sexual characteristics (roughly age 9 or 10) through the early 20s. Adolescence has historically been categorized as a stormy time, but in fact most adolescents transition from childhood to adulthood smoothly, maintaining generally healthy behaviors and good relationships with their caregivers (Christie and Viner 2005; Hazen et al. 2008).

Because adolescence is a distinct developmental stage, caregivers are also presented with some challenges that are unique to this population. As youth transition from childhood to adulthood, they take on increasingly active roles as autonomous decision-makers in many arenas,

including healthcare. Providers can help shepherd adolescents and their caregivers more successfully through this transition by understanding the developmental nuance of adolescence, and by communicating with youth and their caregivers in a sensitive manner. In this chapter, we will touch upon topics for which healthcare providers in general have developed new or more detailed understanding over the past decade. Topics include development, interviewing, substance use, reproductive health, sexual and gender identity, technology and media, and transitioning to adult healthcare.

## Adolescent Development

Adolescence is commonly divided into three phases: early, middle and late. Though there are not exact age cutoffs for each of these stages, in typically developing individuals early adolescence is roughly ages 10–13 (the middle school years in the United States); middle adolescence encompasses roughly ages 14–17 (the high school years); and late adolescence is from ages 18 through the early 20s (late high school through the next 4 years or so). The end of adolescence is generally marked by attainment of independent adult behaviors rather than a numerical indicator, though there remains a good deal of controversy over this endpoint. Conversation in the lay community about “prolonged adoles-

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cence” of the current generation abounds—simply enter the term into any search engine to come up with myriad articles and opinions. While there is evidence to substantiate the assertion that traditional markers used to signify transition into adulthood (e.g., living independently from childhood family unit, finishing schooling, first job, entering into marriage or stable partnership, childbearing) have shifted later in the life course, many experts in the field contend that this shift should not necessarily be viewed in a negative light and may have a neutral or even positive impact (Hayford and Furstenberg 2008; Steinberg 2014).

While much of the commentary on prolonged adolescence refers to cognitive, social and emotional development, concern about earlier physical development, particularly among girls, has also been raised. The age of onset of Tanner 2 breast development may have declined negligibly over recent years, though increased adipose tissue may be mistaken for early breast development and confound the issue (Walvoord 2010). The age of menarche, which is probably a better marker of true pubertal timing, has, indeed, declined in modern times—but the importance of this is unclear, particularly when taken in a broader historical context. During the industrial revolution, often used as a marker for the beginning of “modern times,” menarche was delayed relative to previous eras. This was likely due to remarkably poor living and sanitation conditions. With improved living conditions over the past century, the current age of menarche has become relatively re-aligned with historical norms from eras prior to the industrial revolution (Papadimitriou 2016). Furthermore, the age of menarche seems to generally have stabilized over the past half-century (Walvoord 2010; Papadimitriou 2016). A complete review of physical developmental milestones is beyond the scope of this chapter, but can be readily found elsewhere (Rosen 2004; American Academy of Pediatrics Section on Endocrinology 2015).

With regard to cognitive, social and emotional development, there are fewer outwardly visible markers to help clinicians determine a patient’s stage of development. These developmental

domains can develop in a dyssynchronous manner, and development often does not occur in a linear fashion. Further, development along these domains is context- and culture-dependent; considering context and culture is, in many regards, more important than chronology when determining whether or not a youth’s development is normal. See Table 1.1 for a summary of important cognitive, social and emotional developmental considerations for early, middle and late adolescents.

In general, adolescents in all stages of development have a reputation for taking more risks than adults. Imaging studies have shown that adolescents have particularly active reward centers; youth often perceive similar, or at times even greater, levels of risks as adults. However, the potential reward, or benefit, to engaging in many behaviors is perceived as greater among adolescents than among adults. Thus, adolescents’ perception of risk-to-benefit ratios is skewed compared to adults (Sanders 2013; Ahmed et al. 2015; Chick and Reward processing in the adolescent brain: individual differences and relation to risk taking 2015). Because teens are particularly sensitive to their peers, they are also generally more likely to participate in risky behaviors when surrounded by peers than if they are alone (Ahmed et al. 2015; Chick 2015). Although there does appear to be a population-level correlation between greater reward perception and increasing risk taking behavior, the causality of this relationship has not been firmly established and remains an area of ongoing research; some studies show that adolescents who perceive the greatest reward are not necessarily the same ones who take the greatest risk (Chick 2015).

Functional MRI studies have started to provide greater insight into how physiologic developmental changes may correspond with cognitive, psychosocial and emotional development. In general, gray matter in the frontal lobes peaks around early adolescence and declines over middle and late adolescence, with increasing white matter over the same timeframe. This may represent synaptic proliferation early in adolescence followed by synaptic pruning

**Table 1.1** Cognitive, psychosocial and emotional changes throughout adolescence (Christie and Viner 2005; Hazen et al. 2008; Sanders 2013; Dixon and Stein 2006)

	Early (10–13 years old)	Middle (14–17 years old)	Late (18 years old–early/mid 20s)
<b>Cognitive</b>	<p><i>Concrete and Literal:</i> Youth in this stage remain very concrete. They often have difficulty answering vague questions, such as, “Tell me about yourself.” More concrete questions, like “What did you do yesterday?” will likely be more comfortable for these kids and yield more information. Adolescents this age may be more likely to perceive the interview as a test of sorts, with right or wrong answers, and provide the answer that they think will please the clinician. They often have difficulty organizing tasks, and usually still need concrete directions. They may perceive questions about their peers as more conversational and less threatening than direct, sensitive questioning (for example, asking “Are any of your friends doing XYZ...” and then asking, “What about you? Have you tried XYZ?”). Early adolescents tend to have very little understanding of future consequences of their current actions</p>	<p><i>Abstract Thinking:</i> Many teens this age have just developed the ability to introspect and have more “big concept” understanding—this allows middle adolescents to begin exploring concepts such as spirituality and love at a personal level, and grasp advanced academic concepts such as allegory or calculus. Development of abstract thinking may also contribute to increased egocentrism. Executive functioning remains poor, with relatively low ability to understand long-term consequences or impact of actions on others; on organizing tasks; and on self-control. However, this is often better than it is in an early adolescent. It can also vary by task or domain. This seeming ability to think long-term in some areas but not others can be frustrating to parents and clinicians. However, the ability to think toward the future develops over time. This apparent ability to apply this sort of reasoning and executive functioning in one area but not another often represents that they are progressing along this continuum, rather than a deliberate choice to ‘understand’ the future in one area but not in another</p>	<p><i>Maturing Prefrontal Cortex:</i> The prefrontal cortex is still developing during this stage, but executive function and future thinking is more mature. Often young people in this stage of development are able to participate in deep conversations about abstract topics and draw complex connections. Developing this ability is exciting and young people in this age group are often great activists and can be quite passionate. “Gray” areas can still be challenging when it comes to morals and values—many older adolescents are often still concrete about what is right and wrong from a big-picture perspective. For example, it may be hard for them to recognize why it may ever be acceptable for a politician to act in a way that they feel is “immoral”</p>

(continued)

Table 1.1 (continued)

	Early (10–13 years old)	Middle (14–17 years old)	Late (18 years old–early/mid 20s)
<b>Psychosocial</b>	<p><i>Establishing identity separate from family:</i> Early adolescents are just starting to view themselves as separate from their family. They often “try on” different personas, often still in a very literal sense (for example, by changing outward appearance). They will usually start to test limits with parents; they still desire support, but this can create an internal sense of conflict with their desire for independence. As a result, some teens act resistant. They are still usually very concrete about rules, values and morals—things are very black and white; something is good or bad, with little room for middle ground, gray area, or understanding nuance</p>	<p><i>Refining Self-Image:</i> The bid for independence extends beyond appearance and into arenas such as political views and philosophical opinions. Teens expressing value systems that differ from those of their family might be distressing to parents, however most (but not all!) youth actually return to the values parents promoted in earlier childhood once they emerge from this phase. Many mid-adolescents start to recognize the ‘gray’ area around morals, politics, etc., but this skill is still undeveloped as well. They might understand that there is a gray area (for example, that people have a variety of religious preferences, and that there can be positive and negative aspects of various religions) but tend to be relatively rigid in their own beliefs (for example, “I am an atheist and cannot go to church with my grandmother because it is against my religion,” even if it would mean a lot to the grandparent)</p>	<p><i>Time of Transition:</i> This is a time when many teens transition away from their prior family and/or school roles, moving on to college, work, independent living, and/or the military. Many young people are preoccupied with vocation—what will come next?</p>
<b>Emotional</b>	<p><i>Importance of Peers:</i> Starting to separate from the family unit is emotionally stressful, but desired. This dissonance is often dealt with by creating very strong connections with a peer group. Youth want to be different and separate from family but still need that comforting sense of fitting in somewhere. Often this is achieved through peers. Adults often joke about kids this age talking about how they want to “be different,” but then looking and acting exactly the same as their peers</p>	<p><i>Deeper Peer Relationships and Romance:</i> Most mid-adolescents have fully developed secondary sexual characteristics. This newly developed body often leads to heightened peer and self-awareness. Because their executive functioning is not fully developed, there is often less understanding of consequences. Teens also have less impulse control. In this age group there is often an increase in engaging in physical intimacy. Most teens start to explore sexual relationships at some level. Twenty percent of 15-year-olds, and 48% of 17-year-olds, have had penile-vaginal intercourse (Finer and Philbin 2013)</p>	<p><i>Clearer Sense of Self:</i> Dependence on peers starts to lessen; many young people are now able to define and pursue independent goals. Strong connections to school, family and/or community indicate less likelihood of participating in risky behaviors</p>



accompanied by increased myelination and white matter tract organization over time. Additionally, brain activity in certain regions is different between adolescents and adults completing similar tasks. The cause behind this is not yet clear but may relate to the neuroanatomic changes described above; increasing automaticity/decreasing novelty of tasks over the transition toward adulthood; and/or something else altogether. This remains an area of very active study (Blakemore 2012).

It is likely that physiologic, cognitive, psychosocial and emotional changes are inter-connected in ways that are not yet fully understood. We generally encourage providers to keep adolescent developmental concepts in mind when working with teens, and recognize that behaviors that may not “make sense” to an adult often seem reasonable and logical to the youth because of their context and developmental stage. Understanding the youth’s perspective is a key component of promoting adolescent health.

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## Interviewing the Adolescent Patient

Many issues in adolescent health center around the psychosocial world of the patient. While some of these issues fall into the category of risk behaviors, other health issues, such as mental illness and abuse, may arise due to adverse environments over which the adolescent has little control. Regardless of the reason that an adolescent presents to care, the visit should be viewed as an opportunity to screen for and address common risk behaviors and psychosocial stressors.

There are several different techniques that are used to perform such a screen. Best known is the HEEADSSS mnemonic, which serves as a history-taking tool to cover broad domains of psychosocial assessment (Katzenellenbogen 2005; Goldenring and Rosen 2004). This mnemonic has evolved over time to include more categories and letters. See Table 1.2 for examples of what can be contained in the HEEADSSS assessment.

## Confidentiality

The clinician should interview the adolescent patient alone at some point during the visit. Private portions of the visit allow for discussion of topics that adolescents often prefer to keep private from their parents. Adolescents often speak more freely without parents in the room, sometimes making it easier to establish a relationship with the patient. Often, it can also be helpful to meet with the parent alone, as they may be able to provide information about their child’s mental health, school performance, or social stressors that they are not comfortable discussing in front of the adolescent.

Prior to interviewing an adolescent alone, it is helpful to discuss confidentiality with both adolescent patients and their parents. Many providers choose to name the topics that will be discussed confidentially and the specific issues that require breaking confidentiality (Table 1.3). Starting in the early teenage years, providers should counsel parents that adolescents often feel more comfortable talking without their parents, and that these private visits are an important step in their process toward becoming responsible for their own health and wellbeing.

Laws vary by jurisdiction with regard to services that can be provided confidentially to adolescents without parental consent. These services may include contraceptive care (condoms and birth control methods, including long-acting reversible contraception), prenatal care, abortion services, drug and alcohol treatment services, and mental health treatment (including counseling and medications). In the United States (U.S.), all 50 states have laws allowing minors to access confidential STD-related care. The age of consent for these services varies by state. The Guttmacher Institute provides a thorough listing of state-specific minors’ consent laws for reproductive and sexual health: <https://www.guttmacher.org/state-policy/explore/overview-minors-consent-law> (Guttmacher Institute n.d.).

Many jurisdictions also have laws which allow for the general care of adolescents without parental consent in cases where the minor is



**Table 1.2** The HEEADSSS assessment: a psychosocial interview tool

<b>Home environment</b>	• Who do you live with?
	• Do you feel safe at home?
	• Who are you closest with?
	• Is religion part of your life?
<b>Education and employment</b>	• What school and grade are you in?
	• <i>Any issues with bullying?</i>
	• Do you have friends at school?
	• How are you doing in school? Are you failing any classes?
	• What are your favorite and least favorite classes?
	• Do you have any special circumstances? (504 plan, IEP, special education, tutoring, repeated grades)
	• Do you like school?
	• What are your plans after high school?
	• What are your plans after college?
	• Do you have a job currently?
<b>Eating</b>	• How do you feel about your body? What do you like and not like about it?
	• Are you worried about your weight?
	• Has your weight changed recently?
	• Tell me what you might eat in a typical day
	• Are you trying to lose weight?
	• Do you ever starve yourself, skip meals, or make yourself throw up? Ever take diet pills, laxatives, diuretics?
	• Do you ever feel like your eating is out of control? Eat so much you feel sick?
• <i>Do you have enough food in your home?</i>	
<b>Activities</b>	• What do you do for fun? (With friends? With family?)
	• How many hours do you spend in front of a screen (not for school/work) per day?
	• Tell me about how you get exercise (explore for excessive exercise)
<b>Drugs</b>	• Have you ever tried alcohol? Marijuana? Cigarettes? Other drugs such as ecstasy, methamphetamines, cocaine, heroin, prescription medications (pain medicine or ADHD medicine)?
	• How do you use (pills, snorting, smoking, injecting)?
	• How often and how much do you use?
	• Have you been drunk? Blacked out? Vomited?
	• Have you ever used alone?
	• How many of your close friends use substances?
	• Have you ever driven intoxicated or driven with an intoxicated driver? (This includes alcohol, marijuana, and other drugs)
	• Have drugs or alcohol ever gotten you into trouble?
• What do you think about your drug use?	

**Table 1.2** (continued)

<b>Sexuality</b>	• Are you attracted to boys, girls, both, or neither?
	• <i>How do you identify? Male, female, both, neither, or neither?</i>
	• Have you dated, or had crushes?
	• Are you in a relationship?
	• Have you ever felt that your boyfriend/girlfriend is jealous or controlling?
	• Has your boyfriend/girlfriend ever physically hurt you?
	• Have you had any types of physical relationships? Holding hands, hugging, kissing, touching, oral sex, vaginal sex, anal sex?
	• <i>Have those experiences been enjoyable?</i>
	• Have you ever had any unwanted physical/sexual activity? Have you ever felt pressured into doing something?
	• How many partners have you had all together?
	• What have you (or your partner) used for protection against pregnancy? STDs?
	• Have you ever been pregnant or gotten someone pregnant?
	• Have you ever had an STD? Are you concerned about an STD? When were you last tested for STDs?
	• <i>How do you talk about sex with a partner before you start doing something physical?</i>
	• <i>Have you talked with your parents about your sexual orientation, gender, and relationships?</i>
• <i>Have you ever had sex in exchange for drugs, money, or other things you needed?</i>	
<b>Suicide and depression</b>	• How do you think your mood is?
	• Do you worry you might have depression or anxiety?
	• Do you ever think about hurting or killing yourself?
	• Have you ever hurt yourself (by cutting or other methods)?
	• Have you ever tried to kill yourself?
	• For more thorough depression assessment we recommend screening with the PHQ9
	• For anxiety assessment, we recommend screening with the GAD7
<b>Safety</b>	• How often do you wear a bike helmet?
	• How often do you wear a seat belt?
	• Do you have a driver's license? What are the restrictions?
	• Has anyone ever hurt you or touched you inappropriately?
	• Is there violence in your home? School? Neighborhood? Relationship?
	• Have you ever felt threatened or unsafe? (At home? At school? In your neighborhood? When you are out of your comfort zone?)
	• <i>Have you ever felt you had to carry a weapon to be safe?</i>
	• Have you ever been in a fight?
	• Are there guns or other weapons in your home, or anywhere that you could access them?

Italicized questions represent concepts that are relatively new parts of the routine HEEADSSS assessment. When assessing safety, the provider may consider the ways that the patient's race, gender expression, and body habitus may impact their perception of safety

**Table 1.3** Indications for breaking confidentiality

Indication for breaking confidentiality	Appropriate course of action
Active suicidal ideation with plan of action	Refer to ER (either by EMS or via safe transport if all parties comfortable) Call local crisis line
Behaviors that may cause harm to patient (cutting, purging, risky substance use, inadequate or inappropriate prescription use)	Discuss with parent for safety planning Speak with social worker and/or therapist if available
Specific plan to harm others	Report to local police Refer patient to ER
Report of physical abuse by a caregiver, teacher, or other adult responsible for the child's wellbeing	Call Child Protective Services (CPS) <ul style="list-style-type: none"> <li>• Need as much information as possible including full name and address of perpetrator and details of event</li> <li>• If concern for child's immediate safety, place the call while patient still in office</li> </ul>
Report of sexual abuse by an adult (or older adolescent, depending on state law)	Call local police <ul style="list-style-type: none"> <li>• Need as much information as possible including full name and address of perpetrator and details of event</li> </ul>

considered “mature” or “emancipated” (Coleman and Rosoff 2013). The criteria for this status as a “mature minor” varies by jurisdiction and may include living separately from parents, having a child, being financially independent, or other criteria. In some states, this status may be determined by a healthcare provider, while in some states this must be determined by a judge or other qualified authority. We suggest that providers familiarize themselves with the laws in their jurisdiction, either through online resources published by their local government or by consulting with social workers or hospital ethics officials.

## Adolescent Substance Use and the Changing Legal Environment of Marijuana

Adolescents are very likely to try illicit drugs as they progress into adulthood. In 2015, 44% of high school seniors reported that they had tried marijuana in their lifetime, and 64% reported having ever tried alcohol (Miech et al. 2016). Most people who become addicted to drugs and alcohol begin using in their teen years, making this an important age group to screen for substance use (Chen et al. 2009; Grant and Dawson 1998; Anthony and Petronis 1995). Illicit sub-

stances, if used chronically, can have long-term impacts on brain development (Schepis et al. 2008; Squeglia et al. 2015; Yuan et al. 2015).

Marijuana has become the most commonly used illicit substance amongst U.S. teens (Miech et al. 2016). Jurisdictions vary in their laws on use of marijuana for medical and recreational purposes (Office of National Drug Control Policy n.d.). Despite being legalized only for adults, the legalization of marijuana and other cultural influences have made provider conversations with youth about marijuana more challenging; often, parents and patients are firmly committed to the belief that marijuana use is safe and healthy (Miech et al. 2016). The rest of this section will focus on marijuana use in adolescents, however many of the principles of screening and treatment apply to other drug use as well.

## Epidemiology

In 2014, 21.2% of high school seniors reported having used marijuana in the past month via the Monitoring the Future study (Miech et al. 2016). This rate of use has been consistent since 2011. One study of youth who had used marijuana at least five times demonstrated that 46.3% had continued use after 10 years (Perkonig et al. 2008).

## Forms of Use

The amount of THC in marijuana products has been increasing over time; The mean concentration of THC in confiscated cannabis products has increased from 3.4% in 1993 to 8.8% in 2008 (Mehmedic et al. 2010).

*Inhaled use:* Marijuana may be consumed in the form of cigarettes (joint), cigars (blunt), using a small pipe (bowl), or a large water pipe (bong). Marijuana may also be vaporized using vape pens or vape guns. *Dabbing* is the practice of using THC-rich resins extracted from the marijuana plant. The extract can be obtained in the form of oil, wax, or *shatter*, an amber-colored solid (National Institute on Drug Abuse n.d.-a). This form of use is extremely potent and carries high risk for negative experiences. The extracts are prepared for smoking using butane, which has led to several house fires, explosions, and burns (National Institute on Drug Abuse n.d.-a).

*Edible marijuana* is available in the form of brownies, cookies, candies, and tea. Because the ingested marijuana has to be digested and absorbed into circulation, the effect takes over an hour and users will often ingest more marijuana while waiting to get the desired effect. Because of this risk of overuse, this form of use often results in overdose experiences (National Institute on Drug Abuse n.d.-a). In Washington, where marijuana is legal for adults ages 21 and above, edible marijuana products are being sold in packaging that is increasingly similar in appearance to non-drug products, which may increase the likelihood of accidental ingestion by children.

*Synthetic Marijuana* is commonly known as K2 or Spice. These substances are chemically related to THC but do not come from the marijuana plant (National Institute on Drug Abuse n.d.-a). These drugs can be smoked or obtained in liquid form and vaporized through e-cigarettes or other vaping devices. They are typically much more potent than smoked marijuana. Adverse effects noted from use of Spice and K2 include anxiety and agitation, nausea and vomiting, high blood pressure, shaking and seizures, hallucinations and paranoia, and violent behavior. These substances may not show up on drug tests (National Institute on Drug Abuse n.d.-a).

*Medical Marijuana:* At the time of this publication, medical marijuana has been legalized in many jurisdictions, including 23 U.S. states as well as the District of Columbia (Office of National Drug Control Policy n.d.). There is no chemical difference between medical and recreational marijuana. Typical state laws intend medical marijuana use for adults over age 21. In most states where medical marijuana is legal, minors may obtain medical marijuana with parental permission. Some research suggests that marijuana may be effective in treating cancer-related pain and nausea, however data is limited to adults and quality research on this topic is generally lacking (Wilkie et al. 2016; Harrison et al. 2015).

*Pharmaceutical cannabinoids:* There are two forms of synthetic cannabinoids available in the United States. Neither have been studied in children. Both dronabinol (trade name Marinol, manufactured by Abbvie) and nabilone (trade name Cesamet, manufactured by Meda Pharmaceuticals) are FDA approved for chemotherapy-induced nausea and vomiting.

## Adverse Effects

*Addiction:* An estimated 9% of marijuana users will become addicted to the substance. Among people who begin using as teens, the rate of addiction is 17%. The mechanism for addiction to marijuana is similar to that of other substances, which is via up-regulation of endogenous neurotransmitter receptors due to overstimulation by the exogenous drug (Hasin et al. 2015; Winters and Lee 2008).

*Lung disease:* Marijuana use is associated with increase risk of pneumonia, bronchitis and chronic cough, and increased sick days due to respiratory illness (Hashibe et al. 2006; Polen et al. 1993). Studies linking marijuana with lung cancer are as yet inconclusive (Hashibe et al. 2006).

*Testicular cancer:* Two studies have shown an increased risk of testicular germ cell tumors in marijuana users (Lacson et al. 2012; Daling et al. 2009). Marijuana users who began use before age 18 had a 2.8 times higher risk of testicular germ cell tumor.

*Driving:* Marijuana use has a dose-dependent effect on driving speed, accuracy, and reaction

times. This risk appears to be compounded when marijuana is used in association with alcohol (Lenné et al. 2010; Ramaekers et al. 2004). A review of epidemiologic data showed a twofold increase in risk of a motor vehicle accident after cannabis use (Hartman and Huestis 2013).

*Mental Health:* While it is difficult to establish causality, marijuana use has been associated with a more than fivefold increase in reporting of depression and anxiety in young adults (Patton et al. 2002). Studies have found links between marijuana use and psychosis as well, though causality is difficult to determine (Caspi et al. 2005; Barkus 2016). Some patients likely use marijuana (and other substances) in attempts to self-medicate mental illness. Because mental illnesses are so frequently present in patients who use drugs, it is important to establish their presence in order to refer the patient for concurrent treatment of both mental illness and substance use.

*Cognitive development:* Research suggests that marijuana has deleterious effects on cognitive development. Several studies in animals have demonstrated long-term effects on memory and learning which are amplified when marijuana is used in the adolescent period (Gleason et al. 2012; Lisdahl Medina et al. 2007; Meier et al. 2012; Schweinsburg et al. 2008). A New Zealand study found an average decrease in IQ of 8 points in adults who were heavy marijuana users during adolescence. This effect was not seen among marijuana users who began using during adulthood (Meier et al. 2012). Research has also have shown that marijuana users have lower likelihood of graduating high school (Macleod et al. 2004). Marijuana use has been associated with lower income, lower life satisfaction, unemployment, and welfare dependence (Brook et al. 2013; Fergusson and Boden 2008).

### **Sexual Health**

Little research has suggested a relationship between marijuana use and sexually transmitted infection, although one study did demonstrate a correlation between the two in a survey of Black college students (Keen et al. 2016). It is generally felt that substance use may impair judgment, leading to riskier sex behaviors and, subse-

quently, sexually transmitted infections. The relationship between substance use and sexual assault is thought to be bi-directional, in that prior assault increases risk for substance abuse, and substance abuse increases risk for assault (Resnick et al. 2013). One study found that, of women reporting to an emergency room for rape-related medical exam, 54% reported alcohol use and 12% reported marijuana use at the time of assault (Resnick et al. 2012).

### **Policy and Legal Considerations**

Marijuana has been legalized for medical use in 23 U.S. states as well as the District of Columbia and Canada. Four U.S. states (Colorado, Oregon, Washington, and Alaska) have legalized both medical and recreational marijuana use (Office of National Drug Control Policy n.d.). At the time of this publication, the use of recreational marijuana is illegal in Canada (Government of Canada 2016).

The American Academy of Pediatrics (AAP) updated their policy statement on marijuana use in youth in 2015 (Committee on Substance Abuse and Committee on Adolescence 2015). The AAP opposes marijuana use in children and adolescents under age 21 and opposes use of medical marijuana “outside the regulatory process of the U.S. Food and Drug Administration.” The AAP calls for further research into pharmaceutical cannabinoids. They also propose decriminalization of marijuana use, focusing instead on a treatment approach for marijuana use in young people. Lastly, they discourage marijuana use by adults in the presence of young people.

### **Screening and History**

Providers should screen children and teenagers regularly for substance use during clinic visits. This should be done at well child checks as well as intermittently in subspecialty clinic visits. Providers should ask explicitly about use of a variety of substances including alcohol, cigarettes, marijuana, methamphetamines, cocaine, heroin, mushrooms, ecstasy, Molly,

LSD/acid, non-prescribed medications (such as Benadryl), and misuse of prescribed medications (such as stimulants or benzodiazepines). Providers may choose to utilize the CRAFFT screen (Fig. 1.1) from Boston Children’s Hospital, which can identify problematic substance use and indicate the need for further discussion (The Center for Adolescent Substance Abuse Research [n.d.](#)).

### Screening, Brief Intervention and Referral to Treatment (SBIRT)

SBIRT is a method of identifying and addressing substance use that is intended for primary care providers, and was also developed at Boston Children’s (Committee on Substance Abuse et al. 2011). Screening (using CRAFFT or CAR questions) is intended to assess the presence and

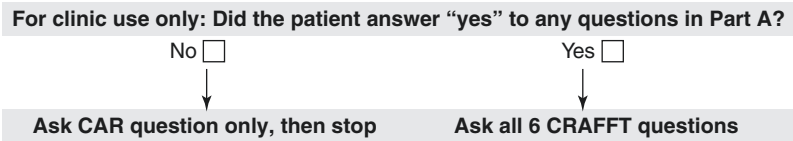
severity of substance use. Brief Intervention is an opportunity to express concern, increase the youth’s insight into their use and provide motivation toward behavioral change. Referral to treatment is an opportunity to provide resources for care to patients who warrant treatment. Teens should be referred for professional assessment and treatment for any of the following: (1) use that has impaired functioning, such as decreased grades or school attendance or withdrawal from activities, (2) use associated with problematic outcomes or unsafe situations such as intoxicated driving, legal or family problems, (3) youth interested in quitting, (4) youth demonstrating signs of dependence such as using alone, having cravings, or having unsuccessful attempts at quitting. Importantly, the SBIRT model recommends providing praise and discussing prevention for youth who are not actively using substances.

The CRAFFT Screening Interview

Begin: “I’m going to ask you a few questions that I ask all my patients. Please be honest. I will keep your answer confidential.”

**Part A**

During the PAST 12 MONTHS, did you:	No	Yes
1. Drink any <u>alcohol</u> (more than a few sips)? (Do not count sips of alcohol taken during family or religious events.)	<input type="checkbox"/>	<input type="checkbox"/>
2. Smoke any <u>marijuana</u> or <u>hashish</u> ?	<input type="checkbox"/>	<input type="checkbox"/>
3. Use <u>anything else</u> to <u>get high</u> ? (“anything else” includes illegal drugs, over the counter and prescription drugs, and things that you sniff or “huff”)	<input type="checkbox"/>	<input type="checkbox"/>



**Part B**

	No	Yes
1. Have you ever ridden in a <b>CAR</b> driven by someone (including yourself) who was “high” or had been using alcohol or drugs?	<input type="checkbox"/>	<input type="checkbox"/>
2. Do you ever use alcohol or drugs to <b>RELAX</b> , feel better about yourself, or fit in?	<input type="checkbox"/>	<input type="checkbox"/>
3. Do you use alcohol or drugs while you are by yourself, or <b>ALONE</b> ?	<input type="checkbox"/>	<input type="checkbox"/>
4. Do you ever <b>FORGET</b> things you did while using alcohol or drugs?	<input type="checkbox"/>	<input type="checkbox"/>

**Fig. 1.1** The CRAFFT screening interview. © John R. Knight, MD, Boston Children’s Hospital, 2016. All rights reserved. Reproduced with permission

## Confidentiality and the Role of the Family

Disclosure of substance use by a minor does not legally require providers to make a report to authorities or parents, unless the patient is at immediate risk of serious harm. In some states, minors have the right to access substance use treatment services without consent from parents. In these cases, the provider may choose to assist the minor in accessing services confidentially. However, most therapy approaches for adolescent substance use rely heavily on family support; for this reason, providers should strongly encourage teen patients to discuss their use with their parents (National Institute on Drug Abuse [n.d.-b](#)). Providers can often help to facilitate this discussion in the clinic. Families can also be key players in motivating the teen patient to engage in treatment. In some states, parents may initiate drug treatment despite the teen's unwillingness to participate.

## Treatment

Much of the approach to treatment for marijuana abuse is similar to treatment for abuse of other substances. Many youth who use marijuana have co-morbid use of other substances; treatment can target the use of multiple substances simultaneously. The National Institute of Drug Abuse recommends treatment of substance use even in adolescents with low levels of use due to the high likelihood of substance use impacting adulthood (National Institute on Drug Abuse [n.d.-b](#)).

For assistance in finding available drug treatment resources, we recommend utilizing the Substance Abuse and Mental Health Services Administration Treatment Locator at [www.find-treatment.samhsa.gov](http://www.find-treatment.samhsa.gov) or by calling 1-800-662-HELP (Substance Abuse and Mental Health Services Administration [n.d.](#)).

## Detox/Withdrawal

Users often report symptoms upon quitting such as sleeplessness, irritability, decreased appetite,

**Table 1.4** Drug treatment approaches (National Institute on Drug Abuse [n.d.-b](#))

Behavioral approaches	Group therapy—employs CBT techniques
	Individual CBT
	Adolescent Community Reinforcement Approach (A-CRA)
	Contingency management
	Motivational enhancement therapy
	Twelve-step facilitation therapy
Family based approaches	Brief Strategic Family Therapy (BSFT)
	Family behavior therapy
	Functional family therapy
	Multidimensional family therapy
Medications	Available for opioid, alcohol and nicotine addiction

anxiety, and cravings. No medical intervention is typically needed for this process.

## Behavioral Treatment

No medications are available for treating marijuana addiction at this time. The mainstay of treatment is behavioral therapy. This typically is provided by a chemical dependency professional (CDP). See [Table 1.4](#) for a list of drug treatment approaches.

Patients with problematic use should undergo a drug and alcohol assessment to determine the appropriate level of treatment ([Table 1.5](#)). Level of treatment is determined by (1) the presence of other behavioral or emotional conditions, (2) motivation to change, (3) risk of relapse or continued drug use, (4) recovery environment (e.g. family, peer, school, community), (5) level of intoxication and potential for withdrawal, (6) presence of other medical conditions.

## Support Groups

While not recognized as evidence-based treatment options, Narcotics Anonymous, Marijuana Anonymous, and other support groups offer social support and accountability to people who are undergoing (or have completed) treatment for



**Table 1.5** Substance abuse treatment settings (National Institute on Drug Abuse [n.d.-b](#))

Treatment setting	Description	Indication
Drug/alcohol education	One-time session or limited series, often court ordered	Relatively isolated incident of drug-related infraction (legal, school-related, etc.)
Limited outpatient treatment	1–2 sessions per week, usually individual, may involve family	Less severe addiction, few additional mental health issues, supportive living environment
Intensive outpatient treatment	3+ sessions per week for several hours a day, often involving family	As above, possibly after failure of limited treatment
Partial hospitalization	Also known as “day treatment.” 4–6 hours a day, 5 days a week	Severe substance use disorders, safe to reside in home environment
Residential/inpatient treatment	24-hour structured environment	Severe addiction and/or comorbid mental or physical health conditions that require 24 h supervision

chemical dependency. Youth-specific groups are rare and youth often feel uncomfortable attending general meetings, however they are typically welcome to attend.

### Resources for Patients

Providers may refer older adolescent patients or parents to the National Institutes of Drug Abuse (NIDA) website, [www.drugabuse.gov](http://www.drugabuse.gov), for more information on marijuana and other substances (National Institute on Drug Abuse [n.d.-a](#)). For younger adolescents, <http://kidshealth.org/en/teens/drug-alcohol/> is a site directed toward teenagers that answers drug and alcohol questions (TeensHealth [n.d.](#)).

### Contraception

Seventy-one percent of youth have experienced coitarche by the age of 19 (Guttmacher Institute 2014). Although teen pregnancy rates have been declining steadily over the past 20 years, nearly 250,000 infants are born to adolescent mothers each year and over three-quarters of all adolescent pregnancies are described as unintended or occurring “too soon” (Office of Adolescent Health 2016). These rates are significantly higher in the U.S. than most other developed countries. Health care providers working with youth must ensure access to high-quality, reliable contraceptive counseling. Ideally, teens will access contraception prior to becoming sexually active.

### Starting the Conversation

Providers can start by initiating a conversation with every teen. It is best to start the conversation by taking a general sexual history, as described in the “Sexuality” section of Table 1.2 in this chapter. If a teen is not sexually active, the provider can initiate a conversation about healthy relationships, providing positive reinforcement that abstinence is a safe and healthy sexual choice. Also remind the teen that if and when they choose to become sexually active, if they are not seeking a pregnancy it is best to initiate contraception prior to their first episode of intercourse. Providers can invite teens to come back and discuss this further at another visit.

If a teen is sexually active, the provider should ask if they are currently trying to get pregnant (for females with any male partner(s)) or currently seeking to become a father (for males with any female partner(s)). If no, the provider should probe further to find out what the patient and their partner(s) are doing to prevent a pregnancy. Assess the teen’s level of knowledge around various contraceptive methods, as well as any contraceptive methods they have used and their satisfaction with these methods.

### Understanding Eligibility for Various Methods

Next, assess what options are medically viable for the patient. The Centers for Disease Control publish U.S. Medical Eligibility Criteria for



Contraceptive Use (USMEC), which can easily be accessed free-of-charge online, or downloaded as an app onto a smartphone (Centers for Disease Control and Prevention 2010). The USMEC provides evidence-informed guidance around the use of various contraceptive methods in patients with a variety of medical condi-

tions, lifestyle factors and family history. Some of the most commonly encountered conditions among adolescents that have an impact on contraceptive decision-making are listed in Table 1.6; this is not an exhaustive list so please refer to the full USMEC guidelines for individual patients.

**Table 1.6** Commonly encountered conditions among adolescents that have an impact on contraceptive decision-making

Condition	Special considerations
Obesity	Most contraceptive options have not been studied specifically in obese and/or morbidly obese women. It is generally accepted that even if there is a decrease in efficacy for some methods, use of one of these methods will still provide contraceptive benefit. Women with obesity should receive full options counseling (Robinson and Burke 2013; McNicholas et al. 2013)
	IUD (copper and levonorgestrel) effectiveness does not vary with BMI category. This may be a particularly good option and is Category 1 per the USMEC (Centers for Disease Control and Prevention 2010; Robinson and Burke 2013; Reifsnider et al. 2013)
	Etonorgestrel levels decline with increasing body weight in individuals with the etonorgestrel implant. The implant may need to be replaced sooner than the standard 3 year interval. However, one study found no significant differences in failure rates by body mass (Xu et al. 2012)
	Serum medroxyprogesterone levels decline with increasing body mass index in patients using depot medroxyprogesterone acetate (DMPA) (Robinson and Burke 2013). DMPA has been associated with weight gain among obese adolescents (Centers for Disease Control and Prevention 2010)
	It remains unclear if there is a difference in efficacy for the combined hormonal patch, ring or pill. The risk of venous thromboembolism (VTE) is increased in women with obesity, but combined methods remain category 2 per the USMEC (Centers for Disease Control and Prevention 2010; Robinson and Burke 2013; Reifsnider et al. 2013)
Patients at risk for low bone mineral density (e.g., anorexia nervosa, wheelchair bound)	DMPA use can lead to a loss of bone mineral density (BMD). BMD can be regained after discontinuation, but the full implications of use (especially long term use) are unknown. This is not an absolute contraindication to use of DMPA among adolescents with or at risk for low BMD (Centers for Disease Control and Prevention 2010; American College of Obstetricians and Gynecologists 2006)
Smoking	The risk of VTE is increased in smokers using combined hormonal contraceptives. In the adolescent age group, this remains category 2 (Centers for Disease Control and Prevention 2010). Advise smokers to quit; advise non-smokers not to start
Hyperlipidemia	Initiation of combined hormonal contraceptives is category 3 (Centers for Disease Control and Prevention 2010)
Hypertension	Varies by level of blood pressure control; however, combined hormonal contraceptives are generally considered category 3 or 4, as estrogen may exacerbate hypertension (Centers for Disease Control and Prevention 2010)
Known thrombogenic mutation	Combined hormonal contraceptives are category 4 (Centers for Disease Control and Prevention 2010)
Depressive disorders	All methods are category 1 (Centers for Disease Control and Prevention 2010)
Diabetes mellitus	All methods are category 1 in patients without vascular disease (Centers for Disease Control and Prevention 2010). When vascular disease is present, consult the USMEC directly

**Table 1.6** (continued)

Condition	Special considerations
Anemia	A single, small study showed a potential decrease in bone pain among patients with sickle cell disease using DMPA (Manchikanti Gomez et al. 2007)
	The copper IUD may cause heavy menses and worsen anemia. This is category 2 (Centers for Disease Control and Prevention 2010)
	Combined hormonal contraceptives are category 2 for patients with sickle cell disease (Centers for Disease Control and Prevention 2010). Some providers and patients avoid these due to the increased risk of VTE
Migraine headaches	With aura: Combined hormonal contraceptives are category 4 due to increased risk of stroke (Centers for Disease Control and Prevention 2010)
	Without aura: Combined hormonal contraceptives are category 2 for initiation; category 3 to continue if migraines develop or worsen on the method (Centers for Disease Control and Prevention 2010)
Use of anticonvulsants	Phenytoin, carbamazepine, barbiturates, primidone, topiramate, and oxcarbazepine decrease efficacy of combined oral contraceptives and progestin only oral contraceptives. Use of these methods is category 3 (Centers for Disease Control and Prevention 2010). If used, contraceptive efficacy may be diminished and a minimum 30 mcg of ethinyl estradiol should be chosen
	Lamotrigine levels decrease while on combined oral contraceptives, and can then significantly increase during placebo week. Use of this method is category 3 (Centers for Disease Control and Prevention 2010). If used, consult with the patient's neurologist and consider using continuously to avoid alterations in lamotrigine levels during the placebo week once a steady state is achieved
HIV/AIDS	Recommendations vary based on stage of illness and medications. Consult the USMEC

Category 1 = no restrictions; 2 = benefits generally outweighs risks; 3 = risks generally outweighs benefits; 4 = contraindicated

## Describing Contraceptive Options to Teens

Once you have determined what options the patient is eligible for, describe the patient's contraceptive options to her in order of most effective to least effective (Table 1.7). Uptake tends to be higher for the options presented earliest in the conversation. Always recommend that the patient use barrier protection for STI prevention, in addition to any other form of contraceptive the patient chooses.

## Long-Acting Reversible Contraception (LARC)

LARC should be the first option that is discussed with most adolescent patients. This recommendation is now supported by the AAP and the American Congress of Obstetricians and Gynecologists (ACOG) (American Academy of Pediatrics Committee on Adolescence 2014; American College of

Obstetricians and Gynecologists 2012). LARC methods include IUDs (copper or levonorgestrel (LNG)-containing) and the implantable levonorgestrel rod. LARC methods are the most effective forms of contraception (other than abstinence) currently available. Return to conception is possible immediately upon device removal.

Despite recommendations to use LARCs as first-line methods among teens, many pediatric and adolescent health providers are less familiar with these methods. A recent review article highlighted a number of barriers that led to limited uptake of these reliable, first-line contraceptive devices, including: provider attitudes, misconceptions and lack of training; cost; concerns around consent and confidentiality; and patient misconceptions and lack of awareness (Kumar and Brown 2016).

Systems are in place to address barriers around cost, consent and confidentiality. Per the Affordable Care Act mandate in the US, contra-

**Table 1.7** Effectiveness of contraceptive options

<b>Most Effective</b>
Abstinence
Long-Acting Reversible Contraception (LARC): Intrauterine Devices (IUDs), implantable rods Depot-medroxyprogesterone acetate (DepoProvera®, “the shot”, “depo”)
Etonorgestrel-ethinyl estradiol vaginal ring (NuvaRing®, “the ring”); (contains estrogen and a progestin)
OrthoEvra® patch (contains estrogen and a progestin)
Combined hormonal oral contraceptives (contains estrogen and a progestin)
Progestin-only oral contraceptives
Barrier protection (most commonly, male condoms)
Other (e.g., you can consider discussing natural family planning, withdrawal, etc. depending on patient— these are all better than nothing!)
Nothing
<b>Least Effective</b>

Note: permanent sterilization is generally not offered as an option to adolescent patients

ception (including LARC) is now generally covered by insurance with no out-of-pocket cost unless the patient’s insurance company has an exempt status. With regard to confidentiality and consent, we gently encourage teens to involve their caregivers in all health-related decision-making, including reproductive health, when it is feasible and safe for them to do so. Some adolescents will do this on their own, while others will request that their provider help guide the discussion. However, many youth do not wish to discuss their reproductive health with their caregiver(s). Most jurisdictions allow adolescents to consent to their own reproductive healthcare. Providers should familiarize themselves with the minors’ consent laws in their own jurisdiction of practice. These are summarized by the Guttmacher Institute ([www.guttmacher.org](http://www.guttmacher.org)) and through the Center for Adolescent Health and the Law (<http://www.cahl.org>).

Providers should also be aware that some insurance providers send itemized bills, which may be addressed to the parent, to the home. This can lead to an accidental breach of confidentiality. If this is a concern to your patient, you may need to investigate the policies of their insurance provider and/or understand the billing policies of the clinic where the device will be

placed. Many jurisdictions provide funding to certain clinics where youth may be able to access contraceptive services without using their insurance.

If you are unable to place LARC devices in your office, consider accessing the website [www.bedsider.org](http://www.bedsider.org) for a list of providers who place LARCs. First and foremost, it is important that providers understand LARC options and provide accurate, positive messaging around LARC for the teens with whom they are working.

A review of the various LARC options is available in Table 1.8.

### Non-LARC Options

The other contraceptive methods mentioned above have been on the market for several decades with relatively high uptake among teens and providers. These methods will not be covered in detail in this update book. If providers or adolescents desire more information on any of the methods available, there are now a number of high-quality, internet based resources that can easily be accessed. [www.youngwomenshealth.org](http://www.youngwomenshealth.org) is factually accurate and suitable for teens of all ages. [www.bedsider.org](http://www.bedsider.org) is another excellent source of reliable information, presented in a teen-friendly format that includes “hooks” such as jokes, videos, infographics, and testimonials. It is a sex-positive site and potentially not developmentally suitable for young adolescents. This site can also be used to get free text reminders sent to patients’ phones for birth control pills, appointments and refills. A portion of the site is geared toward providers.

### Emergency Contraception

There are currently four methods of Emergency Contraception (EC) available in the United States: the copper IUD, ulipristal acetate (UPA), levonorgestrel EC (LNG-EC) and the Yuzpe method.

The copper IUD can be placed within 5 days of unprotected intercourse. This is the most effective EC (Cheng et al. 2012). The copper IUD has the added benefit of providing ongoing contra-

**Table 1.8** Long-acting reversible contraceptive options

	Procedure notes	Mechanism of action	Duration of contraceptive effectiveness		Other
Copper IUD (ParaGuard®)	Placement typically is done as an office procedure (though in special circumstances, such as girls with developmental delays, it can be done under anesthesia). Placement is typically well tolerated, though most	Copper ions kill sperm; may disrupt implantation though this is debated	10 years		Hormone free Menses continue with same regularity; may be heavier Can be used as emergency contraception if placed within 5 days of unprotected intercourse Can be placed immediately postpartum
Levonorgestrel (LNG) IUD (Mirena®, Liletta®, Kyleena®, and Skyla®)	patients experience some cramping at the time of the procedure. While it can vary by provider and patient, the actual procedure usually only takes a few minutes. There is an increased risk of infection during the first approximately 20 days after placement, likely related to introduction of microbes during the procedure. Ongoing increased risk of infection was a concern with a type of IUD that is no longer on the market due to the filaments that were used in the string of the IUD. Current IUDs have monofilament strings and do not promote infection. IUD's are considered safe even in patients with history of prior infection or multiple partners. Patients should be screened for gonorrhea and chlamydia at the time of placement, and treated if infection is present	Thickened cervical mucus diminishes number of sperm passing through cervix LNG causes thinning of endometrium and environment not amenable to sperm survival, fertilization or implantation	Liletta® (19 µg per day) Mirena® (20 µg per day)	5 years	Very low systemic hormone levels. Also highly effective (more than pill) at treating dysmenorrhea and at treating heavy menstrual bleeding/abnormal uterine bleeding Periods typically become lighter and less frequent over time (approximately 90% of patients). Approximately 40% of patients will develop amenorrhea
			Skyla® (14 µg per day)	3 years	Even lower systemic hormone levels than Mirena/Liletta. Most patients continue to have regular periods
Etonorgestrel (ENG) implant (Nexplanon®)	Inserted into arm, procedure is very simple with minimal discomfort and is typically done in the office. Training is easy to obtain; needs to be done through the pharmaceutical company	Thickened cervical mucus diminishes number of sperm passing through cervix ENG effects within uterus leads to thinning of endometrium and environment not amenable to sperm survival, fertilization or implantation Inhibition of ovulation	3 years		Radio-opaque

ceptive benefit for up to 10 years. Use of this method requires access to a provider trained to place the copper IUD within 5 days of unprotected intercourse, and willingness/desire of the young woman to undergo the procedure.

Ulipristal acetate (UPA) 30 mg is the most effective oral form of EC (Glasier et al. 2010). UA is a selective progesterone receptor modulator and can prevent or delay ovulation even after luteinizing hormone (LH) starts to peak (Gemzell-Danielsson 2010). UPA is therefore the superior option for use right around the time of ovulation. UPA requires a prescription from a provider in some jurisdictions and can be dispensed directly by the pharmacist in other jurisdictions. UPA is not stocked by all pharmacies. It can be obtained online and shipped overnight through PRJKT RUBY ([www.prjkruby.com](http://www.prjkruby.com)).

Levonorgestrel (LNG-EC) 1.5 mg is available without a prescription to males and females, and is the most widely used form of EC in the United States. It is less expensive than UPA. LNG-EC is most effective when used within 72 h of unprotected intercourse, but maintains some efficacy out to 5 days (120 h); LNG-EC is not effective once LH starts to peak (Gemzell-Danielsson 2010). LNG-EC is superior to the Yuzpe method, which involves taking multiple combined hormonal contraceptive pills 12 h apart. Dosing regimens by type of OCP can be found at [www.bedsider.org](http://www.bedsider.org), but are not included here because this method is generally no longer utilized due to the wide availability of other, more effective options.

The risk of pregnancy is highest around the time of ovulation; sperm can live for up to 5 days in the reproductive tract. Ovulation occurs 14 days prior to the menstrual period. Predicting the date of the next menstrual period, and therefore determining the expected fertile window, can be more difficult in teens who are not yet regular and are still having anovulatory cycles. However, if the patient is felt to be within her fertile window, we recommend more strongly considering the IUD or UPA even if somewhat more difficult to obtain. The effectiveness of medical EC is also diminished in women with a BMI >25 kg/m<sup>2</sup>; the copper IUD remains the most effective option, but

among medication options, UPA is preferred (Glasier et al. 2011). For all young women, regardless of fertility timing or weight status, the use of LNG-EC is preferred over nothing. Obtaining a copper IUD or UPA is often more difficult and costly than obtaining LNG-EC, and this must be taken into consideration.

EC is not intended for use as regular contraception. Adolescents seeking EC should be counseled on their options for reliable contraception moving forward, as well as on the benefits of consistent condom use.

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## Heavy Menstrual Bleeding

The AAP and ACOG have jointly endorsed a statement describing the importance of considering menstruation to be a “vital sign” among adolescent girls, as a means by which to assess development and to identify pregnancy and a number of potentially serious pathologies including nutritional problems, endocrinopathies, and bleeding disorders (American College of Obstetricians and Gynecologists 2015). The median age of menarche for girls in the United States is 12.43; 90% of all US girls have achieved menarche by age 13.75 (Chumlea et al. 2003).

Adolescent bleeding patterns may vary somewhat from adult patterns (Table 1.9). Anovulatory cycles are common in the first 1–5 years following menarche, with prevalence decreasing over time. Up to 85% of cycles may be anovulatory during the first year after menarche, and up to 44% by 4 years after menarche (Holland-Hall 2013). Anovulatory cycles can lead to irregular bleeding; being familiar with the range of adolescent menstrual patterns can help the clinician distinguish between normal and pathological bleeding.

Heavy menstrual bleeding (HMB) is a common presenting gynecologic complaint among adolescents. HMB can significantly impact a teen’s quality of life, including school attendance and sports participation, and can lead to severe anemia. Heavy menstrual bleeding has been defined as prolonged bleeding (more than 7 days) or blood loss greater than 80 mL per cycle among adult women, but these may not be appropriate

**Table 1.9** Normal menstrual cycles in adolescent girls (American College of Obstetricians and Gynecologists 2015)

Menarche (median age)	12.43 years
Mean cycle interval	32.2 days in first gynecologic year
Menstrual cycle interval	Typically 21–45 days
Menstrual flow length	7 days or less
Menstrual product use	3–6 pads or tampons per day

**Table 1.10** Warner Criteria-Factors correlated with blood loss >80 mL per cycle

1. Rate of changing sanitary products (>every 1–2 h)
2. Clot size >30 mm
3. High total number of products used
4. Subnormal ferritin level
5. Need to change sanitary protection during the night

cutoffs for adolescents and are of questionable clinical significance even among adults (Warner et al. 2004a). Regardless, quantifying blood loss can be difficult among both adolescents and adults. The Warner criteria (Table 1.10) list clinical features that are associated with blood loss of >80 mL per cycle (Warner et al. 2004b). The Pictorial Bleeding Assessment Chart (PBAC) is a scoring tool that is widely used for adult women to identify those with clinically significant bleeding (Higham et al. 1990). Both of these assessment tools were developed in adult women and might not be as accurate in teens.

## Evaluation

In the absence of any validated screening tool for adolescents, clinicians are called upon to take a careful and detailed history from adolescent patients presenting with a complaint of heavy menstrual bleeding. History should include all of the factors described above in Tables 1.9 and 1.10. Cycle interval is standardly defined as the interval from first day of one menstrual period to the first day of the next menstrual period. It can be helpful to have patients give the date of the

first day of bleeding for their last few cycles, if possible. Many free smart phone apps are available for girls to track their periods.

Clinicians should inquire if the patient perceives their flow to be normal, heavy or light, and further define this by asking how often pads or tampons are changed; absorbency level of pads or tampons that are used (e.g., super plus, super, regular, light, overnight, etc.); level of soiling of the product when changed (this may be aided by use of the PBAC, which is readily available online using any search engine); history of soaking through pad or tampon in 1 hour or less; need for simultaneous use of a pad and a tampon to prevent soaking through onto clothing or bedding; passing clots greater than the size of a quarter or large grape; or flooding or gushing (Holland-Hall 2013). It is also helpful to define if the patient’s bleeding pattern has changed dramatically over time.

If the patient does have a bleeding pattern that is clinically abnormal, the clinician should proceed with a comprehensive evaluation. The differential diagnosis for heavy menstrual bleeding is extensive and a thorough history and examination can help guide further testing. In 2011, the International Federation of Gynecology and Obstetrics proposed use of the PALM-COEIN mnemonic (**p**olyp, **a**denomyosis, **l**eiomyoma, **m**alignancy and hyperplasia, **c**oagulopathy, **o**varian dysfunction, **e**ndometrial, **i**atrogenic and **n**ot yet classified) to classify potential causes of abnormal uterine bleeding and create consistent nomenclature among providers (American College of Obstetricians and Gynecologists 2013). The etiologies included in the “PALM” part of the mnemonic are rare in adolescents, but this may serve as a familiar framework for some clinicians and reminds pediatric and adolescent clinicians to attend to anatomic causes. A more detailed list of causes of abnormal uterine bleeding in adolescent girls is included below (Table 1.11).

## History

A careful review of systems can substantially help the clinician narrow down their differential diagnosis. Questions should include screening for