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TECHNICAL REPORT
Contraception for Adolescents

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KEY WORDS
contraception, adolescent, birth control, intrauterine device, contraceptive implant, oral contraceptive pills, contraceptive injection

ABBREVIATIONS
AAP—American Academy of Pediatrics
ART—antiretroviral therapy
BMD—bone mineral density
CDC—Centers for Disease Control and Prevention
COC—combined oral contraceptive
DMPA—depot medroxyprogesterone acetate
EC—emergency contraception
FDA—US Food and Drug Administration
HIPAA—Health Insurance Portability and Accountability Act
IUD—intrauterine device
LARC—long-acting reversible contraception
POP—progestin-only pill
STI—sexually transmitted infection
VTE—venous thromboembolism

abstract

A working knowledge of contraception will assist the pediatrician in both sexual health promotion as well as treatment of common adolescent gynecologic problems. Best practices in adolescent anticipatory guidance and screening include a sexual health history, screening for pregnancy and sexually transmitted infections, counseling, and if indicated, providing access to contraceptives. Pediatricians' long-term relationships with adolescents and families allow them to help promote healthy sexual decision-making, including abstinence and contraceptive use. Additionally, medical indications for contraception, such as acne, dysmenorrhea, and heavy menstrual bleeding, are frequently uncovered during adolescent visits. This technical report provides an evidence base for the accompanying policy statement and addresses key aspects of adolescent contraceptive use, including the following: (1) sexual history taking, confidentiality, and counseling; (2) adolescent data on the use and side effects of newer contraceptive methods; (3) new data on older contraceptive methods; and (4) evidence supporting the use of contraceptives in adolescent patients with complex medical conditions. *Pediatrics* 2014;134:e1257–e1281

INTRODUCTION

Pediatricians play a key role in adolescent sexual health and contraception. Sexual health is an important part of adolescent anticipatory guidance and screening, and pediatricians' long-term relationships with adolescents and families allow them to help promote healthy sexual decision-making, including abstinence and contraceptive use. Additionally, medical indications for contraception, such as acne, dysmenorrhea, and heavy menstrual bleeding, are frequently uncovered during adolescent visits. A working knowledge of contraception will assist the pediatrician in both sexual health promotion as well as treatment of common adolescent gynecologic problems. This technical report provides the pediatrician with updated information on adolescent sexual behavior, guidelines for counseling adolescents, and an update on available methods of contraception. It is a companion to the policy statement "Contraception for Adolescents."[1]

ADOLESCENT SEXUAL BEHAVIOR AND USE OF CONTRACEPTION

Sexual intercourse is common among adolescents. In 2011, 47% of high school students reported ever having had sex, and 34% reported having had sex in the previous 3 months.[2] For the pediatrician, this means that approximately half of their adolescent patients have engaged in sex,

many without adequate protection against pregnancy and sexually transmitted infections (STIs).

Unintended pregnancy is a serious adolescent morbidity, and use of effective contraception is one of the pillars of adolescent pregnancy prevention. Each year, approximately 750 000 adolescent girls become pregnant, and 82% of these pregnancies are unplanned.[3,4] More than half of these pregnancies (59%) end in births, 14% end in miscarriages, and 27% end in abortion.[3] From 1990 to the early 2000s, adolescent pregnancy rates declined markedly, and 86% of this decline was attributable to increased consistent contraceptive use (the remainder was attributed to delay of sexual activity).[5] By 20 years of age, 18% of young women will have given birth, and this number is largely unchanged from 2002.[6]

The contraceptive method most commonly used by adolescents is the condom (96% of young women who have ever used a contraceptive reported previous condom use), followed by withdrawal (57%) (see Table 1). Among hormonal methods, experience with combined oral contraceptives (COCs) is most common (56%), followed by depot medroxyprogesterone acetate

TABLE 1 Lifetime Use (Ever-Use) of Contraception Among Sexually Experienced Women Aged 15 to 19 Years: United States, 2006 to 2010

Method	% Distribution
Any method[188]	98.9
Injectable	20.3
Pill	55.6
Contraceptive patch	10.3
Contraceptive ring	5.2
Emergency contraception	13.7
Condom	95.8
Female condom	1.5
Periodic abstinence—calendar	15.0
Withdrawal	57.3
Other methods	7.1
Long-acting reversible contraceptives (IUDs and implants)[64]	4.5

(DMPA) injection (20%), the transdermal patch (10%), and the vaginal ring (5%). More than 13% of adolescents have ever used emergency contraception (EC), and 15% have ever used periodic abstinence. However, ever having used a method does not necessarily translate into consistent or current use. When a nationally representative sample of all 15- to 19-year-old adolescent girls were asked about current use (past 3 months), 28% reported any contraceptive use. The pill was most commonly used (15%), followed by condoms (6%), DMPA (3%), and withdrawal, the contraceptive ring, and the intrauterine device (IUD) (all approximately 1%). The transdermal patch was less than 1% (see Table 2). Experience with long-acting reversible contraception (LARC), such as IUDs and implants, has increased markedly in 15- to 19-year-olds over the past decade, with the bulk of the increase in the 18- to 19-year age range. By 2009, it was estimated that 4.5% of contraceptive use was an IUD or implant.[4]

SETTING THE STAGE: CONFIDENTIALITY, CONSENT, AND THE SEXUAL HISTORY

Sexual history taking and counseling about pregnancy prevention, including contraceptive use, are key Bright Futures objectives for the adolescent visit.[7] The demands of these tasks can be managed by situating them in an adolescent's medical home. Because of pediatricians' ongoing relationships with adolescents and families, they are optimally suited for this role.[7] The following sections outline the evidence base for key elements relevant to contraceptive care, including confidentiality and consent, sexual history taking, and counseling.

Confidentiality and Consent

In the setting of contraception and sexual health care, the American Academy of

Pediatrics (AAP) believes that policies supporting adolescent consent and protecting adolescent confidentiality are in the best interests of adolescents. Most states have specific laws regarding minor consent to contraception (see "State Minor Consent Laws: A Summary"[8] and the Guttmacher Institute's State Center[9] for regularly updated state-by-state summaries). For states without specific laws, best-practices guidelines, federal statutes, and federal case law may support minor confidentiality and consent.[10] For example, family-planning clinics funded by Title X of the federal Public Health Services Act (42 USC §§300–300a-6 [1970]) are required to provide confidential services to adolescents.[8]

The Health Insurance Portability and Accountability Act (HIPAA [Pub L No. 104-191, 1996]) specifically addresses minor confidentiality. Although HIPAA allows parents access to adolescents' records as personal representatives of the minor, that access is denied when the minor can consent under state or other laws, or when the parent agrees that the minor may have confidential care.[10] The AAP, therefore, recommends that pediatricians have an office policy that explicitly describes confidential services and that pediatricians discuss (and document) confidentiality with all parents and adolescents. As an additional protection for minors' confidentiality, HIPAA states that if there is no applicable state law about the rights of parents to access the protected health information of their children, pediatricians (or other licensed health professionals) may exercise their professional judgment to provide or deny parental access to the records. This can be accomplished with careful documentation of their professional judgment.

Insurance billing, electronic health record systems, and patient portals create additional challenges to maintaining the

TABLE 2 Current Contraceptive Use by Method of Women Aged 15 to 19 Years: United States, 2006 to 2008[162]

Contraceptive Status and Method	% Distribution
Using contraception	28.2
Pill	15.2
Implant, Lunelle, or patch	0.5
3-mo injectable (Depo-Provera)	2.6
Contraceptive ring	1.0
IUD	1.0
Condom	6.4
Withdrawal	1.1
Not using contraception	71.8
Nonsurgically sterile—female or male	0.5
Pregnant or postpartum	3.9
Seeking pregnancy	0.9
Other nonuse:	
Never had intercourse or no intercourse in 3 mo before interview	60.0
Had intercourse in 3 mo before interview	6.5

confidentiality of visits, visit content, and associated laboratory testing that will need to be considered. The AAP policy statement on electronic health records supports privacy policies consistent with state health care consent laws and best practices around sensitive health topics such as sexual behavior and contraception.[11]

Importance of Confidentiality and Consent

Careful attention to minor consent and confidentiality are important, because confidentiality is a major concern of adolescents[12] and a reason for foregoing contraceptive care. In a nationally representative sample, adolescents most in need of confidential health services (eg, sexually active girls) were more likely to cite confidentiality as a reason for foregoing health care.[13] Confidentiality concerns are heightened among adolescents from underrepresented minority groups[14,15] and other groups at high risk of unintended pregnancy (eg, those involved with the juvenile justice system; lesbian, bisexual, and transgender; and lower-income youth).[16,17] Many adolescents

are unaware they can obtain confidential health care,[18] presenting a potential barrier to access to contraceptive services.

Limitations on adolescents' confidentiality and their ability to consent have been associated with lower use of contraceptive services and poor outcomes. Among minors attending family-planning clinics, young women reported that if parental notification were required for prescriptive contraceptives, only 1% would stop having vaginal sex, but 59% would stop using all clinic services.[19] Among young African American women, fear of family finding out about sexual health services was a common reason to delay a first clinic visit for contraception.[20] On a population level, minors' capacity to consent to contraceptives has been associated with lower adolescent birth rates,[21] and restrictions on minors' capacity to consent to contraceptives have been associated with higher birth rates.[22]

Parents

The relationship among parents, confidentiality, and access is complex. Many parents are supportive of minor consent and confidentiality for sexual health services. In a national Internet-based survey, 66% of parents agreed that it was important for adolescents to have private time with physicians, and more than half (54%) of parents did not want doctors to disclose confidential information obtained from adolescents to parents.[23] Many parents are aware that their adolescents use confidential sexual health services. A national study of adolescent family-planning clinic clients revealed that 60% of adolescents reported that their parents were aware of their use of sexual health services.[24] Among adolescents whose parents were aware of their sexual health service use, 79% would continue to use the services, even if parental notification were required; however, among adolescents

whose parents were unaware of their sexual health services use, fewer than 30% would continue to use services.[24]

Sexual History Taking and Counseling

Taking a Sexual History

Adolescents consider pediatricians and other health care providers a highly trusted source of sexual health and other confidential information.[25,26] When pediatricians discuss sensitive topics with adolescents, instead of reporting discomfort, adolescents reported that the pediatrician understood their problems, eased their worries, and allowed them to make treatment decisions.[27] Best-practices guidelines require that the sexual history be taken with the adolescent alone.[7] Key to history taking is an honest, caring, nonjudgmental attitude and a comfortable, matter-of-fact approach to asking questions. This can be accomplished by using the "5 Ps" tool of the Centers for Disease Control and Prevention (CDC): partners, prevention of pregnancy, protection from STIs, sexual practices, and past history of STIs and pregnancy (see http://www.cdc.gov/std/treatment/SexualHistory.pdf).[28]

Contraceptive counseling should be developmentally targeted, because the sexual health and contraceptive needs of early adolescents differ markedly from those of middle and late adolescents. Even among same-age adolescents, there is often a wide range in adolescents' sense of themselves as a sexual being, their sexual experiences, and their interest and need for contraception. For example, a study of early adolescents described views and behaviors ranging from considering sex to be "nasty" and something best left to adults, to an intense curiosity about and initiation of sexual behaviors.[29] Bright Futures provides sample questions and guidance for a developmentally tailored sexual history.[7]

Counseling Using Motivational Interviewing

Increasing evidence from studies of adolescents suggests that individual counseling about contraception and sexual health topics is most effective using patient-centered approaches, such as motivational interviewing.[30,31] Motivational interviewing can be used to address the ambivalence and discrepancies among adolescents' sexual and contraceptive behaviors, their sexual and relationship values, and future life goals. Key elements are (1) an empathetic and nonjudgmental interviewer with unconditional positive regard for the adolescent in a safe, nonthreatening environment; (2) engaging adolescents in their own behavior change; (3) asking adolescents about their goals, and helping them identify inconsistencies between their goals and current behavior; (4) "rolling with resistance," or avoiding direct confrontation when resistance is met, and waiting for adolescents to find their own answers rather than pointing them out; and (5) supporting adolescents' capacity to change.[32,33] Motivational interviewing is a natural extension of youth development principles in its focus on goals and future orientation, belief in adolescents' capacity to change, and engagement of adolescents in the process of adopting health-promoting behaviors.[34]

Motivational interviewing is accomplished through open-ended questions and careful listening.[32,33] In the context of pregnancy prevention and sexual health promotion, discussions might explore the adolescent's reasons for becoming sexually active and the effect that sexual intercourse and unintended pregnancy may have on relationships with peers, parents, and significant others.[35] For example, does the adolescent believe that sex will deepen a relationship?[36] Or is sexual behavior or pregnancy considered a marker for adulthood?[37] A motivational interviewing approach to contraceptive counseling might also focus on adolescents' goals (examples of goals linked to sexual decision-making include school completion, college, marriage, and childbearing[37]), and how contraception and the delay of pregnancy might affect those goals.[35] An example of an inconsistency between goals and behaviors might be the adolescent who expresses a desire to graduate from high school and attend college but is frequently engaging in unprotected sex, putting her at risk for an unintended pregnancy.

A common concern of pediatricians is giving complex messages to adolescents: in the case of sexual behavior, the complex message is that a pediatrician would like to encourage abstinence but also is willing and able provide appropriate counseling regarding sexuality and contraception. With motivational interviewing approaches, it is possible and appropriate for pediatricians to provide this type of complex message, because the focus is on the adolescents' values and relationships and related goals and discrepancies between goals and behaviors. Research suggests that adolescents are capable of understanding this type of complex message and, in fact, may disregard messages that they consider judgmental or overly simplified or that eliminate key health information.[25,26] More detailed information on motivational interviewing with adolescents can be found in recent publications.[35,38]

Abstinence Counseling in the Office Setting

Counseling about abstinence is an important component of sexual health care. When used consistently without exception, abstinence can be an effective means of contraception and STI prevention and is a viable strategy in the pediatrician's toolkit for reducing unintended pregnancy and STIs. It has been estimated that approximately one-quarter of the decline in the adolescent pregnancy rates from 1995 to 2002 was attributable to the delayed initiation of sexual activity.[5] Abstinence counseling should follow the motivational interviewing approaches described previously. A set of practical tips for abstinence counseling within an office-based setting has been published, and it uses a comprehensive motivational interviewing perspective.[35]

When adhered to perfectly, sexual abstinence is 100% effective, making it an attractive choice for pregnancy prevention. However, many adolescents who practice abstinence do not adhere to the method 100% of the time (ie, they occasionally have vaginal-penile intercourse). Few data exist on actual effectiveness of abstinence (called "typical use," see explanation in Methods of Contraception)[39]; however, existing data suggest that the effectiveness of abstinence for pregnancy and STI prevention over extended periods of time is likely low. For example, among adolescents reporting virginity pledges in the National Longitudinal Study of Adolescent Health, at 6-year follow-up (wave 3), 88% had engaged in sexual intercourse (most premarital), and 5% were infected with STIs.[40] Because of concerns about a low typical-use effectiveness of abstinence as a contraceptive method, it is critical for pediatricians to reassess intentions to remain abstinent at every visit and additionally to provide access to comprehensive sexual health information, including information about EC and condom use. Comprehensive information, including pregnancy prevention, should be provided to all adolescents, including those who identify as lesbian and gay, because they may have opposite-sex partners as well.[17]

METHODS OF CONTRACEPTION

Numerous reviews and recommendations for prescribing and managing

contraception are available (see, for example, *Contraceptive Technology*[41] and the CDC's "US Selected Prescribing Recommendations for Contraceptive Use"[42]). Additionally, there are online resources for prescribing contraceptives geared toward clinicians (see Table 3). The following section focuses on the appropriateness of various methods available for adolescents.

When comparing the efficacy of different contraceptive methods, it is important to distinguish "perfect use" and "typical use." Perfect-use efficacy refers to the probability of pregnancy if used consistently and correctly every time; data for perfect use come from clinical trials with very high levels of adherence.[43] Typical-use efficacy refers to the probability of pregnancy during the first year of typical use; data for typical-use efficacy come from national surveys that include users with varying degrees of adherence.[43] Thus, the typical-use efficacy rates reflect how well a contraceptive method works with an average user, factoring in mistakes, such as missed pills, forgotten condoms, or patches that are left on too long. Table 4 includes perfect- and typical-use data for all contraceptive methods. The individual methods appropriate for adolescents are addressed hereafter, discussed in order of effectiveness, starting with LARC. It is recommended that pediatricians use a "tiered" approach to contraceptive counseling, starting with the most effective methods.

Progestin Implants

Currently available progestin implant LARC methods include Implanon and Nexplanon (Merck, Whitehouse Station, NJ). Both consist of a single-rod implant that contains etonogestrel, the active metabolite of desogestrel; Nexplanon also contains barium sulfate to render it visible on radiography. The implant, highly effective with a failure rate of less than 1%,[43,44] may remain in place for 3 years. It is inserted into the inside of the nondominant upper arm, 6 to 8 cm above the elbow, by a medical professional who has completed the requisite training. Insertion takes approximately 1 minute, and removal can be accomplished in under 5 minutes.[45] Complications are rare but include transient nerve injury and the need for removal under general anesthesia.[44,46,47]

Implants are ideal for adolescents who prefer a method that does not require regularly scheduled adherence and who desire an extended length of protection. Authors in Brazil have identified it as a viable option for delaying second pregnancy in adolescent mothers.[48] In Australia, a prospective study was conducted of 137 adolescent mothers, 18 years or younger.[49] Participants selected their own method, with half choosing the implant and the remainder choosing COCs, DMPA, a barrier method, or nothing. Both method continuation and time to next pregnancy were significantly longer in implant users. It must be noted, however, that there were key differences be-

tween the users of the implant and users of other methods. For example, implant users were significantly more likely to be living with the birth father rather than one of their own parents. In addition, more than half of implant users discontinued their method earlier than 24 months, with the most common reason being abnormal uterine bleeding. This is consistent with observational studies (as opposed to clinical trials, which tend to enroll and retain more adherent contraception users) describing continuation rates and bleeding patterns in adult users.[50,51] In a published summary of 11 clinical trials that included a total of 942 women within 80% to 130% of their ideal body weight, 64% reported amenorrhea or infrequent bleeding over the first 2 years, and 15% reported frequent or prolonged bleeding.[52] This may differ from clinicians' anecdotal experience in part because heavier women may have more bleeding than lighter women.[53] Unlike most other continuous methods, it is not clear that implant users experience improved bleeding patterns over time.[54] Experience in the first 3 months may help predict future bleeding patterns,[53] but individual experience is highly variable. Although bleeding is frequent with all progestin-only methods, it is important to remember that unscheduled bleeding can also be a sign of an STI, and adolescents should be tested accordingly. Data are limited, but experts have recommended the use of nonsteroidal anti-inflammatory drugs and/or COCs

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TABLE 3 Online Contraceptive and Sexual Health Resources for Providers

Centers for Disease Control and Prevention	
US Selected Practice Recommendations for Contraceptive Use, 2013	http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6205a1.htm?s_cid=rr6205a1_w
Counseling Resources: Teen Pregnancy Prevention	http://www.cdc.gov/teenpregnancy/healthcareproviders.htm
US Medical Eligibility Criteria for Contraceptive Use, 2010	www.cdc.gov/mmwr/pdf/rr/rr59e0528.pdf
Contraceptive Technology	http://www.contraceptivetechnology.org/reproductive-health-resources/training-videos-slides/
Association of Reproductive Health Professionals Web site	www.arph.org/
Managing Contraception	www.managingcontraception.com/ga
World Health Organization Medical Eligibility for Contraceptive Use	http://whqlibdoc.who.int/publications/2010/9789241563888_eng.pdf
Princeton University Emergency Contraception Web site	ec.princeton.edu/

TABLE 4 Contraceptive Method Efficacy

Method	% of Women Experiencing an Unintended Pregnancy Within the First Year of Use		% of Women Continuing Use at 1 Year[c]
	Typical Use[a]	Perfect Use[b]	
No method	85	85	—
Spermicides (foams, creams, gels, suppositories, and film,)	28	18	42
Fertility awareness-based methods	24	—	47
Withdrawal	22	4	46
Condom			
Female	21	5	41
Male	18	2	43
Diaphragm	12	6	57
Combined pill and progestin-only pill	9	0.3	67
Contraceptive patch	9	0.3	67
Contraceptive ring	9	0.3	67
DMPA injection	6	0.2	56
IUD			
Copper T	0.8	0.6	78
Levonorgestrel	0.2	0.2	80
Single-rod contraceptive implant	0.05	0.05	84
Female sterilization	0.5	0.5	100
Male sterilization	0.15	0.10	100

—, data not available.

Source: Trussell J. Contraceptive failure in the United States. *Contraception*. 2011;83(5):397–404.

[a] Among typical couples who initiate use of a method (not necessarily for the first time), the percentage who experience an unintended pregnancy during the first year if they do not stop use for any other reason. Estimates of the probability of pregnancy during the first year of typical use for spermicides, withdrawal, periodic abstinence, the diaphragm, the male condom, the pill, and Depo-Provera are taken from the 1995 and 2002 National Survey of Family Growth, corrected for underreporting of abortion; see the text for the derivation of estimates for the other methods.

[b] Among couples who initiate use of a method (not necessarily for the first time) and who use it perfectly (both consistently and correctly), the percentage who experience an unintended pregnancy during the first year if they do not stop use for any other reason.

[c] Among couples attempting to avoid pregnancy, the percentage who continue to use a method for 1 year.

as potentially helpful measures to manage implant-related bleeding.[54]

Other than irregular bleeding, adverse effects are not common, but include emotional lability, weight gain, headache, and acne.[52] Data are scant on the effect of the implant on bone mineral density (BMD).[55–57] Given the higher estradiol level in implant users compared with DMPA users,[54] it could be presumed that the implant has less effect on BMD, but this has not been adequately assessed in adolescent women. Similar to the combined hormonal methods, efficacy is impaired by hepatic enzyme-inducing drugs (see Table 5); however, implants are considered safe for women with estrogen contraindications.[58]

For adolescents who need highly effective contraception that is user- and coitus-independent, the implant is an outstanding choice. However, it is critical that the risk of persistent irregular bleeding is well understood; to date, this is the most common complaint resulting in premature removal. For adolescents seeking hormonal methods specifically to manage abnormal uterine bleeding and irregular cycles, a combined method or a levonorgestrel IUD may be more acceptable to the patient.

Intrauterine Contraception

IUDs are inserted into the uterus to provide long-acting reversible contraception. Appropriate for adolescents, IUDs are generally safe, effective methods of contraception with a failure rate of less than 1% (see Table 4).[43] Three IUDs currently are approved for the US market: a copper-containing T-shaped IUD (copper T380-A, ParaGard; Teva North America, North Wales, PA) and 2 levonorgestrel-releasing T-shaped IUDs (52-mg levonorgestrel, Mirena, and 13.5-mg levonorgestrel, Skyla; Bayer HealthCare Pharmaceuticals Inc, Wayne, NJ). The primary mechanism of action of both types of IUD is preventing fertilization by inhibiting sperm motility. The levonorgestrel IUDs also thicken cervical mucus. All mechanisms occur before implantation, when pregnancy begins, and inhibiting implantation is not believed to be a primary mechanism of action for either type of IUD.[59] The 13.5-mg levonorgestrel IUD is approved for 3 years.[60] The 52-mg levonorgestrel IUD is approved for 5 years,[61] although data suggest that it is still effective at least up to 7 years; similarly, the copper T380-A IUD is approved for 10 years,[62] but data support use for 12 years.[63] Although IUDs have very low use in the United States, they are used extensively worldwide, and use is increasing in the United States, particularly among older adolescents.[64]

Previous concerns about adolescents and IUDs have been addressed by more recent data demonstrating that IUDs are safe for nulliparous adolescents. For example, a case-control study demonstrated that past associations between infertility and IUD use among nulliparous women were attributable to STIs rather than IUDs.[65] Other studies support a rapid return to fertility after IUD removal.[66,67] Data also address concerns about pelvic infections. There is a small increase in infection risk around the time of IUD insertion as a result of the procedure. However, beyond the first 20 days after insertion, IUDs do not increase rates of pelvic inflammatory disease (PID) above baseline.[68,69] Screening for gonorrhea and *Chlamydia* can be performed at the same time as insertion.[59] Any necessary treatment can be subsequently provided without IUD removal, as international studies have demonstrated that STIs

TABLE 5 Medications That Decrease COC Efficacy

Antibiotics
  Rifampin
Anticonvulsants
  Felbamate
  Ethosuximide
  Primidone
  Phenobarbital
  Phenytoin (Dilantin)
  Carbamazepine
  Oxcarbazepine
  Lamotrigine[a]
  Rufinamide[a]
  Topiramate
Antidepressants
  St. John's wort[b,c]

Source: World Health Organization. *Medical Eligibility Criteria for Contraceptive Use.* 4th ed. Geneva, Switzerland: World Health Organization; 2009.

[a] Fewer data are available for these newer antiepileptic drugs, but available data suggest they can decrease COC effectiveness.

[b] Advantages of COC use generally outweigh the risks.

[c] Murphy PA, Kern SE, Stanczyk FZ, Westhoff CL. Interaction of St. John's Wort with oral contraceptives: effects on the pharmacokinetics of norethindrone and ethinyl estradiol, ovarian activity and breakthrough bleeding. *Contraception.* 2005;71(6):402-408.

and PID can be treated with the IUD in place,[70] as long as the patient improves with treatment. As a result, there are now more limited infectious contraindications to IUDs. These include current or recent (past 3 months) PID or current gonorrhea, *Chlamydia,* or purulent cervicitis. Additional contraindications include pregnancy and uterine anomalies that distort the uterine cavity in a manner incompatible with IUD insertion (see CDC recommendations for complete list[58]). HIV infection and immunosuppression are not contraindications to IUD use.

The one area with less clarity is that, for insertion of IUDs (but not continuation), "high risk of STIs" is considered by the CDC to be level 2 (benefits generally outweigh risks) or level 3 (risks generally outweigh benefits, but clinician may individualize). However, the data supporting the level 3 categorization are from a study of HIV-infected adult women in Africa.[58] Beyond STI risk, existing concerns about IUD use in adolescents are that rates of expulsions

and experiences of pain and discomfort are somewhat higher among nulliparous compared with parous young women. Nonetheless, current data suggest that IUDs are generally well tolerated in young women and that continuation and satisfaction rates are high.[71–74]

Adolescent-specific data are limited on acceptability and use of IUDs for contraception; however, recent studies are promising, suggesting 1-year continuation rates of 75% or greater.[75–78] The data on levonorgestrel IUD use for medical indications in adolescents reveal improvement in dysmenorrhea and heavy menses.[76,79] The levonorgestrel IUD is also useful for adolescents with medical conditions that require long-term menstrual suppression in which estrogen is contraindicated or that present a serious risk to the fetus in the case of unintended pregnancy. For example, use of the levonorgestrel IUD with disabled nonambulatory adolescents allows effective menstrual suppression while avoiding both exogenous estrogen exposure and the bone-density effects of DMPA.[78,80] Levonorgestrel IUDs also provide an important option for adolescent bariatric surgery patients, for whom experts recommend a delay of pregnancy of at least 12 to 18 months after surgery but who often experience a rapid return to fertility after surgery.[81] Barriers to pediatricians inserting IUDs, such as lack of training, lack of office capacity, or not seeing enough patient volume to maintain skills, pose an access problem, which can be overcome by identifying specific providers in the community to whom these patients can be referred.

Progestin Injections

DMPA, also known by the brand name Depo-Provera (Pfizer, New York, NY) is a long-acting progestin that is given as a single injection every 13 weeks (up to 15 weeks) using a dose of either 150 mg

delivered intramuscularly or 104 mg delivered subcutaneously; the feasibility of self-administration of the latter is currently under investigation. Both regimens have similar effectiveness and side effects.[82] DMPA can be initiated on the same day as the visit ("mid-cycle" or "quick" start). The CDC states that even if pregnancy cannot be definitively ruled out, the benefits of initiating DMPA exceed the risks and that DMPA can be initiated at any time, with a follow-up pregnancy test in 2 to 4 weeks.[42]

DMPA is highly effective in preventing pregnancy. In the first year of use, the probability of becoming pregnant by typical users is approximately 6% (perfect use is 0.2%; see Table 4).[43] Some experts believe that the use of DMPA, which first became available in the United States in 1992, is one factor responsible for the declining rates of adolescent pregnancy in the United States.[5,83]

DMPA is convenient for many adolescents because of its ease of use compared with coitus-dependent methods or those that require daily, weekly, or monthly adherence. Other advantages, similar to combined hormonal methods, include improvement in dysmenorrhea and protection against iron-deficiency anemia and endometrial cancer.[84] DMPA may be safely recommended for adolescents who are lactating[85] and most of those who have chronic illnesses.[58] It may provide additional benefits in some circumstances, for example, by raising the seizure threshold[85] and decreasing sickle cell crises.[87,88] Despite recent work suggesting that DMPA may result in an increased risk of venous thrombosis,[89] for patients at risk for estrogen-related complications, the advantages of DMPA are still believed to outweigh the risks.[58]

The major disadvantages of DMPA for adolescents are menstrual cycle irregularities (present for nearly all patients initially), the need for an

injection every 13 weeks, and potential adverse effects, including weight gain and interference with normal increases in bone density. Other adverse effects include headache, mastalgia, hair loss, and change in libido. Although rare, anaphylaxis to DMPA has been described.[90]

The irregular bleeding associated with DMPA typically improves over time.[91,92] Studies have demonstrated that patients are more likely to continue DMPA use if they are counseled about adverse effects before their first injection, but these studies did not target adolescents specifically.[93,94] Long-term DMPA use is also associated with a delayed return to fertility, typically 9 to 18 months, while the endometrial lining returns to its pre-DMPA state and ovulatory function returns. Both subcutaneous and intramuscular DMPA show similar delays to fertility after injection.[95] However, for adolescent patients, such a delay does not usually pose a major deterrent to using this method.

Although a number of observational studies have found an increased risk of weight gain among young women using DMPA,[96–100] a recent Cochrane review[101] evaluated this subject and identified only 2 high-quality and 2 moderate-quality studies, only one of which[102] demonstrated that adolescents using DMPA had increased body fat percentage and decreased lean body mass. This finding, in contrast to widespread clinical observations about significant weight gain with DMPA, could be explained by significant variability in the trajectories of weight gain among women using DMPA. Bonny et al[103] studied 97 adolescents and found that 21% experienced early weight gain, defined as an increase in weight of more than 5% at 6 months. Over 18 months, those early gainers experienced an increase in mean BMI of 7.6 compared with 2.3 for non-early

weight gainers. Similar findings in adult patients[104] suggest that weight-gain status at 6 months is a strong predictor of future excessive weight gain with ongoing DMPA use but that weight gain on DMPA is not a uniform finding for all patients.[96,98]

Because DMPA suppresses circulating estradiol concentrations, it causes lack of BMD accrual[105–107] and has an adverse effect on biochemical markers of bone formation and resorption.[108] In response to these concerns, the Food and Drug Administration (FDA) issued a "black-box" warning regarding the risk of decreased BMD among DMPA users in November 2004.[109] The warning recommended using DMPA for longer than 2 years only if other methods are inadequate, noting a lack of certainty regarding peak BMD attained later in life among users of DMPA. Since that time, 3 publications have described prospective studies of adolescent and young adult women during and after use of DMPA.[110–112] All 3 documented substantial recovery of BMD after DMPA use, thus, offering reassurance about the long-term skeletal health of adolescent patients who use DMPA. The American College of Obstetricians and Gynecologists, recognizing the risk of unwanted pregnancy if adolescents' contraceptive options are limited, does not advise limiting DMPA use to 2 years, nor does it recommend monitoring BMD after that time frame.[83] In addition, some experts[113] dispute the limited data that suggest a link between DMPA use and elevated risk of fractures in reproductive-age women[114,115] and have called for removal of the black box warning.

Although recent studies are reassuring about the likelihood of bone recovery after DMPA cessation, it is important to consider other risk factors for osteoporosis and to tailor counseling and recommendations to each patient. Factors such as small

body habitus, chronic alcohol or tobacco use, eating disorders, or illness that necessitates chronic use of corticosteroids may lead a clinician to more strongly encourage alternatives to DMPA. All patients should be encouraged to include foods and/or supplements to ensure intake of at least 1300 mg calcium each day along with 600 IU vitamin D,[116] to participate in weight-bearing exercise regularly, and to stop smoking as important measures to promote skeletal health. Clinicians must remind patients that, as with all hormonal methods of contraception, condoms should be used in conjunction with DMPA for protection from STIs.

Combined Oral Contraceptive Pills

COCs have been available for more than 50 years. They are a reliable, effective method for the prevention of pregnancy, are available only by prescription in the United States, and are the most popular method of hormonal contraception among adolescents (see Tables 1 and 2). They are the prototype for other combined methods of birth control, including the vaginal ring and transdermal patch (discussed later), which have similar effectiveness, contraindications, medical benefits, and side-effect profiles.

COC Prescribing

COCs all contain an estrogen and a progestin. In almost every pill, the estrogen component is ethinyl estradiol, in amounts varying from 10 to 50 μg, with "low-dose" pills (35 μg or less) being first-line options for adolescents. An internal pelvic examination is not needed before initiation of this method nor any other method except an IUD. However, routine screening for STIs is recommended in all sexually active patients. (For a more complete discussion of gynecologic examinations of adolescents in the pediatric office

setting, see the 2010 AAP clinical report on the subject.[117] COCs can be started on the same day as the visit ("quick start"), or on the day following EC use (see section on EC) in healthy, non-pregnant adolescents. Patients should be counseled that a back-up method (ie, condoms or abstinence) should be used for at least the first 7 days for contraceptive efficacy, and a condom should be used at all times for protection against STIs. A routine follow-up visit 1 to 3 months after initiating COCs is useful for addressing persistent adverse effects or adherence issues.

There is no 1 pill formulation that is the best choice for every adolescent, and even within the "low-dose" range, changing the amount of estrogen or the type of progestin may be necessary to address adverse effects or optimize medical benefits. Patients also should be informed of common transient adverse effects, including irregular bleeding, headache, and nausea. Neither weight gain nor mood changes have been reliably linked to use of combined hormonal contraception.[118–120] Recommendations for managing adverse effects have been published elsewhere[121] or can be found online (http://www.managingcontraception.com/qa/index.php). COCs have few contraindications in healthy female adolescents. They should not be prescribed for patients with severe and uncontrolled hypertension (systolic pressure ≥160 mm Hg or diastolic pressure ≥100 mm Hg); ongoing hepatic dysfunction; complicated valvular heart disease; migraines with aura or focal neurologic symptoms; complications of diabetes (ie, nephropathy, retinopathy, neuropathy, or other vascular disease); complicated solid organ transplantation; or thromboembolism or thrombophilia (eg, factor V Leiden mutation; antiphospholipid antibody syndrome; or protein C, protein S, or antithrombin 3 deficiency).[111] An excellent and up-to-date resource for prescribing hormonal contraceptives, the "US Medical Eligibility Criteria for Contraceptive Use," is available on the CDC Web site (http://www.cdc.gov/reproductive-health/UnintendedPregnancy/USMEC.htm) and in print.[58] These recommendations weigh the risks and benefits of contraceptive methods against unwanted pregnancy. When hormonal methods are used for medical therapy, the risk/benefit ratio may differ, and treatment decisions should be considered on a case-by-case basis. Other useful resources include a 2004 detailed discussion of contraceptive choices for patients with congenital heart disease[122] and a recent publication offering expert guidance on prescribing contraception to adolescents at increased risk of hypercoagulability.[123] The most serious adverse event associated with COC use is the increased risk of blood clot, which is discussed in further detail in the following paragraphs.[124] Although smoking should be discouraged, it is not a contraindication to COC use in teenagers and young adults.[58]

New data have continued to emerge regarding the risks and benefits of different progestins. On April 10, 2012, the FDA posted a drug safety communication that resulted in revised drug labels for COCs containing the progestin drospirenone.[125] These note that epidemiologic studies reported as high as a threefold increase in the risk of blood clots for drospirenone-containing products when compared with products containing levonorgestrel or some other progestins, whereas other epidemiologic studies found no additional risk of blood clots with drospirenone-containing products.

However, it is important to remember that most of the risk of blood clot is conferred from the estrogen component of the pill and that all COCs confer a lower risk of blood clot than pregnancy.[126] The baseline incidence of venous thromboembolism in adolescents is up to 1 per 10 000 woman-years per year.[127] Currently available COCs increase the risk of blood clot three- to fourfold, or up to 4 per 10 000[123,124] woman-years. In comparison, the incidence of venous thromboembolism (VTE) associated with pregnancy and the postpartum period is 10 to 20 per 10 000 woman-years, of which 1% to 2% are fatal.[128,129]

COCs decrease the effectiveness of some medications (eg, lamotrigine). Conversely, other medications, such as anticonvulsants and antiretroviral agents, decrease COC effectiveness to the extent patients may need to choose alternative methods[130] (see Table 5 and Special Populations). With regard to antibiotics, neither a 2001 review of the literature[131] nor a 2011 case-crossover study of 1330 COC failures[132] found any definitive evidence of decreased COC effectiveness with the use of any antibiotic except rifampin.

Used perfectly, COCs are extremely effective, with a perfect-use failure rate for all users of 0.3%; however, the typical-use failure rate is 9%, suggesting that adherence is a key issue in COC use (see Table 4).[43] Counseling should include strategies to promote adherence, such as cell phone alarms and support from a family member or partner. Patients should be instructed on what to do if pills are missed. A missed pill should be taken as soon as it is remembered. If more than 1 pill in a row is missed, only the most recently missed pill should be taken as soon as possible, and the remaining pills should be taken at the usual time, reminding patients that 7 consecutive hormone pills are required to prevent ovulation. Further instructions can be accessed online at http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6205a1.htm?s_cid=rr6205a1_w#Fig2.[42] Patients should also be advised that EC

may be needed if 2 or more pills are missed in the first week or if 1 or more pills were missed earlier in the same cycle or late in the previous cycle (see online instructions and Fig 1 for details).

COC Regimens

COCs are currently available in fixed-dose, monophasic regimens (each tablet contains the same dose of estrogen and progestin) or in phasic regimens (triphasic and biphasic packs that contain varying doses of estrogen and progestin). Standard pill packs include 28 pills total, with 21 to 24 hormone pills and 4 to 7 placebo (hormone-free) pills. Among low-dose pills, there are no clear data suggesting one formulation is superior to another for adolescent use, so it is appropriate to choose one with the lowest copay on a patient's insurance formulary (if applicable). Many experts recommend starting adolescents on a monophasic pill with monthly bleeding and then changing regimens and/or extending cycles, as indicated, to address patient adverse effects or preference.[121] Many adolescent medicine providers begin with a COC containing 30 to 35 μg of ethinyl estradiol and a progestin, such as levonorgestrel or norgestimate.

The benefits of decreasing or eliminating the placebo hormone-free interval (see section on COC benefits) have been increasingly recognized, and there are several regimens packaged with more than 21 active pills and fewer placebo pills. For example, some regimens (eg, Yaz [Bayer, Leverkusen, Germany], and Generess FE [Watson, Parsippany, NJ]) have 24 active pills and 4 pills without hormones. Several brands are available with 84 active pills and 7 placebos, or 84 active pills and 7 pills of low-dose estrogen (eg, Seasonique and LoSeasonique; Teva, Petah Tikva, Israel). In 2007, the FDA approved the first COC packaged with a year of continuous combined hormone pills, Lybrel (Pfizer, New York, NY).

COC Benefits

The noncontraceptive benefits of COC use include decreased menstrual cramping and blood loss and improvement in acne. Extended or continuous cycles may be particularly appropriate for adolescents with medical conditions, such as anemia, severe dysmenorrhea, endometriosis, abnormal uterine bleeding, and Von Willebrand and other bleeding diatheses and for adolescents who prefer amenorrhea.[133] These regimens may also be useful for conditions that are known to be exacerbated cyclically, such as migraine (without aura), epilepsy, irritable bowel syndrome, some psychiatric symptoms,[134] and behavioral problems (such as increased aggression or self-mutilation) that sometimes worsen cyclically in young women with profound cognitive impairment.[135] The most common adverse effect of extended-cycle regimens is unscheduled bleeding. Eliminating the hormone-free interval will also minimize fluctuations in medications that interact with COCs (see section on Special Populations). In addition, ovarian suppression is optimized by COC regimens with shorter or no placebo (hormone-free) intervals, potentially increasing contraceptive effectiveness, especially among adolescents who frequently miss pills.[136–138]

Families can be reassured that COC use has not been shown to increase the risk of breast cancer.[139] Also, use of COCs for more than 3 years provides significant protection against endometrial and ovarian cancers.[140] Overall, COCs are one of the best-studied medications ever prescribed. Completely reversible and with no negative effect on long-term fertility, COCs are a safe option throughout a woman's reproductive years.
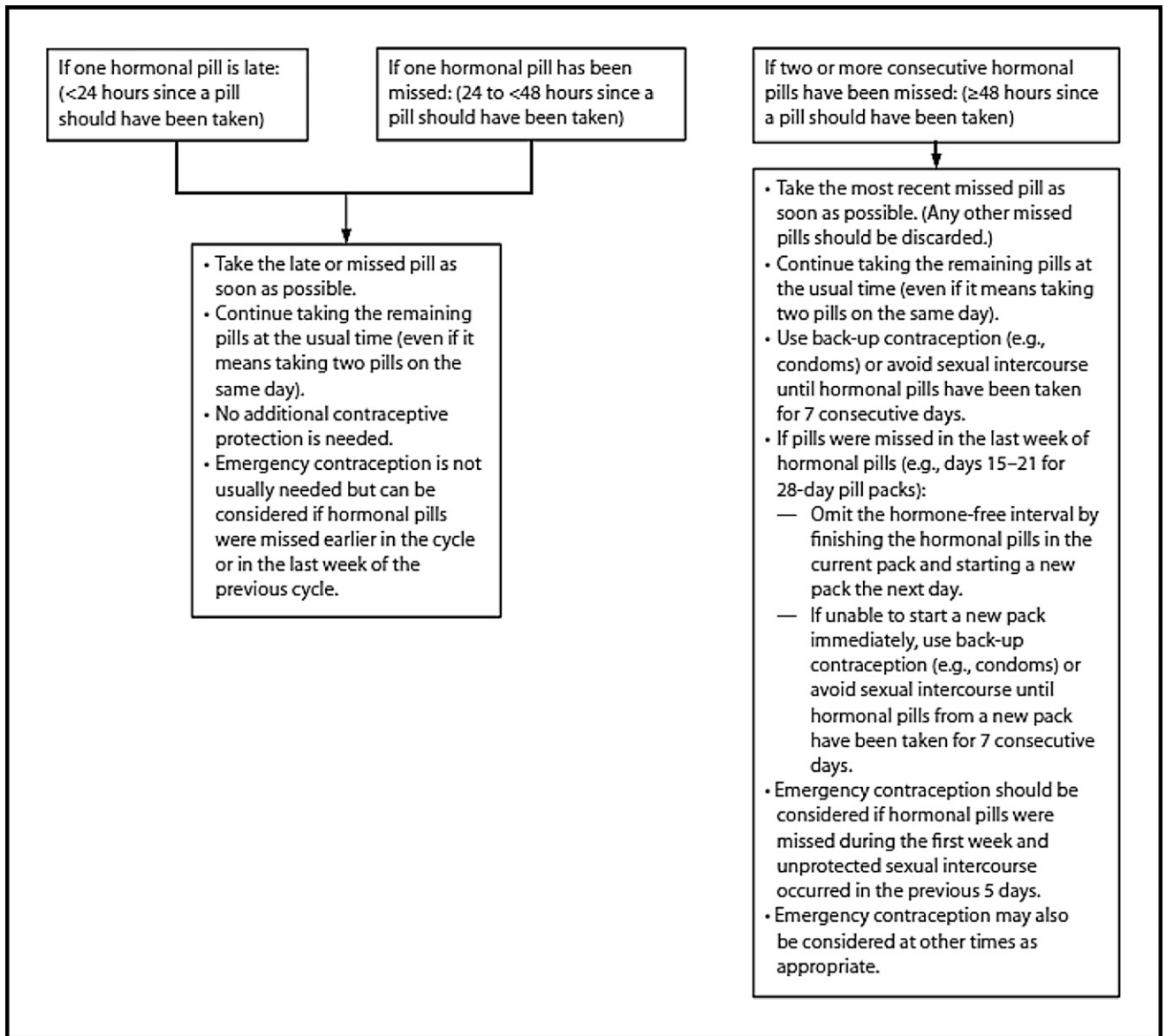
Contraceptive Vaginal Ring

The vaginal ring (NuvaRing; Merck) releases 15 μg ethinyl estradiol and 120 μg etonogestrel (the active metabolite of desogestrel) daily. It is a round, flexible device that measures 54 mm in outer diameter and 4 mm cross-sectionally. This soft silicone vaginal ring releases both estrogen and progestin hormones that protect against pregnancy for 1 month. It is inserted in the vagina and stays in place for 3 weeks, with removal for 1 week to induce menstruation followed by insertion of a new ring. Patients should be instructed to insert a new ring after 7 days even if bleeding has not ceased.

Because adolescents may be unfamiliar with their own reproductive anatomy, a pelvic model[141] or other visual aid may be useful in explaining to patients where the ring will be. Patients should be reassured that the ring will not fall out. Eighty women (~90% of them nulliparous) were examined with the ring in place and none were able to expel the ring by bearing down in a Valsalva maneuver.[142] The ring typically sits with the superior-most portion of the ring lying posterior to the cervix.[143]

Most patients will not have previous experience with intravaginal medication and may have questions about its use, such as whether tampons can be worn when the ring is in place. On the basis of evaluation of serum concentrations of ethinyl estradiol and etonogestrel, contraceptive efficacy should not be compromised by concomitant use of tampons,[144] the spermicide nonoxynol-9,[145] or intravaginal miconazole.[146] Similarly, the ring is intended to stay in place during coitus but can be removed for up to 3 hours if desired. This is not typically recommended, and sexually active patients may be reassured to know that most men were not bothered by its presence, if it was noted at all.[142,147]

The ring has comparable typical-use failure rate (9%), risks, and benefits as other combined hormonal methods[43] but provides the simplest regimen.[148,149] As with COCs, a same-day

If one hormonal pill is late: (<24 hours since a pill should have been taken)

If one hormonal pill has been missed: (24 to <48 hours since a pill should have been taken)

If two or more consecutive hormonal pills have been missed: (≥48 hours since a pill should have been taken)

- Take the late or missed pill as soon as possible.
- Continue taking the remaining pills at the usual time (even if it means taking two pills on the same day).
- No additional contraceptive protection is needed.
- Emergency contraception is not usually needed but can be considered if hormonal pills were missed earlier in the cycle or in the last week of the previous cycle.

- Take the most recent missed pill as soon as possible. (Any other missed pills should be discarded.)
- Continue taking the remaining pills at the usual time (even if it means taking two pills on the same day).
- Use back-up contraception (e.g., condoms) or avoid sexual intercourse until hormonal pills have been taken for 7 consecutive days.
- If pills were missed in the last week of hormonal pills (e.g., days 15–21 for 28-day pill packs):
  — Omit the hormone-free interval by finishing the hormonal pills in the current pack and starting a new pack the next day.
  — If unable to start a new pack immediately, use back-up contraception (e.g., condoms) or avoid sexual intercourse until hormonal pills from a new pack have been taken for 7 consecutive days.
- Emergency contraception should be considered if hormonal pills were missed during the first week and unprotected sexual intercourse occurred in the previous 5 days.
- Emergency contraception may also be considered at other times as appropriate.

FIGURE 1
Instructions for late and missed combined oral contraceptive pills.

start can be used with the vaginal ring. Adverse effects are largely similar to other combined methods, including breast tenderness, headaches, nausea, and breakthrough bleeding or spotting, with the additional vaginal symptoms of discharge, discomfort, and problems related to the device (eg, expulsion).[150] The limited investigation of bone health with the ring points to its bone neutrality, but these studies have not included adolescents younger than 18 years.[151,152] Studies to date

have yielded inconsistent results about how the risk of VTE with use of the ring compares with the risk with use of low-dose COCs.[153–156]

Analogous to experience with the contraceptive patch, it has not been clearly demonstrated that the simplified regimen afforded by the ring results in improved medication adherence or continuation in young people.[157] A trial of 237 college students randomized to use either the ring or COC found that perfect use was greater for the ring in

the first 2 months but that this was no longer statistically significant in the third month of the study. Similarly, 6-month continuation rates were no different and were less than 30% for both groups.[158]

The ring is an excellent method for extended use. The vaginal ring package insert states that 1 ring can be used for up to 28 days with no back-up method; however, the rings contain sufficient medication to be used for up to 35 days[159] and, thus, can be replaced

once every calendar month. This eliminates the need for additional refills potentially not covered by insurers, which sometimes poses barriers to continuous pill and patch regimens. As with COCs, the longer the duration of continuous hormones, the greater the number of unscheduled bleeding days; however, the difference between a 28-day and 49-day cycle is small.[160] Similar to COCs, the decision about how often to allow uterine bleeding to occur can be individualized to the adolescent's medical needs and preferences. Women who choose to use the ring continuously with no planned ring-free days can be advised to remove the ring for 4 days if they have more than 5 days of consecutive bleeding, as this has been found to result in fewer bleeding days overall.[161]

Transdermal Contraceptive Patch

The combination hormone transdermal contraceptive patch (Ortho Evra [Ortho-McNeil Pharmaceutical, Raritan, NJ]) contains 0.6 mg norelgestromin and 0.75 mg ethinyl estradiol and measures approximately 1.75 × 1.75 in. The patch can be placed on the abdomen, upper torso, upper outer arm, or buttocks, using 1 patch for each of 3 weeks in a row, followed by 1 week off the patch, during which a withdrawal bleed usually occurs. Current estimates of failure rates for typical use are 9% (<1% for perfect use).[43] Approved by the FDA in November 2001, patch use rose in popularity until 2005, when use declined[162] after publicity about increased estrogen exposure from the patch, which has been found to be 1.6 times higher than estrogen exposure with a COC.[153] The patch has undergone multiple label revisions, most recently August 22, 2012. The 2012 package insert contains a black box warning citing 5 US studies[163–170] (1 with statistically significant findings) that suggest a possible increased risk of VTE compared with a 20- to 35-μg COC, with odds ratios

of 1.2 to 2.2. Although these potential health risks are concerning to some adolescents, the patch remains an important contraceptive alternative that may be the best option for some adolescents, especially in comparison with the many adverse consequences of unplanned pregnancy, which include an increased risk of VTE. Nonetheless, other methods may be safer first-line choices for patients interested in extended cycling.

The patch has comparable efficacy, benefits, and drug interactions as other combined methods, but provides a simpler regimen. Thus, it was initially assumed that the patch would promote improved contraceptive adherence in adolescents. Accordingly, early studies demonstrated better adherence to the patch than to COCs among adults,[171,172] most notably among 18- and 19-year-olds,[173,174] and 2 smaller studies of adolescents had high rates of self-reported short-term perfect patch use, 87% and 93%.[175,176] However, contraceptive effectiveness requires that the method be sufficiently well accepted to be continued over time.

To our knowledge, there are no studies that have randomized adolescents to use either the patch or pills, and the observational studies that have compared these methods are plagued by possible selection bias; adolescents who choose a nondaily method may have behavioral characteristics that would interfere with continuation and perfect use of any method.[177–179] For example, Bakhru and Stanwood[177] prospectively followed 1230 women (416 of whom were 17 years or younger) who self-selected their method and found 57% continuation of the patch at 1 year compared with 76% continuation of the pill ($P = .004$). In contrast to their initial hypothesis, patch users were significantly less likely than pill users to continue their method and, thus, were more likely to experience pregnancy.[177]

Even lower rates of patch continuation, ranging from 25% to 50%, have been found in other longitudinal studies of adolescent patch users.[179–181]

In addition, similar findings have been shown in randomized studies of adults. A 2010 Cochrane review[182] (based on 4 such studies) concluded that patch users were more likely than pill users to discontinue study participation because of adverse effects. Similarly, in a study that randomized 500 women (average age, 25–26 years) to either the patch or the contraceptive vaginal ring, only 27% of patch users (versus 71% of ring users) planned to continue their assigned method after the 3-month study concluded.[183]

Side effects of the patch are largely similar to other combined methods, with the addition of local adverse effects, such as dislodged patches and hyperpigmentation,[175,176] contact dermatitis and other skin irritation,[184] and concerns about the visibility and appearance of the patch.[185,186] Investigations into the patch's effect on bone health have yielded inconsistent results, with findings in adults[150,151] more reassuring than those in adolescents.[187] However, this limited work is far from conclusive.

Progestin-Only Pills

Progestin-only pills (POPs, also known as "mini-pills") work primarily by thickening cervical mucus, not by inhibiting ovulation. Because of the timing of this effect, it is generally recommended that pills be taken between 4 and 22 hours before coitus usually takes place. Perfect and typical-use failure rates for POPs are not calculated separately from those of combined hormonal contraceptives. Given the importance of even small variations in the timing of pill administration and the continued potential for ovulation, POPs are generally held to be less effective than combined hormonal methods.

Similar to other progestin-only methods, irregular bleeding is a common adverse effect. However, POPs are markedly less effective than other progestin-only methods, including the progestin-containing IUD, the progestin implant, and injectable progestin. Therefore, POPs are not typically recommended as a first-choice contraceptive in healthy adolescents. Nonetheless, they provide a progestin-only alternative for selected adolescent patients with demonstrated excellent medication adherence.

Male Condoms

The male condom is a mechanical barrier method of contraception and STI prevention. In a recent nationally representative survey, condom use was reported at first intercourse by 68% of adolescent girls and 80% of adolescent boys and at most recent intercourse by 52% of adolescent girls and 75% of adolescent boys.[188] Male condoms have several advantages for adolescents, including involving males in the responsibility of contraception, easy accessibility and availability to minors, use without a prescription, and low-cost STI protection.

Male condoms are most commonly made of latex. Lubricated condoms are used for vaginal and anal intercourse; unlubricated condoms are available for oral sex. Although many individuals will need additional lubrication with condoms, adolescents' lubricant use is rarely assessed. Condoms should be used only with water-based lubricants (eg, K-Y Jelly [McNeil PPC Inc, Fort Washington, PA], Astroglide [Biofilm Inc, Vista, CA]), because oil-based lubricants (eg, petroleum jelly, massage oils, body lotions) can weaken latex and cause breakage. Male condoms also are available as polyurethrane (synthetic) for people with latex sensitivities and as natural membrane (eg, lamb cecum). Polyurethrane condoms have similar effectiveness to latex condoms but are more resistant to deterioration and are compatible with both oil- and water-based lubricants. Natural membrane condoms are porous and provide inadequate STI protection.

Condom effectiveness depends on consistent and correct use (see Table 6).[189] For pregnancy prevention, the failure rate at the end of first-year use for the male latex condom is 2% with perfect use and 18% with typical use.[43,190] Consistent evidence supports condoms as reducing the risk of disease transmitted to and from the penile urethra, including gonorrhea, *Chlamydia*, trichomoniasis, hepatitis B, and HIV.[191–195] Emerging evidence also supports condoms as reducing the risk of acquiring diseases transmitted through skin or mucosal contact, including genital herpes simplex virus,[196,197] human papillomavirus,[198,199] and syphilis.[200] Because condoms protect against STIs, all sexually active adolescents should be encouraged to use condoms, regardless of whether an additional contraceptive method is used. Instructions for condom use can be found in Table 6. Additional details on condoms and recommendations can be found in the AAP policy statement on condom use by adolescents.[201] Despite increases in condom use, many adolescents do not use condoms effectively or at all. Condom use is influenced by individual, relationship, and broader social and structural factors,[202–204] which should be addressed on multiple levels, including provider counseling, sex education, and interventions to improve access. Because condom use requires cooperation and communication between partners, condom use within relationships changes as relationships evolve[205] and commonly declines in established relationships.[206,207]

Emergency Contraception

In the United States, the available methods of EC include orally administered hormones, either in a progestin-only dedicated EC product (levonorgestrel, 1.5 mg) or in high-dose combined estrogen and progestin oral contraceptive pills (the Yuzpe regimen); uliprystal acetate (a progesterone receptor modulator); and insertion of a copper IUD. These methods can prevent pregnancy when initiated up to 5 days after an act of underprotected sexual intercourse but are more effective the sooner they are used. Data suggest that uliprystal acetate, approved by the FDA in 2010, may have increased effectiveness over oral levonorgestrel at the end of the 5-day window of use and in heavier women.[208–210] On the basis of data demonstrating that the levonorgestrel EC pill loses effectiveness in women who weigh more than 165 pounds and is ineffective in women who weigh more than 176 pounds, the levonorgestrel EC pill is undergoing revised labeling in Europe, and the FDA is considering whether to require similar revisions in the United States.[211]

Unlike uliprystal, which is pregnancy category X, levonorgestrel does not have teratogenic or other adverse effects on the fetus,[212] and a pregnancy test is not necessary before prescribing levonorgestrel EC.[213] Levonorgestrel EC is estimated to be up to 85% effective.[213,214] Additional details on prescribing EC can be found in the AAP policy statement on emergency contraception,[213] and additional guidance can be found at http://ec.princeton.edu/questions/dose.html#dose.

Plan B One-Step (Teva Pharmaceuticals, Petah Tikva, Israel), a dedicated progestin-only method, is approved by the FDA as a nonprescription product for all women of childbearing potential. Generic versions are approved as nonprescription for women 17 years of age and older; however, proof of age is not required to purchase them.

Given the barriers to EC access and the importance of timely use, advance prescription for EC should be a part of routine adolescent care.[213] There are

TABLE 6 How to Use a Condom Effectively

Before: Store condoms in a cool, dry place. Heat, including body heat from a pocket, can cause latex to degrade over time. Check the expiration date before use.

1. Use a new condom for every act of vaginal, anal, and oral sex throughout the entire sex act (from start to finish).
2. Before any genital contact, put the condom on the tip of the erect penis with the rolled side out.
3. If the condom does not have a reservoir tip, pinch the tip enough to leave a half-inch space for semen to collect. Holding the tip, unroll the condom all the way to the base of the erect penis.
4. After ejaculation and before the penis gets soft, grip the rim of the condom and carefully withdraw. Then gently pull the condom off the penis, making sure that semen does not spill out.
5. Wrap the condom in a tissue and throw it in the trash where others will not handle it.
6. If you feel the condom break at any point during sexual activity, stop immediately, withdraw, remove the broken condom, and put on a new condom.
7. Ensure that adequate lubrication is used during vaginal and anal sex, which might require water-based lubricants. Oil-based lubricants (eg, petroleum jelly, shortening, mineral oil, massage oils, body lotions, and cooking oil) should not be used, because they can weaken latex, causing breakage.

no medical contraindications to this method, and multiple studies have found that providing EC in advance increases the likelihood of women using it when it is needed and does not increase sexual or contraceptive risk-taking behavior.[215,216] Given the sometimes sporadic and unplanned nature of adolescent sexual behavior, counseling and advance provision of EC should be a part of anticipatory guidance.

Other Barrier Methods

Female Condoms

The female condom is a polyurethane or synthetic nitrile pouch with 2 flexible rings, one fitting inside the vagina and the other on the perineum. Female condoms have a perfect-use failure rate of 5% and a typical-use failure rate of 21%.[43] Among US adolescents and young adults, the female condom

has had very low uptake,[217] in part because of higher cost, less availability, lack of knowledge, and negative attitudes toward female condoms.

Vaginal Spermicides

Vaginal spermicides are a chemical barrier method (most commonly nonoxynol-9) applied intravaginally through a variety of forms: gel, foam, suppository, or film. Spermicides consist of 2 components: a formulation (the gel, foam, suppository, or film) and the chemical ingredient that kills the sperm. Table 4 describes typical- and perfect-use failure rates for vaginal spermicides. The CDC identifies being at high risk for HIV (eg, commercial sex workers) and HIV infection as contraindications for use of spermicides, as use can disrupt the cervical mucosa, potentially increasing risk of HIV acquisition or increased viral shedding and transmission of HIV.[58,218]

Diaphragm, Cervical Cap, and Contraceptive Sponge

The diaphragm, cervical cap, and sponge are barrier methods of contraception. They are less commonly recommended for adolescents, because they do not provide STI protection and have lower effectiveness rates than other methods.[43] Diaphragms are flexible latex cups used with spermicide that are inserted into the vagina before intercourse and must remain in place for 6 hours after intercourse. Cervical caps are latex or silicone cups with a firm rim that adhere to the cervix and provide continuous contraceptive protection for up to 48 hours. Sponges are polyurethane sponges that contain nonoxynol-9 spermicide. They are approximately 2 inches in diameter, can be inserted up to 24 hours in advance, and must be left in place for 6 hours after intercourse. Sponges are available over the counter. Diaphragms and caps require fitting by a health care pro-

fessional. Table 4 provides typical- and perfect-use failure rates for the diaphragm, cervical cap, and contraceptive sponge. For the sponge, typical- and perfect-use failure rates are as much as 16% and 11%, respectively.[219] These methods are contraindicated in women at high risk of HIV or women with HIV infection, because the concomitant spermicide use may increase risk of HIV acquisition or transmission.[58] Detailed information can be found in *Contraceptive Technology.*[41]

Fertility Awareness and Other Periodic Abstinence Methods

Periodic abstinence methods identify fertile days within each menstrual cycle, and the individual abstains during those fertile times. Fertile days can be determined using a menstrual calendar, basal body temperature, and cervical mucus consistency. In a recent national survey, 17% of adolescents report ever using periodic abstinence.[6] Among both adults and adolescents, as many as 24% of individuals reporting periodic abstinence as their primary method of contraception will experience an unintended pregnancy within the first year of use. More concerning is the poor continuation rates for the method,[220] even for individuals participating in clinical trials.[221] An additional challenge with adolescents is that ovulation may not be predictable in the first few year(s) after menarche. If periodic abstinence is used, counseling on dual use of a condom and more reliable alternative methods should be offered. More detailed information can be found in *Contraceptive Technology.*[41]

Withdrawal

Withdrawal, or coitus interruptus, is a method in which the male partner attempts to "pull out" his penis before ejaculation. Although typically considered a "nonmethod," withdrawal is commonly practiced by both adults

and adolescents. In the National Survey of Family Growth 2006 to 2008, 8% to 11% of respondents reported using withdrawal at first sex,[6] and in the 2006 to 2010 survey, 57% of adolescents reported ever using withdrawal as a contraceptive method.[188] Adolescents' reasons for using withdrawal include dissatisfaction with hormonal methods, and as a secondary or back-up method to condoms or hormonal contraception.[222] Relationship development and the establishment of trust also were cited as reasons for use of withdrawal.[222] The typical-use failure rate of withdrawal across all age groups is 22%[43]; however, unlike condoms, it provides no STI protection. Because of the common use of withdrawal, pediatricians should remember to ask about it; because of the limited effectiveness[43] and lack of STI protection afforded by withdrawal, pediatricians should encourage adolescents to adopt more effective hormonal and/or barrier methods.

SPECIAL POPULATIONS

Pediatricians care for adolescents with a range of medical conditions that can affect sexuality, sexual behavior, and contraceptive needs. The CDC has recently addressed the contraceptive needs of young women with medical conditions in its publication "US Medical Eligibility Criteria for Contraceptive Use."[58] Available online, this document summarizes the literature on safety and efficacy of different contraceptive methods by medical condition. Populations of particular importance to pediatricians are summarized as follows.

Adolescents With Disabilities

An estimated 16% to 25% of adolescents are identified as having special health care needs, including physical disability, developmental disability, and chronic illness.[223] Sexuality and sexual health care needs in this population are often overlooked, yet data reveal that adolescents with disabilities and chronic illnesses have similar levels of sexual behaviors and sexual health outcomes (eg, STIs).[224,225] Adolescents with disabilities and chronic illnesses also have similar needs for counseling and support of healthy sexuality development.[226,227] These data underscore the need for pediatricians to address sexuality and contraception as part of routine care and as a core function of a medical home, particularly for adolescents using teratogenic medications.

Adolescents with more severe physical disabilities or cognitive impairment may need hormonal contraceptives for menstrual control and hygiene. Adolescents with disabilities may have early or irregular menstrual cycles,[228] and medications such as certain anticonvulsants and antipsychotics may influence the neuroendocrine system, leading to abnormal bleeding.[229] Menstrual hygiene also may present a special problem for adolescents with motility and transfer difficulties, as well as for those with behavioral and developmental disabilities.[230] Menstrual control and suppression is commonly achieved with COCs, transdermal patches, DMPA, and levonorgestrel IUDs.[77,231,232] Continuous or extended cycles of COCs is a common approach,[231,232] and there are reports of successful use of 52-mg levonorgestrel IUDs in adolescent patients.[76,77,80] Surgical approaches (tubal ligation, endometrial ablation, or hysterectomy) are rarely necessary and present special ethical and legal issues. A detailed discussion of menstrual management for adolescents with disabilities can be found in recent review articles as well as professional consensus statements.[231–233]

Adolescents With Obesity

Similar to adolescents with disabilities, sexuality and sexual health are often overlooked among adolescents with obesity. Although national data demonstrate some weight and BMI-related variation in body image and sexual behaviors, the sexual behaviors and sexual health needs of adolescents with obesity are substantially similar to those of their normal-weight peers.[234,235] Obesity and related endocrine effects may influence the efficacy and adverse effect profiles of contraceptives, including EC (see previous section on EC). Excess pregnancies were found among transdermal contraceptive patch users weighing more than 90 kg (198 lb; 0.9% vs 0.3% among "perfect" users).[236,237] Data are limited and inconsistent about whether hormonal contraceptive effectiveness varies by body weight or BMI.[58] Systematic reviews and large cohort studies have revealed no or mixed effects for the effect of both body weight and BMI on COCs, IUDs, implants, and contraceptive injections.[238–240] When examining complications, the World Health Organization and CDC found that among adult women, COC users with obesity are more likely than nonusers to experience thromboembolic complications.[111] However, the absolute risk of thromboembolic complications among adolescent COC users is low.

Women with obesity, either with or without polycystic ovary syndrome, are often anovulatory and experience infrequent menses. Metformin is frequently used in the treatment of these women and can increase the frequency of ovulation, increasing their contraceptive needs. A frequent concern by both adolescents and providers is additional weight gain with hormonal contraceptive use among adolescents with obesity. Adult data suggest that women with obesity are not more likely to have significant weight gain with combined or progestin-only contraceptives.[241–243] In contrast, adolescents with obesity who used DMPA were more likely than normal-weight nonusers,

COC users with obesity, and normal-weight DMPA users to gain weight.[96]

Increasing numbers of adolescents are having bariatric surgery performed, and these patients present special contraceptive needs. Presurgery data reveal a high prevalence of menstrual problems among adolescents with morbid obesity.[81] Postsurgery data demonstrate an improvement in fertility, and professional consensus statements recommend delaying pregnancy for at least 12 to 18 months after bariatric surgery.[244] Together, these suggest a need for highly effective contraceptives in such patients. The surgical procedures themselves may influence effectiveness of contraceptives. Postoperative complications, such as long-term diarrhea and/or vomiting, have the potential to decrease COC effectiveness.[58] Additionally, surgical procedures involving a malabsorptive component have the potential to decrease COC effectiveness.[58] Similar concerns about decreased COC effectiveness have not been described with laparoscopic placement of an adjustable gastric band. Given the challenges with oral, transdermal, and injectable contraceptives and the need for effective long-term postprocedure contraceptives, there is increasing use and success with levonorgestrel IUDs placed at the time of surgery.[81]

Adolescents With HIV

The vast majority of adolescents with HIV acquire their infection during adolescence through sex, intravenous drug use, or other behavioral mechanisms. Only a small proportion of adolescents with HIV are infected perinatally. National data reveal that sexual behaviors of HIV-infected adolescents do not differ substantially from their uninfected peers, and therefore, these adolescents have similar contraceptive and sexual health needs. However, because of risks of transmission to partners and because of drug interactions with antiretroviral

therapy (ART), adolescents with HIV infection present a challenge to prescribing contraception. Many antiretroviral agents have interactions with COCs, and a physician with expertise in HIV care should be consulted when prescribing hormonal contraception for an HIV-infected adolescent on ART.[58,245] The CDC and the World Health Organization provide guidance on prescribing different contraceptives for patients with HIV infection receiving ART.[246] Condoms are the preferred method of barrier contraception because of their demonstrated ability to decrease HIV transmission. Spermicides and diaphragms are contraindicated among HIV-positive women because of the potential for increased risk of genital lesions and potential increased risk of HIV transmission associated with nonoxynol-9. IUDs do not increase the risk of HIV acquisition or transmission and are safe and effective for HIV-infected individuals without increasing the risk of infections or complications in HIV-infected women. If COCs are used in HIV-infected adolescents receiving ART, a preparation containing ethinyl estradiol $\geq$30 µg should be prescribed.[58]

Data on the interactions between ART and hormonal contraceptives (both combined and progestin only) are limited, but effects are known to include increased ART toxicity and, in the case of ritonavir-boosted protease inhibitors, decreased contraceptive steroid concentrations, potentially compromising contraceptive effectiveness. Other ART regimens (eg, etravirine-containing regimens) are teratogenic, necessitating highly effective contraceptives.[246]

Adolescent Recipients of Solid Organ Transplantation

The improved survival of pediatric recipients of solid organ transplantation has prompted increased attention to

quality-of-life issues, including involvement in romantic and sexual relationships, issues that are typically addressed by the patient's pediatrician. Neither transplantation nor immunosuppressant medications decrease fertility, and conception can occur as early as 3 weeks after liver transplantation.[247,248] Similar to other adolescents with chronic illnesses, transplant recipients are likely to be as sexually active as their peers.[225,249–253] However, because these patients may underestimate their own fertility and because subspecialty physicians underestimate sexual activity and contraceptive needs in patients with chronic disease, it is imperative that primary care physicians assess these issues.[254–256]

For transplant recipients who choose not to remain abstinent, a highly effective method is indicated. Patients who have established normal organ function and are stable at least 6 to 8 months after transplantation can use any of the currently available hormonal contraceptives, provided they do not have other contraindications to the estrogen component.[58,254,257,258–260] Contraindications to estrogen, however, occur more commonly in transplant recipients. For example, COCs should not be prescribed to patients with active liver dysfunction or coronary artery disease.[139] Also, deterioration of organ function or episodes of rejection would require reevaluation and consideration of substituting a nonhormonal method, at least temporarily. Given the excess risks associated with unplanned pregnancies in transplant recipients, knowledge about the availability of EC is especially important.

Potential drug interactions should be assessed, both to avoid drug toxicities and to maintain the effectiveness of all prescribed medications.[261] For example, COCs can increase concentrations of immunosuppressive medications, such as cyclosporine, which has a narrow

therapeutic window and significant toxicities (see Table 7). Patient care decisions may require consultation with a clinical pharmacologist. To avoid monthly fluctuations in drug concentrations, patients using combined methods should use them continuously, without a hormone-free interval. Although 1 study suggests that immunosuppressant concentrations remain stable with use of the contraceptive vaginal ring,[259] both the ring and the patch are sufficiently similar to COCs that, until further data are available, they should be used with the same precautions that apply to COCs. Drug interactions with progestin-only methods are uncommon; however, monitoring cyclosporine concentrations is advisable.[262]

Historically, IUDs have been considered contraindicated in immunosuppressed patents because of theoretical risks of both decreased efficacy and increased risk of infection. However, more recent evidence argues against these theoretical risks,[263] and the CDC does not consider IUDs contraindicated in patients with stable graft function.[58] Although data are currently limited, anecdotal experience with adult transplant recipients suggests the levonorgestrel IUD can be an excellent choice because of the lack of drug interactions and outstanding contraceptive effectiveness.

Adolescent Oncology and Other Medically Complex Patients

Pediatricians may be called on to provide contraceptives for patients with cancer and other complex medical illnesses. In addition to pregnancy prevention, these adolescents may need menstrual suppression for heavy menstrual bleeding, bleeding disorders, or chemotherapy. Other medical conditions, such as rheumatologic illnesses, may present issues related to estrogen use, thromboembolism, or medication interactions. For these and other complex illnesses, the principles have been discussed in the previous sections, and consultation with appropriate adolescent medicine, adolescent gynecology, or family-planning specialists can be sought.

ADHERENCE AND FOLLOW-UP

Frequent follow-up is important to maximize adherence for all methods of contraception, to promote and reinforce healthy decision-making, and to screen periodically for risk-taking behaviors and STIs. Follow-up visits should include routine examinations, reassessment for contraception method, STI surveillance, and other sexual health preventive measures, such as human papillomavirus immunization. The timing and frequency of reassessment will vary depending on the contraceptive method and the patient's other health needs. An internal pelvic examination is not necessary for hormonal contraception (for a more complete discussion of

TABLE 7 Immunosuppressant Adverse Effects and Interactions With Hormonal Contraception

Type of Medication	Drug Interactions	Adverse Effects Influencing Contraception	Contraceptive Considerations
Corticosteroids (prednisone)	COCs may increase plasma concentrations of corticosteroids; monitor for increased corticosteroid effects	Hypertension	Severe and uncontrolled hypertension is a contraindication to COC use.
		Diabetes	Low-dose pills have minimal impact on glucose metabolism.
		Weight gain, osteoporosis	Monitor weight and BMD carefully if DMPA is used.
Azathioprine (Imuran[a])		Liver toxicity	Liver dysfunction interferes with estrogen metabolism.
Mycophenolate mofetil (CellCept[b])		Diarrhea, vomiting	Severe gastrointestinal disturbance could decrease COC absorption.
Cyclosporine, tacrolimus (Prograf,[c] FK506)	COCs may increase levels; monitor blood levels closely	Hypertension	Severe hypertension is a contraindication to COC use.
		Hyperlipidemia	COCs have minimal effect on lipids.
		Hyperkalemia	Drospirenone (a progestin with spironolactonelike activity) is contraindicated with hyperkalemia.
		Diabetes	Low-dose pills have minimal impact on glucose metabolism.
		Headache	Headache can be an adverse effect of steroid hormones: monitor headache frequency.[d]
Sirolimus (Rapamune[e])	COCs may increase levels; monitor blood levels closely	Hyperlipidemia	COCs have minimal effect on lipids.

Reproduced with permission from Sucato GS, Murray PJ. Gynecologic issues of the adolescent female solid organ transplant recipient. *Pediatr Clin North Am.* 2003;50(6):1521–1542.
[a] Triton Pharma Inc, Concord, Ontario.
[b] Genentech USA Inc, South San Francisco, CA.
[c] Astellas Ireland Co Ltd, Kerry, Ireland.
[d] If headaches increase after initiation of contraceptive method or neurologic symptoms accompany migraine headache, consider changing method.
[e] Pfizer, Philadelphia, PA.

gynecologic examinations of adolescents in the pediatric office setting, see the 2010 AAP clinical report on gynecologic examinations for adolescents).[117] Regularly scheduled visits need to occur to assess contraceptive issues, such as use, adherence, adverse effects, and complications. Adolescents should receive ongoing support and reinforcement by using motivational interviewing approaches to enhance effective and consistent contraceptive use, including engaging parental support for contraceptive adherence, when possible. In addition, condom use at each sexual intercourse must be advised and reinforced at every visit. Individual factors, relationship factors, family support, knowledge and understanding of contraceptives, personal resources, access to confidential care, and fertility intentions have all been demonstrated to affect adolescent contraceptive choice. Adolescents rely on trusted health professionals, such as pediatricians, for accurate information, for individualized counseling and prescribing, and for support and problem-solving around continuation and adherence.

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