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Contraception in Adolescents

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19 Contraception in adolescents

*Donald E. Greydanus, Carolyn M. Lentzsch-Parcells,
and Hatim A. Omar*

The age of adolescence is the time when most adolescents in the world begin to be sexually active with resultant millions of pregnancies and sexually transmitted diseases (STDs). This chapter considers methods of contraception for these adolescents, including oral contraceptives, transdermal contraception, minipills, intravaginal ring, injectable contraception, intrauterine devices (IUDs), barrier contraceptives, implants, and others. It is important for clinicians caring for sexually active youth to provide information regarding contraception and appropriate contraceptive prescriptions.

19.1 Introduction

The median age of first intercourse in the United States, Western Europe, Eastern Europe (Ukraine), Eurasia (Russia), and other parts in the world is 16 years of age, with many youth having multiple sexual partners. Clinicians caring for adolescents should ask about possible coital behavior and provide effective contraception to those youth continuing to be sexually active without intent of becoming pregnant (1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23). The following box lists questions helpful to ask when discussing contraception with adolescents – particularly if they are sexually active.

Questions for adolescents seeking contraception

1. What methods have you used before?
2. Did you have any problems with your previous method? What did you like/not like?
3. Do you have any concerns about methods of contraception?
4. If your friends use contraception, what comments have they made?
5. Will you be able to use these methods correctly? Which ones?
6. Is your weight of concern to you? Have you been or are you now dieting?
7. The some methods may lead to unplanned bleeding? Can you deal with that?
8. Have you heard about any problems with the pill or other methods, such as possible weight gain or infertility?
9. Are you aware of minor side effects that the pill may cause?
10. Do you have questions I have not answered?

A number of effective and safe contraceptive methods (see ►Tab. 19.1) are available for the sexually active adolescent who wishes to avoid pregnancy. The most effective methods of contraception include abstinence, combined oral contraceptives (24), transdermal contraceptive patch (Ortho Evra®), vaginal contraceptive rings

Tab. 19.1: Contraceptive methods.

Abstinence

Rhythm method of contraception (periodic abstinence)

- Calendar
- Ovulation method
- Symptothermal
- Postovulation

Oral contraceptives (combined)

Transdermal contraceptive patch (Ortho Evra)

Vaginal contraceptive ring (NuvaRing)

Minipills (progestin-only pills [POPs])

Emergency contraceptives (ECs)

Vaginal barrier contraceptives

- Diaphragm
- Vaginal contraceptive sponge
- Cervical cap (Prentif Cavity-rim®)
- Female condom (Reality®)
- Vaginal spermicides
- Male condoms

Injectable Contraceptives

- Depo-Provera®
- Lunelle®

IUDs

- Progestasert® IUD (with progesterone)
- ParaGard® (Copper T380A IUD)
- Mirena® (IUD with levonorgestrel)

Implants

- Implanon
- Norplant (no longer available in the United States)

Sterilization

- Female
- Male (vasectomy)

Coitus interruptus

(NuvaRing®), progestin-releasing implant (Implanon®), IUDs, and intramuscular depo-medroxy-progesterone acetate (Depo-Provera, DMPA); these methods have pregnancy rates under 1/100 woman-years of use (see ►Tab. 19.2). Unfortunately, the difference in contraceptive effectiveness between perfect use and typical use leads to millions of unintended pregnancies each year. Perfect use is defined as correct, consistent, and continued use of a method chosen by the sexually active patient.

Tab. 19.2: Effectiveness of methods.

Method	Perfect Use	Typical Use
OCP	>99%	95%
Ortho Evra	>99%	98%–99%
NuvaRing	98%–99%	98%–99%
DMPA	99.7%	99.7%
Mirena	99.9%	99.9%
ParaGard	99.4%	99.2%
Condoms	97%	86%
Implanon	>99%	100%*

*Postmarketing Pearl index of 0.024.

The less patient-dependent a method, the closer the typical usage is to the perfect usage. Thus, methods such as the implant, DMPA, and IUDs have typical usage that is virtually equal to perfect usage, and the intravaginal ring and transdermal patch have better typical usage than oral contraceptive pills (OCPs). The barrier methods (condoms, diaphragms, cervical caps, vaginal sponges, female condoms, and vaginal spermicides) are not typically recommended as the only method for adolescents, unless they are mature and motivated enough to use them; even then, pregnancy rates are higher than with the methods identified above as the most effective ones.

Over the past 20 years, a number of newer contraceptive methods have been approved in the United States by the U.S. Federal Drug Administration; these include ECs (Preven®, Plan B®), Depo-Provera®, the cervical cap, Lunelle® (injectable contraceptive with estrogen), Mirena® (an IUD with levonorgestrel), the contraceptive patch (Ortho Evra®), and an intravaginal ring (NuvaRing®). Over the past 15 years, research has developed various ways of contraceptive steroid release (see the following box, “Methods to Deliver Steroids”), producing a number of potential advantages (see the following box, “Advantages of Newer Contraceptive Methods”). After OCPs were developed in the 1960s, the emphasis has been on having pill formulations that have reduced estrogen and progestin dosages along with the development of phasic and extended dosing regimens as well as the above-mentioned newer methods. This chapter reviews some of these important methods of contraception. ►Fig. 19.1 lists frequency of contraceptive use by sexually active adolescents in the United States.

Methods to deliver steroids

- Pills
- Patch
- Injectables
- Implants
- Vaginal rings
- Hormone-releasing IUDs

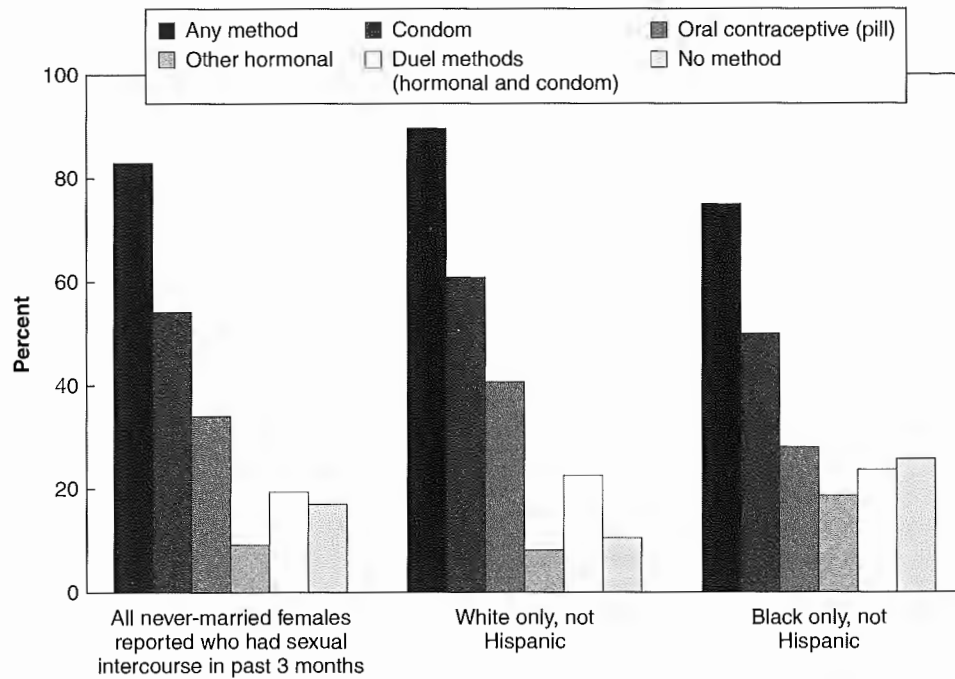


Fig. 19.1: Contraceptive use among never-married female adolescents 15–19 years of age who have had sexual intercourse in the past 3 months, by specified method used at last intercourse and race and Hispanic origin: United States, 2002.

Advantages of newer contraceptive methods

- Effective
- Easy for the adolescent to use
- Increased number of options
- Improved compliance
- Low hormone doses
- Continuous low levels of hormones
- Reversible

19.2 Oral contraceptives (OCPs; combined oral contraceptives [COCs])

One of the main contraceptives for several decades has been the COC, containing synthetic estrogen (usually ethinyl estradiol [EE], occasionally mestranol) and synthetic progesterone (several types, see the following box) (1,2,3,4,5,6,7).

COC hormones

- Estrogen

EE

Mestranol (three brands)

- Progestins

Norgestrel

Levonorgestrel

Norethindrone

Norgestimate

Norethindrone acetate

Desogestrel

Ethinodiol acetate

Drospirenone

Gestodene

The mechanisms of the combined birth control pill (OCPs or COCs) include pregnancy prevention by inhibition of ovulation, cervical mucus thickening, endometrial atrophy, and tubal transport changes. When discussing OCPs with adolescents, it is helpful to note the many benefits and uses of these pills, as listed in the following box. OCPs are usually available as 28-day packs, which contain 21 days of active pills containing consistent steroid dosages (monophasic) and placebo pills for the last 7 days to allow the adolescent to continue with one pill a day. Variations on this are being developed, such as having only 2 days of placebo for each 28-day cycle or extended cycles.

Use of oral contraceptives to manage various disorders

Acne vulgaris

Coagulopathies (anticoagulation therapy)

Decreased risk of ectopic pregnancy, ovarian and endometrial cancer

Dysmenorrhea

Epilepsy

Endometriosis

Headaches

Hypothalamic amenorrhea due to eating disorders, exercise, stress

Iron deficiency anemia

Menorrhagia

Polycystic ovary syndrome (PCOS)

Premature ovarian failure/Turner syndrome

Premenstrual syndrome (PMS)/ PTS

Rheumatoid arthritis

Multiphasic pills have also been developed that contain steroid dosages that vary through the month (bi- or triphasic). There is no evidence that multiphasic pills provide any benefit over monophasic formulations and are often more expensive. There is also no evidence that one OCP brand is better than another, only that an individual adolescent may prefer or tolerate one brand over another. Generally, a pill with between 20 mcg and 35 mcg of EE is selected. While efficacy appears to be the same, pills containing 20 mcg or less of EE have been shown to have a greater rate of irregular bleeding than higher dose pills.

Some females benefit from extending the menstrual cycle to reduce the number of yearly menstrual periods. This can be applied to those having problems worsened by their menstrual periods, such as some with epilepsy, headaches, menorrhagia, premenstrual tension syndrome (PTS), iron deficiency anemia, endometriosis, coagulation disorders; those receiving anticoagulation; athletes wishing to avoid a cycle during an important sports event; and others. Some 91-day packs are currently commercially available (Seasonique®, Seasonale®, LoSeasonique®).

OCPs may be initiated according to three different schedules. First, for the Quick Start, the patient should take the first pill immediately, and backup contraception should be used for 7 days (24). Urine pregnancy test may be performed if patient has had unprotected sex since last menses and should be repeated if next menses is missed or there are other concerns for pregnancy. Emergency contraception may be considered if unprotected sex has occurred in the last 5 days. Quick Start may improve compliance, decrease confusion, and provide immediate contraception. OCPs can also be started on the first day of the next menses, and no backup method is needed. Lastly, they may be started on the Sunday after the next menses. This may cause confusion, difficulty with weekend refills, and delay in initiation, especially in women with irregular menses. ►Tab. 19.3 provides instruction on management of missed pills. The sexually active adolescent should be instructed that OCPs (COCs) do not prevent STDs, and thus, condoms, are also recommended.

Tab. 19.3: Missed OCPs.

EE Dosage of Pill	Number of Pills Missed	
30–35 mcg	1–2 pills missed: Take last missed pill immediately and continue normal pill-taking schedule. Backup method not needed.	3 or more pills missed*: Take last missed pill immediately and continue normal pill-taking schedule. Discard other missed pills. Backup method needed for 7 days. Consider EC.
	20 mcg or less	
	1 pill missed: Take last missed pill immediately and continue normal pill-taking schedule. Backup method not needed.	2 or more pills missed*: Take last missed pill immediately and continue normal pill-taking schedule. Discard other missed pills. Backup method needed for 7 days. Consider EC.

*If missed pills occur during third week, finish active pills, discard placebos, and start new pack.

19.2.1 Contraindications to OCPs/COCs

Counseling sexually active youth about OCPs involves discussing conditions that may present increased risks for the adolescent. The World Health Organization (WHO) has published guidelines for medical eligibility to help in this endeavor (►Tab. 19.4). Females in WHO Category 1 do not have any restrictions to using OCPs, while those in WHO Category 2 have some increased medical risk. However, OCPs and other combined hormonal contraceptives should still be considered for those in Category 2 as the risk of pregnancy may outweigh the medical concerns. Females in WHO Category 3 have such an increased risk that they are not placed on OCPs unless there is no other available, effective contraceptive agent. Finally, those in WHO Category 4 are not placed on the OCP because the medical risks are too great.

Tab. 19.4: WHO medical eligibility categories for OCPs.

Category 1 (No Restrictions)

- Antibiotics
- Benign breast disease
- Benign ovarian tumors
- Cervical ectropion
- Dysmenorrhea
- Endometriosis
- Epilepsy
- Family history of breast cancer
- Gestational trophoblastic disease (benign or malignant)
- Headaches (mild)
- History of ectopic pregnancy or abortion (post abortion after first or second trimester)
- History of gestational diabetes
- Increased STD risk
- Iron deficiency anemia
- Irregular menstrual bleeding
- Obesity
- Ovarian or endometrial cancer
- Past pelvic surgery
- Pelvic inflammatory disease (PID)
- Postpartum at or over 21 days
- Thyroid disorders (as hypo/hyperthyroidism, simple goiter)
- Varicose veins
- Various infections: malaria, tuberculosis, others
- Viral hepatitis carrier

Category 2 (Caution)

- Cervical cancer
 - Diabetes mellitus (uncomplicated)
-

(Continued)

Tab. 19.4: WHO medical eligibility categories for OCPs. (*Continued*)

- Headaches (severe and if they start after beginning OCPs)
- Hypertension at 140–159/100–109 mm Hg
- Major surgery without prolonged immobilization
- Migraine headaches without focal neurologic involvement.
- Patients who have a hard time taking the OCP correctly:

Drug or alcohol abuse
Mental retardation
Persistent history as poor OCP takers
Severe psychiatric disorders

- Sickle-cell disease or sickle-C disease
- Undiagnosed breast mass

Category 3 (Usually No OCP Given)

- Gallbladder disease
- Lactating (6 weeks to 6 months)
- Less than 21 days postpartum
- Medications that interfere with OCP efficacy
- Undiagnosed abnormal vaginal/uterine bleeding

Category 4 (OCP Contraindicated)

- Breast cancer
- Cerebrovascular accident (active or history)
- Complicated structural heart disease (with pulmonary hypertension, atrial fibrillation, or history of subacute bacterial endocarditis)
- Coronary (or ischemic) heart disease (active or history)
- Deep vein thrombosis or pulmonary embolism (active or history)
- Diabetes mellitus (complicated with retinopathy, neuropathy, nephropathy)
- Headaches (including migraine headaches) with focal neurologic symptoms
- Hypertension (severe: 160+/110+ mm Hg or with vascular complications)
- Lactation under 6 weeks
- Liver disease (including liver cancer, benign hepatic adenoma, active viral hepatitis, severe cirrhosis)
- Pregnancy, complicated
- Surgery (involving the lower extremities and/or prolonged immobilization)

Used with permission from: Greydanus DE. Contraception. In: Greydanus DE, Patel DR, Pratt H, Bhave S, eds. Course manual for adolescent health. New Delhi, India: New United Process, Naraina Industrial Area, 2002:309–24.

19.2.2 Cardiovascular risks and OCPs

If the adolescent has had a venous thrombosis (VT) in the past, OCPs are contraindicated (25–27). VT risks are greater in the adolescent and young adult female than risks for arterial thrombosis. Morbid obesity is a well-known risk factor for VT, though the amount of increased risk in the otherwise healthy adolescent is not known. Most adolescents who develop a VT do not have identifiable risk factors. Screening questions for adolescents seeking OCPs in regards to VT are listed in the following box.

Questions about personal/family history of thromboembolism

1. Have you or a close family member (including uncles/aunts) had blood clots in legs or lungs?
2. Have you or a close family member been hospitalized for blood clots in legs/lungs?
3. Have you or a close family member taken blood thinners?
4. Under what circumstances did the clot form? (e.g. during air travel)

The following box lists risk factors for thrombosis. Death from cardiovascular disease (arterial and venous) can occur among 20- to 24-year-old females at 2–6 per million per year. Thus, death from the OCP is a small, but known risk, though the risk of death from pregnancy is much greater (10,25). The OCP should be stopped if the adolescent has a condition requiring prolonged bed rest, as with major surgery. Smoking should be discouraged in the adolescent but is not a reason by itself to avoid OCPs. Blood pressure can increase in those on OCPs and should be monitored. If there is a personal or family history for increased lipids, the OCP is permitted if the low density lipoprotein range is under 160 mg/dl or the triglycerides under 250. Other guidelines may be used by the clinician if these guidelines are not accepted in one's region.

Risk factors for thrombosis

Pregnancy
 Factor V Leiden mutation
 Prothrombin mutation G20210A
 Hyperhomocysteinemia from mutations in MTHFR gene
 Deficiencies of Proteins: C, S, or antithrombin III
 Synthetic oestrogen use
 Tobacco use
 Other medical risk factors: immobilization, surgery (especially orthopedic and pelvic), cancer, obesity, severe illness, other thrombophilias

19.2.3 OCPs and miscellaneous risks

There are a number of so-called “minor” adverse effects that are well-known with the OCPs, such as headaches, mood changes, nausea, and breast tenderness. These effects are usually tolerated and do disappear with cessation of the pill. Though often linked to OCPs, there is no clear evidence that weight gain is directly caused by OCP/COC use. Uterine breakthrough bleeding can be seen with OCPs and is a common cause for stopping the OCPs. Breakthrough bleeding usually resolves with continued use of the same OCP. Occasionally, a change to another brand is necessary. If the breakthrough bleeding is significant, the patient should be evaluated for other causes.

Adolescents with well-controlled diabetes mellitus usually do well with low dose OCPs; OCPs are not provided if complications arise, such as hypertension, retinopathy, nephropathy, or neuropathy. Some clinicians recommend that OCPs be avoided in those with migraine headaches having auras and in those with worsening headaches on the OCP. Some anticonvulsants lead to reduced OCP efficacy. These include barbiturates, phenytoin, carbamazepine, felbamate, topiramate, and vigabatrin. A number of other medications can interfere with OCP efficacy, such as rifampin, griseofulvin, ketoconazole, itraconazole, and others. Antacids and OCPs should be separated by at least 3 hours. Those with active liver disease should avoid OCPs.

19.3 Transdermal hormonal contraception

The use of the patch to provide contraception has become a popular method for many adolescents and is based on decades-long research in using transdermal mechanisms to deliver medication. Patients should be advised that the same adverse effects as OCPs apply, with the possible addition of increased breast symptoms and local dermatitis at the patch site. The contraceptive patch is about the size of a matchbook and placed on the skin in various sites: upper outer arm, buttocks, upper torso, and abdomen. It is not placed on the breasts or skin that is irritated or cut. The patch produces a daily release of 20 mcg EE and 150 mcg of norelgestromin, a hormone that is the active metabolite of norgestimate. The patch is typically started on the first menstrual day, replaced weekly for 3 weeks, and then no patch is placed on week 4, allowing menses to occur. A Quick Start, as discussed above, may also be used for initiation. A different site is chosen with each patch application.

Pregnancy rates are similar to the OCPs, 0.7 to 1.24 per 100 woman-years with the patch versus 2.18 for OCPs (10). This rate is not affected by exposure to water baths or saunas, strenuous exercise, or warm, humid climates. Increased risks for pregnancy include wearing a patch for more than 7 days, patch detachment, and not placing a patch after being off for 7 days. If the patch detaches, it should be reattached immediately. If the patch cannot be reattached with its own adhesive, a new patch should be placed, and the patient should place the next patch on schedule. If the patch is off for more than 24 hours or the patient is more than 2 days late in changing it, a backup contraceptive method should be used for 7 days. Some concern has been raised that pregnancy risks may be increased in females over 90 kg. COC efficacy is reduced in obese females but is better than noted with use of barrier methods alone. This reduced efficacy is due to increased basal metabolic rates, augmented adipose tissue sequestration, and increased hepatic metabolism of enzymes found in obesity.

19.4 NuvaRing vaginal ring

NuvaRing is a flexible, transparent, soft vaginal ring made of an ethylene vinyl acetate copolymer with two steroid reservoir cores providing a daily release of 15 mg EE and 120 mcg of etonogestrel (desogestrel metabolite). It is placed in the vagina by the adolescent for 3 weeks and then removed for 1 week. Quick Start is possible. If the ring is expelled, it is simply cleaned and placed back in the vagina; if the ring is removed for more than 3 hours, a backup method of contraception is needed until the ring is back in the vagina for 7 days. It is an excellent method of contraception for those who are comfortable with their bodies. Adolescents are often reticent to use the ring due to the method of insertion and removal. Insertion can be simplified by placing the NuvaRing in an empty tampon applicator and using the applicator to insert the ring. The user needs to be counseled that the ring does not prevent STDs. Advantages of the ring include excellent contraceptive efficacy, easily placed as well as removed, confidential method, continuous hormone release, and rapid return of ovulation after cessation of the method. Potential adverse effects include vaginitis, vaginal discomfort, foreign body sensation, as well as the common side effects of all COCs as mentioned above.

19.5 POPs

POPs provide contraception by cervical mucus thickening and endometrial atrophy; ovulation is not reliably inhibited, leading to pregnancy rates of 1–3 or more per 100,000. Progestins used in POPs include 0.35 mg of norethindrone (Micronor®; Nor-Q.D®) and 0.075 mg of norgestrel (Ovrette®). POPs are suggested by some clinicians for sexually active females with contraindication to estrogen (such as hypertension or coronary heart disease). Typical adverse effects of POPs include amenorrhea and irregular uterine bleeding. POPs should not be used by females with ectopic pregnancy history or taking certain medications, such as anticonvulsants, rifampin, and griseofulvin. POPs are not typically recommended for adolescents due to the above increased pregnancy risk and the need for an active pill (no placebos) to be taken at the same time daily, making compliance difficult for teens.

19.6 ECs

The following box lists some of the ECs that have been available (28). The Yuzpe regimen uses combination of EE (100 mcg) and a progestin and results in significant nausea due to the high dose of estrogen (use of antiemetic is recommended), while Plan B contains levonorgestrel only and thus produces less nausea and has been shown to be somewhat more effective than the Yuzpe regimen. The expected pregnancy rate from one unprotected coital episode is about 8 percent; this is reduced to less than 1 percent with some ECs if used within 24 hours of unprotected sex. EC is most effective if used within the first 72 hours after unprotected sex or contraception failure but may be taken up to 5 days after coitus. If the patient is pregnant while taking ECs, the fetus is not harmed. ECs are over-the-counter in many parts of the world. They should

not be used as regular contraception. Reasons to use ECs include having sex without protection, slippage, or breaking of a condom; missing two or more OCPs in a row; barrier contraceptive dislodgement (such as a diaphragm or cervical cap); IUD dislodgement; and being more than 14 weeks from the last Depo-Provera® injection.

EC

Ovral® : 2 tablets by mouth immediately followed by 2 tablets in 12 hours

Lo/Ovral®, Nordette® or Levlen® : 4 tabs and 4 more in 12 hours

TriPhasil® or Tri-Levlen® (yellow tabs only): 4 tabs and 4 more in 12 hours

Ovrette®: 20 tabs and 20 more in 12 hours

Preven® Emergency Contraceptive Kit

Plan B®): levonorgestrel, 0.75mg followed by 0.75 mg in 12 hours

19.7 Injectable contraceptives

DMPA (Depo-Provera®) is a commonly used injectable contraceptive that inhibits ovulation, thins the endometrium, and thickens the cervical mucus. It is most commonly used in the intramuscular formulation, but a subcutaneous version has been developed which may show promise for self-administration in the future. It is a reliable contraceptive if taken on a regular basis at a dose of 150 mg every 12 week. A very low pregnancy rate is noted at 0.3 percent. It does not contain estrogen and thus can be used for those with contraindications to using estrogen. Bone loss is noted in adolescents on this contraceptive – an average of 3.1–5 percent after 2 years of use. However, several studies have shown significant bone mineral density recovery after cessation of DMPA, though it is unclear yet whether DMPA decreases peak bone density when used during adolescents. Therefore, DMPA should be used with caution in youth at risk for low bone density, such as those with chronic renal disease, anorexia nervosa, and those with limited mobility (29). Use of Depo-Provera often leads to irregular menstrual periods and then amenorrhea. The following box provides a partial list of adverse effects. Benefits of this contraceptive include reliable contraception, reduced dysmenorrhea, less seizure activity in some females with epilepsy, and lower PTS.

Partial list: Side effects of Depo-Provera®

Acne

Amenorrhea

Behavioral changes (depression, anxiety, irritability)

Breast tenderness

Decreased bone density

Dizziness

Fatigue

Partial list: Side effects of Depo-Provera® (Continued)

Glucose intolerance
 Hair loss
 Irregular menstrual bleeding
 Nausea
 Weight gain

Other injectable contraceptives that are available are Lunelle® (United States), Cyclo-Provera, and Cyclofem (5 mg estradiol cypionate and 25 mg medroxyprogesterone acetate [MPA/E2C]); these combination injectables (containing estrogen and progesterone) are given intramuscularly every month (every 28–30 days) and have very high contraceptive efficacy. Since it contains estrogen, dysfunctional uterine bleeding and amenorrhea are not as common as noted with Depo-Provera. Another injectable product is Mesigyna® (with 50 mg of norethindrone and 5 mg of estradiol valerate).

The etonogestrel-releasing implant (available as Implanon® in the United States since 2006) is a subdermal implant consisting of one 40 mm long, 2 mm diameter rod. This rod is made up of a core containing 68 mg of etonogestrel within a rod of ethylene vinyl acetate copolymer covered in a membrane of the same material. This implant is inserted subdermally, typically in the region of the bicipital groove, using the sterile preloaded inserter. Implanon provides 3 years of contraception by releasing a steady dose of progestin causing inhibition of ovulation and increasing cervical mucus viscosity. As a progestin-only method of contraception, the implant does not have the side effects or contraindications associated with estrogen containing methods. Unlike MPA, the implant does not cause decreased levels of estrogen and thus does not decrease bone density.

The benefits include high efficacy, long-acting, non-estrogen-containing, cost effective, requires little effort of the part of the patient, rapid return to fertility, and the benefits of other progestin-only methods. Adverse affects include irregular bleeding, headaches, acne, weight gain, possible mood disturbance, and increased blood pressure. If irregular bleeding occurs, the patient should be evaluated for other causes. If no other cause is found and the bleeding is significant or disruptive for the patient, non-steroidal anti-inflammatory drugs, COCs (varying regimens), or EE have been shown to be effective to treat breakthrough bleeding due to the implant and possibly other progestin-only methods as well.

The effect of Implanon may be decreased in those with liver disease and by medications that induce CYP3A, such as many antiepileptics, rifampin, and Saint-John's-wort. Like DMPA, many women eventually experience amenorrhea with the implant. Barriers to use include cost and the need for insertion and removal. The need for removal by a trained professional may also be seen as a benefit in the adolescent population as this gives the practitioner an opportunity to counsel the patient on family planning, safer sex practices, and additional contraception options as well as to conduct appropriate screening prior to the adolescent discontinuing this method, which may decrease unintended pregnancy. Overall, implantable contraception is an excellent option for teens.

19.8 IUD

A number of IUDs are available in the world; the three types available in the United States are Progestasert IUD®, the ParaGard® (Copper T380A), and the Mirena® IUD. The following box lists the contraceptive mechanisms of IUDs.

IUD contraceptive effects

1. Prevents fertilization
2. Interferes with ovum development
3. Interferes with sperm movement and ability to penetrate ovum
4. Inhibits sperm survival
5. Helps prevent egg release
6. Thickens cervical mucus

Progestasert IUD® is replaced annually and has an expulsion rate of 2.7 percent, while ParaGard® is replaced every 8 to 10 years and has an expulsion rate of 5 percent. In the United States, concern has been raised about a possible link between its use and PID in females due to often criticized research dating to the 1980s. Though controversial, it has limited the use of IUDs in adolescents in the United States; it is used by 12 percent of contraceptive-using women throughout the world. Data on the currently available IUDs show no increase in risk of PID unless the patient has an infection with *Chlamydia* or gonorrhea at the time of placement. Therefore, patients should be screened for sexually transmitted infections (STIs) prior to IUD placement.

Mirena IUD (Levonorgestrel-containing IUD; LNG-IUD) is a second-generation of steroid-releasing IUDs. It releases 20 mcg of levonorgestrel per 24 hours over the first 5 years of use, decreasing to 10 mcg per day after 5 years. It is a popular IUD used by more than 2 million women in the world. It has a failure rate of 0.2 percent in the first year and 0.7 percent at 5 years. It exerts a local effect on the endometrium as well as the cervical mucus; ovulation may continue, and endometrial thinning can lead to amenorrhea. The following box lists potential adverse effects of Mirena IUD, the most common of which is irregular bleeding. It has been used to reduced menstrual bleeding in females with dysfunctional uterine bleeding because it can reduced menstrual blood loss by 90 percent. Contraindications to Mirena IUD use include distorted uterine cavity, history of subacute bacterial endocarditis, prosthetic heart valves, and active PID.

Mirena IUD side effects

Common

- Initial increased menstrual bleeding
- Abdominal pain

Rare

- Hypersensitivity reaction
- IUD becomes embedded in myometrium
- Perforation of uterus or cervix

Mirena IUD side effects *(Continued)*

Uncommon

- Acne/other skin problems
- Back pain
- Breast tenderness
- Headache
- Nausea
- Mood changes

ParaGard® (Copper T380A) is a copper T IUD which prevents pregnancy by the interference of sperm motility by the copper ions. ParaGard® is highly effective with a first year failure rate of 0.8 percent with typical usage and a high rate of continuation among adolescents. The primary benefit to ParaGard® is that it is nonhormonal and can therefore be used as reliable contraception in those with contraindications to hormone use or history of side effects with hormonal contraception or those patients wishing to avoid hormone usage for other reasons. Adverse effects are primarily increased dysmenorrhea and menstrual bleeding, abdominal pain, expulsion, and rarely perforation. Contraindications are similar to those for Mirena. In general, IUDs are a safe, effective, long-term method of birth control that can be used in nulliparous adolescents. While not recommended for teens at high risk for STIs, IUDs have not been found to increase risk of PID, nor have they been found to affect future fertility.

19.9 Barrier methods**19.9.1 Diaphragm and vaginal spermicides**

The following box, “Vaginal Barrier Contraceptives,” lists barrier contraceptives. These methods are only recommended for highly motivated sexually active individuals. Clinicians can learn to fit diaphragms, helping determine the proper size, and teaching the youth successful use of this method. The diaphragm is used with vaginal cream or foam and is often used with the condom. Vaginal contraceptives or spermicides include foams, jellies, creams, suppositories, and a contraceptive film. Contraindications to diaphragm use are listed in the following box, “Contraindications to Use of the Diaphragm,” and advantages of vaginal contraceptives are listed in the box, “Vaginal Contraceptive Advantages.” Side effects include vaginal odor and, in rare cases, allergic reactions. Females who have diabetes mellitus and use a diaphragm have increased risks for urinary tract infections. In rare cases, toxic shock syndrome may occur, and the diaphragm is contraindicated in a female having a history of toxic shock syndrome.

Vaginal barrier contraceptives

- Diaphragm
- Cervical cap (Prentif®)
- Vaginal contraceptive sponge
- Vaginal spermicides
- Female condom (Reality®)
- Male condom

Contraindications to use of the diaphragm

- Allergy to rubber or spermicides
- Anteversio (severe; forward tilting of uterus)
- Complete uterine prolapse
- Perineal tears
- Retroversion (severe; backward tilting of uterus)
- Short anterior vaginal wall
- Vesicovaginal (or rectovaginal) fistulas
- Toxic shock syndrome

Vaginal contraceptive advantages

- Allows the pair to share contraceptive responsibility when used with a condom
- Can reduce dyspareunia if present (vaginal lubricant)
- Cost is minimal
- Prescription is not needed
- Provide effective contraception, especially if used in conjunction with condom or diaphragm
- Side effects are few
- Useful for young women with only occasional coitus

19.9.2 Cervical cap

The Prentif® cavity-rim cervical cap is a small, latex cap (with spermicide placed inside) that is half the size of a diaphragm and fits around the cervix via suction. Four cervical sizes are available and about one-fourth of females cannot be fitted with a cervical cap. The clinician should obtain cervical cytology before and at the time of cervical cap fitting because cervical dysplasia has been reported in cap users; additional cervical cytology is also recommended 3 months after the fitting. Contraindications to cap use include cervical laceration, cervical scarring, and a history of toxic shock syndrome.

19.9.3 Vaginal contraceptive sponge

The sponge is made of polyurethane with a concave shape; it is a disposable method available without prescription, inserted in the vagina up to 2 days before sex and left in place 6 to 24 hours after coitus. Adverse effects include vulvar rash, vaginal odor, pruritus, candidiasis, and increased risk for urinary tract infection as well as toxic shock syndrome. Its contraceptive efficacy is similar to other barrier contraceptives.

19.9.4 Female condom

The female condom is a polyurethane bag or sheath that does not require a prescription. It is placed in the vagina prior to coitus; it is not used with a male condom. Some STD protection is provided by the female condom, and its overall contraceptive efficacy is similar to that of other barrier contraceptives – acceptable, but not as good as oral contraceptives.

19.9.5 Male condom

Male condoms are recommended to reduce the risk for STDs as well as pregnancy. Their contraceptive efficacy is similar to other barrier methods. They must be used correctly with each act of coitus or their efficacy becomes considerably reduced. Latex condoms are associated with increased breakage rates when exposed to high temperatures and/or ultraviolet light; they are also weakened by exposure to oil-based lubricants. Latex allergy is noted in 7 percent of the general population, and the polyurethane condom can then be used. In general, male condom usage should be encouraged in the adolescent population primarily for STI prevention. However, barrier methods are typically not recommended as the sole method of birth control in adolescents.

19.10 Summary

Contraception is an important concept for sexually active youth who wish to avoid unwanted, unplanned pregnancy. This chapter has reviewed effective methods of contraception that are available. Clinicians caring for adolescents should ask about the sexual behavior of these youth and provide advice on contraception, beginning with abstinence. Sexual responsibility involves prevention of unwanted pregnancy, premature childbearing, and STIs. A summary of contraceptive options for sexually active adolescent females having chronic illness is provided in ►Tab. 19.5.

19.11 Internet sites

- American College of Obstetrics and Gynecology: <http://www.acog.org>
- Alan Guttmacher Institute, New York: <http://www.agi-usa.org/index.html>
- Association of Reproductive Health Specialists: <http://www.arhp.org>
- Cochrane Library: <http://hiru.mcmaster.ca/cochrane/cochrane/cdsr.htm>

- Journal of the American Medical Association-JAMA Contraception Information Center: <http://www.ama-assn.org/special/contra.html>
- European Journal of Contraception and Reproductive Health: <http://www.tandf.co.uk/journals>
- Family Health Institute: <http://www.fhi.org>
- Centers for Disease Control, Atlanta, Georgia, USA: <http://www.health.gov/healthypeople/>
- World Health Organization Medical Eligibility Criteria: http://www.who.int/reproductivehealth/publications/RHR_00_2_medical_eligibility_second_edition/index.ht
- Emergency Contraceptives Info: <http://www.not-2-late.org>

Tab. 19.5: Chronic Disorders and Contraception (9,10,20,21,22)

Disorder	Recommended Methods	Concerns	Additional Comments
Antiphospholipid antibody (aPI) syndrome	DMPA or the Mirena IUD/intrauterine system (IUS)	See increased risks for thrombosis in these patients and thus avoid COCs. Avoid COCs in these patients with moderate or high titers of antiphospholipid antibodies (i.e. at or over 40 GPL or MPL units).	Risk of thrombosis is especially increased if other risk factors for thrombosis are present.
Cancer	Potentially all methods; see various cautions. For example: Avoid DMPA if taking chemotherapy due to increased risks for infection from neutropenia or an injection-induced hematoma due to thrombocytopenia (TCP). Chemotherapy-induced bone loss may be increased by DMPA. Avoid IUDs for those with neutropenia or TCP. Caution with contraceptive implants for those with TCP and irregular menstrual bleeding.	COCs are contraindicated in those with breast cancer. Progestin and estrogen receptors are noted in ovarian cancer tissue; thus, COCs are not prescribed to patients with ovarian cancer. Avoid the minipill with a positive history for ectopic pregnancy or if taking meds with drug interactions (i.e. certain anticonvulsants, griseofulvin, rifampin).	COCs may reduce risks for ovarian and endometrial carcinoma. Pregnancy worsens breast cancer, endometrial cancer, ovarian cancer, malignant gestational trophoblastic disease, malignant liver tumors (hepatoma), and hepatocellular liver carcinoma (22).

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Tab. 19.5: Chronic Disorders and Contraception (9,10,20,21,22) (Continued)

Disorder	Recommended Methods	Concerns	Additional Comments
Congenital heart disease (CHD)	DMPA and minipill are recommended for those with CHD if stable. Mirena IUD/IUS is usually OK. Observe for potential adverse reactions during IUD placement, such as syncope, bradycardia, and seizures. Avoid IUD if patient is on anticoagulation due to increased risk for bleeding with IUD placement.	Those on COCs have increased risk for thrombophlebitis, vascular thromboses (arterial or venous), and pulmonary embolism. Avoid COCs (including patch) with a positive history for these conditions. See the text. Avoid COCs if there is increased risk for thromboembolism or endocarditis – depending on the type of CHD. COCs (including the patch) are avoided in those with CHD with cardiac shunts, congestive heart disease, low output cardiac disorders, and coronary heart disease. Avoid COCs (including patch) in those with CHD and pulmonary hypertension.	Females with valvular heart disease and other CHD may be at endocarditis risk during IUD placement and 1 month after the placement. Pregnancy is associated with increased adverse health effects in ischemic heart disease, complicated valvular heart disease, peripartum cardiomyopathy, stroke (22).
Diabetes	All methods are acceptable if the metabolic status is stable: COCs, DMPA, minipill, IUDs.	Avoid COCs should be avoided in any adolescent female with two diabetic complications (peripheral vascular disease, nephropathy, and retinopathy), vascular sequelae (i.e. VT), or hypertension. DMPA is safe even with the presence of diabetes complications. IUDs may induce chronic or resistant	COCs do not worsen the metabolic status. Newer oral contraceptive progestins (norgestimate, gestodene, and desogestrel) may cause less carbohydrate metabolism effects than the older progestins. Pregnancy is associated with

(Continued)

Tab. 19.5: Chronic Disorders and Contraception (9,10,20,21,22) (Continued)

Disorder	Recommended Methods	Concerns	Additional Comments
Epilepsy	DMPA, IUD (Mirena and copper), minipill, barrier contraception	<p><i>Candidaalbicans</i> vaginitis in some.</p> <p>Caution with COCs since there can be interference with some antiepileptic drugs with increased pregnancy risks: carbamazepine (Tegretol) Phenobarbital Phenytoin (Dilantin) Primidone (Mysoline) Topiramate (mild inducer) (Topamax)</p>	<p>increased adverse health effects in insulin-dependant diabetes mellitus with complications (22).</p> <p>Avoid minipill due to increased risk for pregnancy and potential teratogenicity of antiepileptic medications. Pregnancy is associated with increased adverse health effects in epilepsy (22).</p>
Hyperlipidemia	All methods are recommended for stable hyperlipidemia. Use low-dose COCs.	Avoid COCs if low density lipoproteins (LDL) level is over 160 mg/dl, triglycerides are over 250 mg/dl, or in situations with the existence of multiple risk factors for coronary artery disease (CAD): diabetes mellitus, hypertension, obesity, smoking, and positive family history for premature CAD.	Research notes that estrogen can lower high density lipoprotein levels, raise LDL levels, and increase triglyceride levels.
Hypertension	All methods are used if the condition is stable.	Avoid estrogen-containing methods for unstable hypertension (such as blood pressures over 160/100 mm Hg). Pregnancy is associated with increased adverse health effects in uncontrolled hypertension (22).	COCs result in a small increase in blood pressure – higher increase in anecdotal situations.
Inflammatory bowel disease (IBD)	All methods are usually acceptable.	COCs may reduce bowel symptoms in	DMPA may reduce breakthrough

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Tab. 19.5: Chronic Disorders and Contraception (9,10,20,21,22) (Continued)

Disorder	Recommended Methods	Concerns	Additional Comments
	Avoid DMPA on a prolonged basis in those on corticosteroids due to bone loss exacerbation.	active colitis; COCs efficacy may be lowered due to increased breakthrough bleeding and reduced OC absorption. Use the patch if gastrointestinal absorption may be a problem. Mirena IUD/IUS appears to be effective and safe.	bleeding and secondary anemia; may be best for combination of IBD and coagulation disorders.
Intellectual disability	See schizophrenia		
Liver disease	DMPA and IUDs are safe with active liver disease. Barrier contraception is also fine (except for the increased pregnancy risks inherent in this method).	Avoid COCs in those with active liver disease (including hepatitis and cirrhosis). COCs are OK when the liver function tests return to normal. Unknown the effect of obesity-induced nonalcoholic steatohepatitis on COC efficacy.	Incidence of hepatic cell adenoma is 3.4/100,000 pill users. Pregnancy is associated with increased adverse health effects in severe (decompensated) cirrhosis (22).
Migraine headaches	DMPA, the minipill (progesterone-only pill), and the Mirena IUD in addition to barrier contraceptives	Females with migraine headaches with complicated migraines (i.e. with neurological symptoms) have heightened risk for cerebral ischemia and cerebrovascular accidents if placed on COCs because of estrogen effects	Use COCs with caution in those with migraines and stop if auras develop and/or the headaches become worse.
Obesity	Levonorgestrel IUD and minipills may be the best option for the morbidly obese adolescents. COCs or intravaginal ring are recommended unless estrogen-	COCs are good management choices for obese youth needing contraception as well as PCOS, hirsutism, and acne vulgaris. DMPA may induce	COC efficacy is reduced in obese females but is better than noted with use of barrier methods alone. The reduced efficacy is due to increased basal

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Tab. 19.5: Chronic Disorders and Contraception (9,10,20,21,22) (Continued)

Disorder	Recommended Methods	Concerns	Additional Comments
	contraindications arise (as thrombo-embolism, others).	weight gain, and this should be closely monitored.	metabolic rates, augmented adipose tissue sequestration, and increased hepatic metabolism of enzymes.
Pulmonary disease	All methods are acceptable in patients with cystic fibrosis (CF) with no other contraindications for contraceptives.	COCs are safe and effective in those with CF. Bronchial mucus is not thickened to a major extent (as with cervical mucus) to interfere with contraception. Pulmonary embolism (PE) is a rare event—avoid COCs if other high risk factors for PE are present in CF females.	Can use all methods in those with asthma. If pulmonary tuberculosis is present, rifampin can decrease COC efficacy.
Renal disease	If the renal disease (including end-stage renal disease, or ESRD) is stable, OK to use COCs, DMPA, Mirena IUD/IUS, and barrier contraception.	COCs are safe for ESRD if renal state is not impaired (stable) with no hypertension, cardiovascular disease, and thromboembolism. Estrogen is contraindicated in those with ESRD with significant hypertension or if bedridden. Avoid DMPA if bone loss is of concern. Avoid the IUD with increased risk of endometritis and worsening anemia.	COCs may improve hyper- menorrhea in some with ESRD.
Rheumatoid arthritis (RA)	COCs, Depo-Provera, barriers	Potential concern with IUDs due to potential infection. Females with severe RA may have difficulty inserting a vaginal ring,	Avoid COCs if there is increased risk for vasculitis, atherosclerosis, or ischemia. See possible drug

(Continued)

Tab. 19.5: Chronic Disorders and Contraception (9,10,20,21,22) (Continued)

Disorder	Recommended Methods	Concerns	Additional Comments
		diaphragm, cervical cap, or other barrier contraceptives.	interactions between COCs and RA drugs, such as warfarin, corticosteroids cyclosporine, and some anticonvulsants.
Sickle-cell disorders	COCs, Depo-Provera, barriers	Pregnancy increases risk for both mother and fetus. COCs do not increase risk due to sickling; Depo-Provera may reduce sickling crises. Pregnancy is associated with increased adverse health effects in sickle-cell disease (22).	Sickling is a different process than thrombosis, and thus COCs do not increase risk for thrombosis.
Systemic lupus erythematosus (SLE)	COCs may be the best choice.	Avoid COCs in the presence of vasculitis, nephritis, or the aPI syndrome. Avoid the progesterone drospirenone if renal failure noted since hyperkalemia can develop. Pregnancy is associated with increased adverse health effects in SLE (22).	DMPA may worsen bone loss already present in SLE patients. Avoid the IUD due to the lowered immune status of SLE patients.
Thyroid disease	All methods are acceptable.	No contraindications for contraception with hyper-/hypothyroidism.	If she is on levothyroxine, check T ₄ and TSH levels after two oral contraceptive cycles.
Schizophrenia	DMPA and IUDs	Some females find it difficult to use COCs or use barriers due to limited mental health status.	Sterilization remains a complex and highly controversial concept in contemporary society.
Miscellaneous	HIV: DMPA works well. Alternative: IUD.	HIV: Potential drug interactions between	HIV: Use condoms as well to protect

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Tab. 19.5: Chronic Disorders and Contraception (9,10,20,21,22) (*Continued*)

Disorder	Recommended Methods	Concerns	Additional Comments
		COCs and certain anti-HIV drugs; some cause decrease in estrogen (lopinavir/ ritonavir and nevirapine), and some cause an increase in estrogen (atazanavir and efavirenz).	partner from HIV transmission. Pregnancy is associated with increased adverse health effects in HIV/AIDS (22).

GPL, IgG phospholipid; MPL, micrograms of IgM antibodies; TSH, thyroid-stimulating hormone

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