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Long-Acting Reversible Contraception: Implants and Intrauterine Devices

Intrauterine devices and contraceptive implants, also called long-acting reversible contraceptives (LARCs), are the most effective reversible contraceptives. The major advantage of LARCs compared with other reversible contraceptive methods is that they do not require ongoing effort on the part of the user for long-term and effective use. In addition, return of fertility is rapid after the removal of the device (1, 2). The purpose of this Practice Bulletin is to provide information for appropriate candidate selection and the management of clinical issues and complications associated with LARC use.

Background

There are currently three LARC methods available in the United States, two of which are intrauterine devices (IUDs), 1) the copper T380A IUD, 2) the levonorgestrel intrauterine system, and 3) the etonogestrel single-rod contraceptive implant. The use of IUDs has increased over the past decade, from 1.3% in 2002 to 5.5% in 2006–2008, according to the most recent data from the National Survey of Family Growth (3). The single-rod contraceptive implant was approved by the U.S. Food and Drug Administration (FDA) in 2006, and use has not yet been tracked; however, millions of women worldwide have used the method. Preliminary data reported from the Contraceptive CHOICE project, a prospective cohort of women aged 14–45 years, showed that in the absence of financial, knowledge, health care provider, or logistical barriers, the rate of initiation of LARC was higher than any other contraceptive method. Of the first 2,500 women enrolled in the study, 67.1% chose an IUD

or the contraceptive implant (4). Encouraging the use of LARC methods for appropriate candidates may help lower U.S. unintended pregnancy rates because gaps in use and discontinuation of shorter acting methods are associated with unintended pregnancy rates in high-risk women (5). Typical-use pregnancy rates for LARCs are lower, and continuation rates are higher, when compared with oral contraceptives (see Table 1) (6). In an economic analysis, both types of IUDs were among the three least expensive contraceptive methods over a 5-year period (7).

Long-Acting Reversible Contraceptive Devices

Copper Intrauterine Device

The copper T380A is a T-shaped device of polyethylene wrapped with copper wire around the stem and arms. A number of different mechanisms of action have been proposed, including inhibition of sperm migration and

Committee on Practice Bulletins—Gynecology. This Practice Bulletin was developed by the Committee on Practice Bulletins—Gynecology with the assistance of Eve Espey, MD, MPH, and Rameet H. Singh, MD, MPH. The information is designed to aid practitioners in making decisions about appropriate obstetric and gynecologic care. These guidelines should not be construed as dictating an exclusive course of treatment or procedure. Variations in practice may be warranted based on the needs of the individual patient, resources, and limitations unique to the institution or type of practice.

Table 1. Comparison of First-Year Unintended Pregnancy and Continuation Rates Among Intrauterine Device and Implant Users in the United States

Method	Percentage of Women Experiencing an Unintended Pregnancy in the First Year of Use		Percentage of Women Continuing Use*
	Typical Use [†]	Perfect Use [‡]	
Intrauterine Device			
Copper T	0.8	0.6	78
Levonorgestrel	0.2	0.2	80
Implant	0.05	0.05	84
Combined pill and progestin-only pill	9	0.3	67
Female sterilization	0.5	0.5	100
Male sterilization	0.15	0.10	100

*Among couples attempting to avoid pregnancy, the percentage reflects women who continue to use a method for 1 year.

[†]Among typical couples who initiate use of a method (not necessarily for the first time), the percentage reflects women who experience an accidental 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 and the diaphragm are taken from the 1995 National Survey of Family Growth corrected for underreporting of abortion; estimates for fertility awareness-based methods, withdrawal, 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.

[‡]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 reflects women who experience an accidental pregnancy during the first year if they do not stop use for any other reason.

Modified with permission from Trussell J. Contraceptive failure in the United States. *Contraception* 2011;83(5):397–404. Epub 2011 Mar 12.

viability, change in transport speed of the ovum, and damage to or destruction of the ovum. The evidence suggests these prefertilization effects constitute the primary mechanism of action for pregnancy prevention in the copper IUD (8). Postfertilization effects, including damage to or destruction of the fertilized ovum, also may occur (9). All effects, both prefertilization and postfertilization, occur before implantation.

The FDA has approved use of the copper IUD for up to 10 continuous years, during which it remains highly effective. It has a reported failure rate at 1 year of 0.8 per 100 women, and a 10-year failure rate comparable with that of female sterilization (1.9 per 100 women over 10 years) (6). The most common adverse effects reported are abnormal bleeding and pain (10).

Levonorgestrel Intrauterine System

The levonorgestrel intrauterine system is also T-shaped and contains a polydimethylsiloxane sleeve containing 52 mg of levonorgestrel on the stem. The levonorgestrel intrauterine system and copper IUD have similar primary mechanisms of action. In addition to these effects, the levonorgestrel intrauterine system causes endometrial suppression and changes the amount and viscosity of cervical mucus. As with the copper IUD, all effects—

both prefertilization and postfertilization—occur before implantation.

The levonorgestrel intrauterine system is FDA approved for up to 5 years of use, but may be effective for up to 7 years (11). The 1-year failure rate is 0.2 per 100 women (6). It releases 20 µg of levonorgestrel daily, and this small amount of steroid confers minimal systemic adverse effects, although some women may experience hormone-related effects, such as headaches, nausea, breast tenderness, depression, and cyst formation. Most women ovulate normally but experience diminished menstrual bleeding because of the local effect of levonorgestrel on the endometrium (12, 13). One small study reported ovulation in 63% of the amenorrheic group and in 58% of the regularly menstruating group (13).

Overall, complications with IUDs are uncommon and mainly include expulsion, method failure, and perforation. The expulsion rate is between 2% and 10% during the first year (6). Perforation occurs in 1 per 1,000 insertions or less (14).

Contraceptive Implants

The contraceptive implant is placed subdermally and consists of an ethylene vinyl acetate copolymer core containing 68 mg of etonogestrel surrounded by an ethylene

vinyl acetate copolymer skin. The ethylene vinyl acetate copolymer allows for a controlled release of etonogestrel over a period of 3 years. Etonogestrel is the active metabolite of desogestrel (15). The single-rod implant is 4 cm in length and 2 mm in diameter and is packaged preloaded in a disposable sterile applicator. It does not contain latex, is not biodegradable, and is currently not radiopaque (16).

The primary mechanism of action of the implant is suppression of ovulation by altering the hypothalamic–pituitary–ovarian axis (15, 17, 18). Additional contraceptive efficacy may be conferred by the implant’s thickening of cervical mucus (18, 19) and alteration of the endometrial lining (19, 20). The contraceptive implant is the most effective method of reversible contraception, with a typical-use pregnancy rate of 0.05% (6).

After implant insertion, changes in menstrual bleeding patterns are common and include amenorrhea or infrequent, frequent, or prolonged bleeding. Other reported adverse effects include gastrointestinal difficulties, headaches, acne, breast pain, vaginitis, and weight gain (21–23).

Complications related to implant insertion (1.0%) and removal (1.7%) are uncommon. Insertion complications include pain, slight bleeding, hematoma formation, difficult insertion, and unrecognized noninsertion. Removal may be complicated by breakage of the implant and inability to palpate or locate the implant because of deep insertion (22, 23). Fertility returns rapidly after the discontinuation of the implant (17, 23). All health care providers who perform implant insertions and removals must receive training from the manufacturer.

Long-Acting Reversible Contraceptive Eligibility

Long-acting reversible contraceptive methods have few contraindications, and almost all women are eligible for implants and IUDs. The World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) have developed evidence-based medical eligibility criteria for contraceptive use (24, 25). Separate recommendations are given for both the initiation and continuation of use, and guidelines are assigned to one of four categories based on their level of risk (see Box 1) (25). Both IUD and contraceptive implant use in women with a variety of characteristics and medical conditions are addressed in the *U.S. Medical Eligibility Criteria for Contraceptive Use* “Summary of Classifications for Hormonal Contraceptive Methods and Intrauterine Devices” (available at <http://www.cdc.gov/mmwr/pdf/rr/rr59e0528.pdf>), which has been endorsed by the American College of Obstetricians and Gynecologists.

Box 1. U.S. Medical Eligibility Criteria Categories for Classifying Hormonal Contraceptives and Intrauterine Devices

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

Data from U.S. Medical Eligibility Criteria for Contraceptive Use, 2010. Centers for Disease Control and Prevention. MMWR Recomm Rep 2010;59(RR-4):1–86.

Clinical Considerations and Recommendations

► Are IUDs and implants appropriate for nulliparous women and adolescents?

Nulliparous women and adolescents can be offered LARC methods, including IUDs. In 2005, FDA-approved changes were made to the package insert of the copper IUD, removing language suggesting IUD candidates be limited to those having one or more children. The levonorgestrel intrauterine system is not specifically approved for nulliparous women. However, the *U.S. Medical Eligibility Criteria for Contraceptive Use* classifies use in nulliparous women for both IUDs as Category 2, finding the advantages to generally outweigh the risks (25). The *U.S. Medical Eligibility Criteria for Contraceptive Use* also assigns a Category 2 rating for use of both IUDs by adolescents (25).

Available evidence suggests that IUDs are more effective and have higher rates of satisfaction in nulliparous women compared with oral contraceptives. In the levonorgestrel intrauterine system group, 89.7% of participants reported that this contraceptive method was moderately good to very good compared with 87.7% in the oral contraceptive group ($P=0.36$) (26). Although good quality comparative data are lacking, it appears that expulsion rates for the levonorgestrel intrauterine system and the copper IUD are similar (4.4% and 3.3–9.2%, respectively) in nulliparous versus parous women (27, 28). A systematic review reported expulsion rates for adolescents ranging from 5% to 22%. These rates were reported to be inversely related to age in two of the

studies, but may have been influenced by type of IUD and parity (29). The rate of removal of the copper IUD for reports of pain and bleeding in nulliparous women ranges from 3.6% to 24% in most studies and may be slightly higher than the rate of removal for these adverse effects in parous women (27). Overall, IUD continuation rates for nulliparous women are high and may be viewed as a surrogate for satisfaction.

There are no studies demonstrating an increased risk of pelvic inflammatory disease (PID) in nulliparous IUD users, and no evidence that IUD use is associated with subsequent infertility (30). In a 2001 case-control study of 1,895 women with primary tubal infertility using several control groups to minimize bias, previous copper IUD use was not associated with an increased risk of tubal occlusion in nulliparous women. Those with tubal infertility were more likely to have antibodies to chlamydia, indicating that the presence of a sexually transmitted infection (STI), was the likely explanation of infertility (30).

The *U.S. Medical Eligibility Criteria for Contraceptive Use* assigns a Category 1 rating to the use of the contraceptive implant by nulliparous women and adolescents. Although limited evidence exists on the use of the implant in adolescents, evidence suggests that implants are well accepted in this population. Contraceptive acceptability and continuation rates were studied in a group of 137 postpartum adolescents (31). At 24 months, continuation rates were higher in contraceptive implant users compared with contraceptive injection and combined contraceptive pill users ($P < 0.001$) (31).

► ***When is an appropriate time to insert an IUD or contraceptive implant?***

Insertion of an IUD or an implant may occur at any time during the menstrual cycle as long as pregnancy may be reasonably excluded. Clinicians have traditionally inserted the IUD during menses, but no major advantage of this practice has been documented. No backup contraceptive method is needed after inserting the copper IUD, regardless of when in the menstrual cycle it is inserted (32). Backup methods of contraception (ie, use of a condom) should be used for 7 days after insertion of the levonorgestrel intrauterine system, or contraceptive implants unless these devices are inserted within 5 days of initiating menses, immediately after childbirth or after abortion, or immediately upon switching from another hormonal contraceptive (17).

Postpartum Insertion

The immediate postpartum period is a particularly favorable time for IUD or implant insertion. Women who

have recently given birth are often highly motivated to use contraception, they are known not to be pregnant, and the hospital setting offers convenience for both the patient and the health care provider. In addition, women are at risk of an unintended pregnancy in the period immediately after delivery. In a study in which women were instructed to abstain from sexual intercourse until 6 weeks postpartum, 45% of participants reported unprotected sex before that time (33).

Intrauterine Device

The *U.S. Medical Eligibility Criteria for Contraceptive Use* classifies immediate postpartum copper IUD insertion as Category 1 and immediate postpartum levonorgestrel intrauterine system insertion in both nonbreastfeeding and breastfeeding women as Category 2 (25). Immediate postpartum IUD insertion, which is an insertion within 10 minutes of placental separation, appears safe and effective (34, 35). Insertion of both the copper IUD and levonorgestrel intrauterine system after 10 minutes postplacental separation up until 4 weeks postpartum is classified as a *U.S. Medical Eligibility Criteria for Contraceptive Use* Category 2, and insertion at or after 4 weeks postpartum is classified as a *U.S. Medical Eligibility Criteria for Contraceptive Use* Category 1 (25). Patients should be seen 1–2 weeks after insertion to have the strings cut.

The expulsion rate associated with immediate postpartum insertion is higher than that for interval insertion and may be as high as 24% (34, 36). Differences in expulsion rates are similar with manual insertion versus use of ring forceps, but may differ depending on the experience of the inserter. Immediate insertion after cesarean delivery may be associated with a lower risk of expulsion than after vaginal delivery (35). The benefits of immediate insertion may outweigh the increased risk of expulsion. Disadvantages of waiting 4–6 weeks postpartum for interval insertion include failure to return for follow-up and not obtaining an IUD at the follow-up visit (34, 37).

An advantage of the copper IUD is its lack of hormonal content, avoiding any theoretic effect on breastfeeding. However, in a single randomized control trial examining the effect of IUDs on breastfeeding in women randomized either to insertion of a levonorgestrel intrauterine system (n=163) or a copper IUD (n=157) at 6–8 weeks postpartum, there were no differences in breastfeeding duration or infant growth between the two groups (38).

Immediate postpartum insertion is contraindicated among women in whom peripartum chorioamnionitis, endometritis, or puerperal sepsis is diagnosed. The International Planned Parenthood Federation, in collaboration

with WHO and other international organizations, developed guidelines that include the restriction of IUD insertion within 3 months of treatment of puerperal sepsis (39).

Contraceptive Implant

Insertion of the implant is safe at any time in nonbreast-feeding women after childbirth (Category 1 rating). The *U.S. Medical Eligibility Criteria for Contraceptive Use* classifies the placement of an implant in breastfeeding women less than 4 weeks after childbirth as Category 2 because of theoretic concerns regarding milk production and infant growth and development. Implants may be offered to women who are breastfeeding and more than 4 weeks after childbirth because the *U.S. Medical Eligibility Criteria for Contraceptive Use* classifies delayed insertion as Category 1 (25).

Although long-term data on the effect of hormonal methods on breastfeeding are limited, observational studies of progestin-only contraceptives suggest they have no effect either on a woman's ability to successfully initiate and continue breastfeeding or on an infant's growth and development (40). A randomized trial compared postpartum insertion of the etonogestrel contraceptive implant at 1–3 days with standard insertion at 4–8 weeks postpartum. The study reported no differences in breastfeeding outcomes between groups, including lactogenesis and the risk of lactation failure (41). In addition, a prospective nonrandomized comparative study examined breast milk composition in 80 women using the contraceptive implant versus a nonhormonal IUD, initiated at least 28–56 days after childbirth. Breast milk composition, measured by total protein, fat, and lactose content, did not differ between the groups, nor did the quantity of breast milk (42). After a 3-year follow-up, there was no difference between the groups in terms of neonatal body length, biparietal head circumference, and body weight. (43).

Postabortion Insertion

Insertion of an IUD or implant immediately after either an abortion or miscarriage is safe and effective and has many of the same advantages as immediate postpartum insertion. Immediate insertion of the copper IUD or levonorgestrel intrauterine system after a first-trimester abortion is classified as Category 1 in the *U.S. Medical Eligibility Criteria for Contraceptive Use*, and Category 2 for second-trimester postabortion insertion (25) because of a higher risk of expulsion compared with insertion after a first-trimester abortion. Contraceptive implant insertion immediately after a first-trimester abortion or second-trimester abortion also is classified as Category 1, but is based on studies of a levonorgestrel implant system no longer marketed in the United States (44–47).

Women who have an abortion are at high risk of repeat unintended pregnancy, and ovulation may resume within 10 days of abortion (48). Thus, prompt initiation of a contraceptive method is critical. Women who have an IUD inserted immediately after abortion have higher rates of use compared with interval insertion, and lower rates of repeat abortion than those who choose another method (49, 50).

Intrauterine device insertion immediately after first-trimester suction aspiration appears to have a low risk of complications similar to that of interval insertion (51). One randomized controlled trial has evaluated immediate versus delayed insertion of IUDs after first-trimester abortion. The immediate insertion group showed a higher risk of expulsion versus the delayed group, but 42% of women in the delayed group did not return for a follow-up visit (52). Immediate IUD insertion is contraindicated within 3 months after septic abortion (25, 39).

► *What are the adverse effects of IUDs and the contraceptive implant on the menstrual cycle?*

Long-acting reversible contraceptive methods have an effect on menstrual bleeding, and patients should be given anticipatory guidance about these effects. New onset abnormal uterine bleeding should be evaluated similarly to that of non-LARC users, and the differential diagnosis remains similar, including failed contraception (ie, pregnancy) and gynecologic malignancy. However, because many LARC users are young women, they may expect irregular, unpredictable bleeding over the entire course of LARC use, which would not necessarily require further evaluation.

Intrauterine Devices

A randomized trial found that long-term copper IUD users were more likely to discontinue the device because of heavy menstrual bleeding and dysmenorrhea (9.7 per 100 women using the copper IUD versus 1.3 per 100 women using the levonorgestrel intrauterine system), whereas levonorgestrel intrauterine system users were more likely to discontinue the device because of amenorrhea and spotting compared with copper IUD users (4.3 per 100 women versus 0 per 100 women, respectively) (53).

Patients should be advised that menstrual bleeding and cramping may initially increase with use of the copper IUD. Good evidence supports first-line treatment of dysmenorrhea with nonsteroidal anti-inflammatory medications (54). In addition, evidence demonstrates that reports of bleeding and dysmenorrhea decrease over time in copper IUD users. In one analysis, the prevalence of pain decreased from 1.1 events per 100 women-weeks in the first period assessed (0–9 weeks) to 0.3 events

per 100 women-weeks after 39 weeks of use. However, intermenstrual spotting and pain did not decrease over time (55).

The levonorgestrel released from the levonorgestrel intrauterine system concentrates in the endometrium and produces a thin decidualized endometrial lining that becomes unresponsive to endogenous estrogen stimulation. Most women continue to ovulate while using the levonorgestrel intrauterine system. However, because of levonorgestrel's effect on the endometrium, the amount and duration of menstrual bleeding is reduced. This effect may begin during the first menstrual period after placement of the device, and bleeding becomes progressively less over time.

In a large randomized control trial comparing the levonorgestrel and copper IUDs, one third of women using the levonorgestrel device developed oligomenorrhea immediately (ie, no more than one episode of bleeding in a 90-day interval) or amenorrhea, and 70% of women experienced oligomenorrhea or amenorrhea at the end of 2 years (56). Similarly, symptoms of dysmenorrhea were reduced in levonorgestrel intrauterine system users. The reduction in bleeding is significant and consistent. The levonorgestrel intrauterine system was recently FDA approved for the treatment of heavy bleeding in women who use the method for contraception, and it is used widely for this indication. A review of 18 studies of levonorgestrel intrauterine system use for the treatment of menorrhagia found a menstrual blood loss reduction of 79–97% (57). In addition, studies document an overall high rate of patient satisfaction and continued use in patients with menorrhagia.

Contraceptive Implant

A noncontraceptive benefit of the implant is a significant decrease in dysmenorrhea (58–60). However, uterine bleeding patterns with contraceptive implant use are unpredictable and are cited as the most common reason for discontinuation. An integrated analysis of 11 international clinical trials that included 923 women documented the variable bleeding patterns among users, assessed in 90-day reference periods (59). Women usually experienced infrequent bleeding (33.6% of the reference periods) or amenorrhea (22.2% of the reference periods). Frequent bleeding was found in 6.7% of the reference periods and prolonged bleeding in 17.7% of the reference periods. Only 11.3% of patients discontinued the implant because of bleeding irregularities, mainly due to frequent and prolonged bleeding. Overall, the mean number of spotting or bleeding episodes was less than the number reported in normal menstrual cycles. Women with favorable bleeding profiles in the first 3 months of use were likely to continue with that bleeding pattern for the first 2 years, whereas those who started with an

unfavorable pattern had a 50% chance of improving (22, 58, 59). Body weight appears to have an effect on bleeding among implant users. Women with low body weight had fewer bleeding and spotting days than women with a higher body weight (59).

A recent study of 137 adolescents in the postpartum period aged 18 years and younger assessed acceptability, continuation, and repeat pregnancy rates in implant users versus nonusers. Of those adolescents that discontinued the implant before 24 months of use, 40% cited abnormal bleeding as the main reason for discontinuation (31).

► *In pregnant women, does removal of the IUD affect pregnancy outcome?*

The FDA and the WHO recommend that IUDs be removed from pregnant women when possible without an invasive procedure (32, 61). Complications of continuing a pregnancy with an IUD in place include an increased risk of spontaneous abortion and septic abortion.

Few studies examine the outcomes of pregnancies that result from contraceptive failure of the IUD. Most reports about complications date from the 1970s and 1980s, and suggest an increased risk of miscarriage, with a higher loss rate if a copper IUD is retained (62, 63) than if it is removed (64). A 2005 study of 318 pregnant women with a copper IUD in place documented similar findings (65). A population-based retrospective review of all pregnancies beyond 22 weeks that occurred from 1998–2007 in a large hospital in Israel reported that women with a retained IUD had significantly more placental abruption, placenta previa, preterm delivery, cesarean delivery, low birth weight babies, and chorioamnionitis compared with women who conceived without an IUD in place. Women who conceived with an IUD in place but whose IUD was removed had outcome values that were intermediate between the other two groups (66).

A pregnancy conceived with a levonorgestrel intrauterine system that is retained raises the theoretic concern of the effect of fetal exposure to hormones. A review of the literature of fetal exposure to levonorgestrel from a retained levonorgestrel intrauterine system during pregnancy revealed only 36 reported cases; however, the amount of systemic levonorgestrel released is equal to or less than that in a combined contraceptive pill and is unlikely to have an effect on an ongoing pregnancy (67).

► *Do IUDs cause ectopic pregnancy?*

The *U.S. Medical Eligibility Criteria for Contraceptive Use* classifies use of both the copper and levonorgestrel IUDs in women with a history of ectopic pregnancy as Category 1. The contraceptive implant does not increase the risk of ectopic pregnancy in women with a previous

history of ectopic pregnancy and also is classified as Category 1 in the *U.S. Medical Eligibility Criteria for Contraceptive Use* (25). Use of an IUD does not appear to increase the absolute risk of ectopic pregnancy. Cohort data demonstrate an ectopic pregnancy rate of 0–0.5 per 1,000 women-years among women using either the copper IUD or the levonorgestrel intrauterine system, compared with a rate of 3.25–5.25 per 1,000 women-years among women who do not use contraception (68, 69). A meta-analysis of 16 case–control studies concluded that IUDs do not increase the risk of ectopic pregnancy because they prevent pregnancy so effectively (70).

However, if pregnancy does occur with an IUD in place, the pregnancy is more likely to be ectopic. Although case–control studies of ectopic pregnancy associated with IUD use indicate relative risk, prospective data from randomized controlled trials describe a low absolute risk, a measure that is more useful clinically (68, 69). In other words, the proportion, not the risk, of ectopic pregnancies is increased (71). Given this very low risk, intrauterine devices may be offered to women with a history of ectopic pregnancy.

► ***When should an IUD be removed in a menopausal woman?***

Awaiting 1 year of amenorrhea in women using a copper IUD to ensure menopausal status is advisable before removing the device. Given that amenorrhea may be a secondary effect of the levonorgestrel intrauterine system, measuring follicle-stimulating hormone levels in serum may be considered to confirm menopausal status for women using this system. Alternatively, there is no compelling evidence for the removal of an IUD before its expiration date in menopausal women.

No clinical trials have examined the risks from prolonged IUD retention in asymptomatic menopausal women. Generally, menopausal women tolerate IUDs well, and the levonorgestrel intrauterine system has been studied and found to be effective for noncontraceptive indications, such as the progestin component of hormone therapy (72) and for endometrial protection in women using tamoxifen as part of breast cancer therapy (73).

► ***What procedures (ie, endometrial biopsy, colposcopy, loop electrosurgical excision procedure) can be performed with an IUD in place?***

An endometrial biopsy may be performed without removing the IUD. Endometrial sampling can be performed with a small endometrial suction curette. As with other women who experience dysfunctional bleeding in the perimenopausal period, unexpected bleeding should prompt

evaluation in women with IUDs (74). Cervical colposcopy, cervical ablation or excision, or endometrial sampling, may be performed with an IUD left in place. During these procedures, IUD strings may be tucked into the cervical canal if possible, or cut. A case series reports use of the hollow handle of a sterile absorbent-tipped applicator as a protecting tube for the IUD strings during the loop electrosurgical excision procedure in order to avoid having to trim the strings (75).

► ***What treatment options are appropriate for an asymptomatic patient with an IUD who has actinomyces identified by cervical cytology screening?***

Although options for management have included oral antibiotics, removal of the IUD, or both, current recommendations for asymptomatic patients with an IUD and actinomyces found by cervical cytology screening focus on expectant management. Both the UK Faculty of Family Planning and the Standards and Guidelines of the Planned Parenthood Federation of America recommend continued IUD use and patient education about the small risk of actinomycosis (76). Most frequently, however, IUD users whose Pap test results incidentally report a finding of actinomyces are asymptomatic and are at extremely low risk of pelvic actinomycosis. The prevalence of actinomycosis, characterized by granulomatous pelvic abscesses, has been estimated to be less than 0.001% (76).

► ***When is an IUD appropriate for emergency contraception?***

Insertion of a copper IUD is the most effective method of postcoital contraception when inserted up to 5 days after unprotected intercourse (77). The levonorgestrel intrauterine system has not been studied for emergency contraception. In a study of 1,963 women who underwent insertion of a copper IUD for postcoital contraception, including 95 nulliparous women, the pregnancy rate was 0.23% (78). Women who use the copper IUD for postcoital contraception may benefit from retention of the device for long-term contraception because the same study found that only 5.7% of participants discontinued copper IUD use before the 12-month follow-up period. No randomized controlled trials have compared IUD insertion with medical regimens for emergency contraception.

► ***Is routine screening for sexually transmitted infections (eg, gonorrhea and chlamydia) required before insertion of an IUD?***

Current data do not support routine screening for sexually transmitted infections (STIs) before IUD insertion

for women at low risk of STIs. For women at high risk of STIs (eg, aged 25 years or younger or having multiple sex partners), it is reasonable to screen for STIs and place the IUD on the same day (and administer treatment if the test results are positive) or when the test results are available. Screening for IUD users should follow current CDC guidelines for STI screening (79). An asymptomatic woman with a positive test result for chlamydia or gonorrhea at the time of IUD insertion may be treated and the IUD may be left in place. The *U.S. Medical Eligibility Criteria for Contraceptive Use* assigns a Category 2/3 for IUD initiation among women with an increased risk of STIs, clarifying that the Category 3 classification specifically applies to women with a very high individual risk of exposure to gonorrhea or chlamydial infection. Intrauterine device continuation is considered a Category 2 among women with an increased risk of STIs. A Category 2 rating is given to continuing IUD use in a woman found to have a chlamydia or gonorrhea infection and then treated with appropriate antibiotic therapy (25).

Women with an STI at the time of IUD insertion are more likely to develop pelvic inflammatory disease (PID) than women without an STI (80); however, even in women with an untreated STI, the risk appears low (81, 82). Prevalence of STIs in a given population is an important predictor of pelvic infection. In most U.S. populations, the prevalence of STDs is low (less than 10%), so the risk of PID with IUD insertion is low. In populations with a high prevalence of STIs (rates greater than 10%), screening based on history may be helpful in identifying women at higher risk (83). Women with a mucopurulent cervico-vaginal discharge or with known chlamydia or gonorrhea cervicitis should be treated before IUD insertion.

The optimal time for IUD insertion among these women is unclear. The International Planned Parenthood Federation restricts IUD insertion within 3 months of diagnosis and treatment of STIs that produce cervical infection (39). For women at high risk of an interval pregnancy during delayed insertion, a negative STI test result at 3–4 weeks after completing therapy may be an appropriate requirement before IUD insertion. Because of the high risk of reinfection, the CDC recommends repeat testing at 3–6 months among women who received a diagnosis of gonorrhea and chlamydial infection (79).

► ***Does antibiotic prophylaxis before IUD insertion decrease the risk of subsequent pelvic infection?***

Routine antibiotic prophylaxis to prevent pelvic infection is not recommended before IUD insertion. In a meta-

analysis of four randomized controlled trials of women with a low prevalence of STIs, antibiotic prophylaxis at the time of IUD insertion did not decrease the risk of PID nor did it reduce the likelihood of removal within the first 3 months (84). The risk of developing pelvic infection is increased only in the first 20 days after IUD insertion (85), suggesting that bacterial contamination associated with the insertion process is the cause of infection, and not the IUD itself. Although the relative risk of PID is increased in the first 20 days, the absolute risk of developing PID remains quite small (84).

► ***How should patients be counseled about the potential adverse effects of implants?***

Metabolic Effects

The *U.S. Medical Eligibility Criteria for Contraceptive Use* classifies implant use in women with type 1 diabetes and type 2 diabetes as Category 2, including women with diabetic vascular complications, indicating that the benefits of implant use outweigh any risks (25). The contraceptive implant may have an effect on carbohydrate metabolism by causing mild insulin resistance, with no significant change in serum glucose levels in normal women (86).

Data from current studies conflict on the effects of etonogestrel on liver function tests (87, 88). Limited studies suggest no adverse effects on the lipid profile of implant users (89, 90).

Weight Gain

Weight gain is a major concern of contraceptive users. Although commonly reported in contraceptive studies, it is often difficult to ascertain whether weight gain is caused by the contraceptive itself because most studies lack a control group. Between 6% and 12% of implant users in contraceptive studies report weight gain (23, 57) but few discontinue the implant because of weight change. Studies suggest the overall implant removal rate because of weight gain varies from 3% to 7% (23, 57).

Dermatologic Reactions

Acne is a commonly reported adverse effect of progestone-only contraceptives. Overall, most women using the implant have either no change or an improvement in reports of acne and 10–14% of users experience a worsening of symptoms.

Bone Mineral Density

The limited evidence available is reassuring that implants do not have a major effect on bone mineral density

(BMD), a surrogate marker for fracture risk. No studies have evaluated fracture risk in current or past implant users, change in BMD after discontinuation of the implant, or the BMD effects of the implant in women younger than 18 years. Extrapolating from pharmacokinetic studies of the etonogestrel implant and data on BMD assessment in women aged 18 years and older, the implant should not affect ovarian estradiol production or BMD in adolescents (91–93).

▶ ***What are the difficulties associated with IUD insertion and continuation, and how are they best addressed?***

Overall, difficulties with IUD insertion rarely occur. Difficulties that have been reported include vasovagal reaction, the need for cervical dilation, severe pain, inability to insert the IUD, and uterine perforation. Use of pretreatment analgesia with oral nonsteroidal anti-inflammatory drugs, paracervical block, mechanical dilation, and concomitant ultrasonography also may ease the discomfort of insertion. Uterine perforation is estimated to occur in approximately 1 in 1,000 insertions (94). Adherence to insertion guidelines included with IUD packaging may help avoid uterine perforation; the risk of perforation appears to decrease with increasing insertion experience. If either the copper IUD or the levonorgestrel IUD perforates into the peritoneal cavity, the location of the IUD should be confirmed by X-ray, and the IUD should be removed by laparoscopy or laparotomy (94, 95).

Partial expulsion should be ruled out if the strings are longer than expected. If the male partner reports penile discomfort during vaginal penetration, the strings may be trimmed to the level of the external cervical os or even shorter to a level within the endocervical canal.

Summary of Recommendations and Conclusions

The following recommendation and conclusion are based on good and consistent scientific evidence (Level A):

- ▶ Routine antibiotic prophylaxis to prevent pelvic infection is not recommended before IUD insertion.
- ▶ Insertion of a copper IUD is the most effective method of postcoital contraception when inserted up to 5 days after unprotected intercourse.

The following recommendations and conclusions are based on limited or inconsistent scientific evidence (Level B):

- ▶ Intrauterine devices may be offered to women with a history of ectopic pregnancy.
- ▶ Insertion of the implant is safe at any time in non-breastfeeding women after childbirth.
- ▶ Implants may be offered to women who are breastfeeding and more than 4 weeks after childbirth.
- ▶ Insertion of an IUD or implant immediately after either an abortion or miscarriage is safe and effective.
- ▶ Immediate postpartum IUD insertion, which is an insertion within 10 minutes of placental separation, appears safe and effective.

The following recommendations and conclusions are based primarily on consensus and expert opinion (Level C):

- ▶ The *U.S. Medical Eligibility Criteria for Contraceptive Use* classifies placement of an implant in breastfeeding women less than 4 weeks after childbirth as Category 2 because of theoretic concerns regarding milk production and infant growth and development.
- ▶ Nulliparous women and adolescents can be offered LARC methods, including IUDs.
- ▶ The FDA and the WHO recommend that IUDs be removed from pregnant women when possible without an invasive procedure.
- ▶ Long-acting reversible contraceptive methods have few contraindications, and almost all women are eligible for implants and IUDs.
- ▶ Insertion of an IUD or an implant may occur at any time during the menstrual cycle as long as pregnancy may be reasonably excluded.
- ▶ For women at high risk of STIs (eg, aged 25 years or younger or having multiple sex partners), it is reasonable to screen for STIs and place the IUD on the same day (and administer treatment if the test results are positive) or when the test results are available.
- ▶ Long-acting reversible contraceptive methods have an effect on menstrual bleeding, and patients should be given anticipatory guidance about these effects.
- ▶ An endometrial biopsy may be performed without removing the IUD. Cervical colposcopy, cervical ablation or excision, or endometrial sampling, may be performed with an IUD left in place.

Proposed Performance Measure

Percentage of eligible women seeking contraception who are offered LARC

References

1. Hov GG, Skjeldestad FE, Hilstad T. Use of IUD and subsequent fertility—follow-up after participation in a randomized clinical trial. *Contraception* 2007;75:88–92. (Level II-3)
2. Andersson K, Batar I, Rybo G. Return to fertility after removal of a levonorgestrel-releasing intrauterine device and Nova-T. *Contraception* 1992;46:575–84. (Level I)
3. Mosher WD, Jones J. Use of contraception in the United States: 1982-2008. *Vital Health Stat* 23 2010;(29):1–44. (Level II-3)
4. Secura GM, Allsworth JE, Madden T, Mullersman JL, Peipert JF. The Contraceptive CHOICE Project: reducing barriers to long-acting reversible contraception. *Am J Obstet Gynecol* 2010;203:115.e1–115.e7. (Level II-2)
5. Raine TR, Foster-Rosales A, Upadhyay UD, Boyer CB, Brown BA, Sokoloff A, et al. One-year contraceptive continuation and pregnancy in adolescent girls and women initiating hormonal contraceptives. *Obstet Gynecol* 2011;117:363–71. (Level II-2)
6. Hatcher RA, Trussell J, Nelson AL, Cates W Jr, Stewart F, Kowal D, editors. *Contraceptive technology*. 19th rev. ed. New York (NY): Ardent Media; 2007. (Level III)
7. Trussell J, Lalla AM, Doan QV, Reyes E, Pinto L, Gricar J. Cost effectiveness of contraceptives in the United States [published erratum appears in *Contraception* 2009;80:229–30]. *Contraception* 2009;79:5–14. (Level III)
8. Rivera R, Yacobson I, Grimes D. The mechanism of action of hormonal contraceptives and intrauterine contraceptive devices. *Am J Obstet Gynecol* 1999;181:1263–9. (Level III)
9. Stanford JB, Mikolajczyk RT. Mechanisms of action of intrauterine devices: update and estimation of postfertilization effects. *Am J Obstet Gynecol* 2002;187:1699–708. (Level III)
10. Brockmeyer A, Kishen M, Webb A. Experience of IUD/IUS insertions and clinical performance in nulliparous women—a pilot study. *Eur J Contracept Reprod Health Care* 2008;13:248–54. (Level III)
11. Sivin I, Stern J, Coutinho E, Mattos CE, el Mahgoub S, Diaz S, et al. Prolonged intrauterine contraception: a seven-year randomized study of the levonorgestrel 20 mcg/day (LNg 20) and the Copper T380 Ag IUDs. *Contraception* 1991;44:473–80. (Level I)
12. Barbosa I, Olsson SE, Odland V, Goncalves T, Coutinho E. Ovarian function after seven years' use of a levonorgestrel IUD. *Adv Contracept* 1995;11:85–95. (Level II-3)
13. Nilsson CG, Lahteenmaki PL, Luukkainen T. Ovarian function in amenorrheic and menstruating users of a levonorgestrel-releasing intrauterine device. *Fertil Steril* 1984;41:52–5. (Level III)
14. World Health Organization. Mechanism of action, safety and efficacy of intrauterine devices: report of a WHO scientific group. World Health Organization Technical Report Series 753. Geneva: WHO; 1987. (Level III)
15. Diaz S, Pavez M, Moo-Young AJ, Bardin CW, Croxatto HB. Clinical trial with 3-keto-desogestrel subdermal implants. *Contraception* 1991;44:393–408. (Level II-3)
16. Schering-Plough Corporation. Implanon (etonogestrel implant). Schering-Plough: Kenilworth (NJ); 2009. Available at: <http://www.spfiles.com/piimplanon.pdf>. Retrieved March 31, 2011. (Level III)
17. Makarainen L, van Beek A, Tuomivaara L, Asplund B, Coelingh Bennink H. Ovarian function during the use of a single contraceptive implant: Implanon compared with Norplant. *Fertil Steril* 1998;69:714–21. (Level I)
18. Davies GC, Feng LX, Newton JR, Van Beek A, Coelingh-Bennink HJ. Release characteristics, ovarian activity and menstrual bleeding pattern with a single contraceptive implant releasing 3-ketodesogestrel. *Contraception* 1993;47:251–61. (Level III)
19. Croxatto HB. Mechanisms that explain the contraceptive action of progestin implants for women. *Contraception* 2002;65:21–7. (Level III)
20. Van den Bosch T, Donders GG, Riphagen I, Debois P, Ameye L, De Brabanter J, et al. Ultrasonographic features of the endometrium and the ovaries in women on etonogestrel implant. *Ultrasound Obstet Gynecol* 2002;20:377–80. (Level II-3)
21. Zheng SR, Zheng HM, Qian SZ, Sang GW, Kaper RF. A randomized multicenter study comparing the efficacy and bleeding pattern of a single-rod (Implanon) and a six-capsule (Norplant) hormonal contraceptive implant. *Contraception* 1999;60:1–8. (Level I)
22. Blumenthal PD, Gemzell-Danielsson K, Marintcheva-Petrova M. Tolerability and clinical safety of Implanon. *Eur J Contracept Reprod Health Care* 2008;13(suppl 1):29–36. (Level II-3)
23. Darney P, Patel A, Rosen K, Shapiro LS, Kaunitz AM. Safety and efficacy of a single-rod etonogestrel implant (Implanon): results from 11 international clinical trials. *Fertil Steril* 2009;91:1646–53. (Level II-3)
24. World Health Organization. *Medical eligibility criteria for contraceptive use*. 4th ed. Geneva: WHO; 2009. Available at: http://whqlibdoc.who.int/publications/2010/9789241563888_eng.pdf. Retrieved March 31, 2011. (Level III)
25. U S. medical eligibility criteria for contraceptive use, 2010. Centers for Disease Control and Prevention (CDC). *MMWR Recomm Rep* 2010;59(RR-4):1–86. (Level III)
26. Suhonen S, Haukkamaa M, Jakobsson T, Rauramo I. Clinical performance of a levonorgestrel-releasing intrauterine system and oral contraceptives in young nulliparous women: a comparative study. *Contraception* 2004;69:407–12. (Level I)

27. Hubacher D. Copper intrauterine device use by nulliparous women: review of side effects. *Contraception* 2007; 75(6 suppl):S8–11. (Level III)
28. Paterson H, Ashton J, Harrison-Woolrych M. A nationwide cohort study of the use of the levonorgestrel intrauterine device in New Zealand adolescents. *Contraception* 2009;79:433–8. (Level II-2)
29. Deans EI, Grimes DA. Intrauterine devices for adolescents: a systematic review. *Contraception* 2009;79:418–23. (Systematic Review)
30. Hubacher D, Lara-Ricalde R, Taylor DJ, Guerra-Infante F, Guzman-Rodriguez R. Use of copper intrauterine devices and the risk of tubal infertility among nulligravid women. *N Engl J Med* 2001;345:561–7. (Level II-2)
31. Lewis LN, Doherty DA, Hickey M, Skinner SR. Implanon as a contraceptive choice for teenage mothers: a comparison of contraceptive choices, acceptability and repeat pregnancy. *Contraception* 2010;81:421–6. (Level II-3)
32. World Health Organization. Selected practice recommendations for contraceptive use. 2008 update. Geneva: WHO; 2008. Available at: http://whqlibdoc.who.int/hq/2008/WHO_RHR_08.17_eng.pdf. Retrieved March 31, 2011. (Level III)
33. Brito MB, Ferriani RA, Quintana SM, Yazlle ME, Silva de Sa MF, Vieira CS. Safety of the etonogestrel-releasing implant during the immediate postpartum period: a pilot study. *Contraception* 2009;80:519–26. (Level I)
34. Chen BA, Reeves MF, Hayes JL, Hohmann HL, Perriera LK, Creinin MD. Postplacental or delayed insertion of the levonorgestrel intrauterine device after vaginal delivery: a randomized controlled trial. *Obstet Gynecol* 2010; 116:1079–87. (Level I)
35. Grimes DA, Lopez LM, Schulz KF, Van Vliet HA, Stanwood NL. Immediate post-partum insertion of intrauterine devices. *Cochrane Database of Systematic Reviews* 2010, Issue 5. Art. No.: CD003036. DOI: 10.1002/14651858.CD003036.pub2. (Systematic Review)
36. Celen S, Moroy P, Sucak A, Aktulay A, Danisman N. Clinical outcomes of early postplacental insertion of intrauterine contraceptive devices. *Contraception* 2004;69: 279–82. (Level II-3)
37. Ogburn JA, Espey E, Stonehocker J. Barriers to intrauterine device insertion in postpartum women. *Contraception* 2005;72:426–9. (Level III)
38. Shaamash AH, Sayed GH, Hussien MM, Shaaban MM. A comparative study of the levonorgestrel-releasing intrauterine system Mirena versus the Copper T380A intrauterine device during lactation: breast-feeding performance, infant growth and infant development. *Contraception* 2005;72:346–51. (Level I)
39. IMAP statement on intrauterine devices. International Medical Advisory Panel. *IPPF Med Bull* 2003;37(2):1–4. (Level III)
40. Kapp N, Curtis K, Nanda K. Progestogen-only contraceptive use among breastfeeding women: a systematic review. *Contraception* 2010;82:17–37. (Systematic Review)
41. Gurtcheff SE, Turok DK, Stoddard G, Murphy PA, Gibson M, Jones KP. Lactogenesis after early postpartum use of the contraceptive implant. *Obstet Gynecol* 2011;117:1114–21. (Level I)
42. Reinprayoon D, Taneepanichskul S, Bunyavejchevin S, Thaithumyanon P, Punnahitananda S, Tosukhowong P, et al. Effects of the etonogestrel-releasing contraceptive implant (Implanon) on parameters of breastfeeding compared to those of an intrauterine device. *Contraception* 2000;62:239–46. (Level II-3)
43. Taneepanichskul S, Reinprayoon D, Thaithumyanon P, Praisuwanna P, Tosukhowong P, Dieben T. Effects of the etonogestrel-releasing implant Implanon and a non-medicated intrauterine device on the growth of breast-fed infants. *Contraception* 2006;73:368–71. (Level II-3)
44. Kurunmaki H. Contraception with levonorgestrel-releasing subdermal capsules, Norplant, after pregnancy termination. *Contraception* 1983;27:473–82. (Level II-2)
45. Kurunmaki H, Toivonen J, Lahteenmaki PL, Luukkainen T. Immediate postabortal contraception with Norplant: levonorgestrel, gonadotropin, estradiol, and progesterone levels over two postabortal months and return of fertility after removal of Norplant capsules. *Contraception* 1984;30:431–42. (Level III)
46. Lahteenmaki P, Toivonen J, Lahteenmaki PL. Postabortal contraception with norethisterone enanthate injections. *Contraception* 1983;27:553–62. (Level III)
47. Ortayli N, Bulut A, Sahin T, Sivini I. Immediate postabortal contraception with the levonorgestrel intrauterine device, Norplant, and traditional methods. *Contraception* 2001;63:309–14. (Level II-2)
48. Lahteenmaki P, Luukkainen T. Return of ovarian function after abortion. *Clin Endocrinol* 1978;8:123–32. (Level III)
49. Fox MC, Oat-Judge J, Severson K, Jamshidi RM, Singh RH, McDonald-Mosley R, et al. Immediate placement of intrauterine devices after first and second trimester pregnancy termination. *Contraception* 2011;83:34–40. (Level II-2)
50. Goodman S, Hendlish SK, Reeves MF, Foster-Rosales A. Impact of immediate postabortal insertion of intrauterine contraception on repeat abortion. *Contraception* 2008; 78:143–8. (Level II-2)
51. Grimes DA, Lopez LM, Schulz KF, Stanwood NL. Immediate postabortal insertion of intrauterine devices. *Cochrane Database of Systematic Reviews* 2010, Issue 6. Art. No.: CD001777. DOI: 10.1002/14651858.CD001777.pub3. (Systematic Review)
52. Gillett PG, Lee NH, Yuzpe AA, Cerskus I. A comparison of the efficacy and acceptability of the Copper-7 intrauterine device following immediate or delayed insertion after first-trimester therapeutic abortion. *Fertil Steril* 1980;34:121–4. (Level I)
53. Andersson K, Odland V, Rybo G. Levonorgestrel-releasing and copper-releasing (Nova T) IUDs during five years of use: a randomized comparative trial. *Contraception* 1994;49:56–72. (Level I)
54. Grimes DA, Hubacher D, Lopez LM, Schulz KF. Non-steroidal anti-inflammatory drugs for heavy bleeding or pain associated with intrauterine-device use. *Cochrane Database of Systematic Reviews* 2006, Issue 4. Art. No.:

CD006034.DOI:10.1002/14651858.CD006034.pub2. (Systematic Review)

55. Hubacher D, Chen PL, Park S. Side effects from the copper IUD: do they decrease over time? *Contraception* 2009;79:356–62. (Level II-3)
56. Sivin I, Stern J, Diaz J, Diaz MM, Faundes A, el Mahgoub S, et al. Two years of intrauterine contraception with levonorgestrel and with copper: a randomized comparison of the TCu 380Ag and levonorgestrel 20 mcg/day devices. *Contraception* 1987;35:245–55. (Level I)
57. Varma R, Sinha D, Gupta JK. Non-contraceptive uses of levonorgestrel-releasing hormone system (LNG-IUS)—a systematic enquiry and overview. *Eur J Obstet Gynecol Reprod Biol* 2006;125:9–28. (Systematic Review)
58. Funk S, Miller MM, Mishell DR Jr, Archer DF, Poindexter A, Schmidt J, et al. Safety and efficacy of Implanon, a single-rod implantable contraceptive containing etonogestrel. Implanon US Study Group. *Contraception* 2005;71:319–26. (Level III)
59. Mansour D, Korver T, Marintcheva-Petrova M, Fraser IS. The effects of Implanon on menstrual bleeding patterns. *Eur J Contracept Reprod Health Care* 2008;13(suppl 1):13–28. (Level III)
60. Walch K, Unfried G, Huber J, Kurz C, van Trotsenburg M, Pernicka E, et al. Implanon versus medroxyprogesterone acetate: effects on pain scores in patients with symptomatic endometriosis—a pilot study. *Contraception* 2009;79:29–34. (Level I)
61. U.S. Food and Drug Administration. Mirena (levonorgestrel-releasing intrauterine system) July 2008. Detailed view: safety labeling changes approved by FDA Center for Drug Evaluation and Research (CDER) -- July 2008. Silver Spring (MD): FDA; 2008. Available at: <http://www.fda.gov/Safety/MedWatch/SafetyInformation/Safety-RelatedDrugLabelingChanges/ucm121936.htm>. Retrieved March 31, 2011. (Level III)
62. Foreman H, Stadel BV, Schlesselman S. Intrauterine device usage and fetal loss. *Obstet Gynecol* 1981;58:669–77. (Level II-3)
63. Tatum HJ, Schmidt FH, Jain AK. Management and outcome of pregnancies associated with the Copper T intrauterine contraceptive device. *Am J Obstet Gynecol* 1976;126:869–79. (Level II-3)
64. Skjeldestad FE, Hammervold R, Peterson DR. Outcomes of pregnancy with an IUD in situ—a population based case-control study. *Adv Contracept* 1988;4:265–70. (Level II-3)
65. Inal MM, Ertopcu K, Ozelmas I. The evaluation of 318 intrauterine pregnancy cases with an intrauterine device. *Eur J Contracept Reprod Health Care* 2005;10:266–71. (Level II-3)
66. Ganer H, Levy A, Ohel I, Sheiner E. Pregnancy outcome in women with an intrauterine contraceptive device. *Am J Obstet Gynecol* 2009;201:381.e1–381.e5. (Level II-3)
67. Hopkins MR, Agudelo-Suarez P, El-Nashar SA, Creedon DJ, Rose CH, Famuyide AO. Term pregnancy with intraperitoneal levonorgestrel intrauterine system: a case report and review of the literature. *Contraception* 2009;79:323–7. (Level III)
68. Sivin I. Dose- and age-dependent ectopic pregnancy risks with intrauterine contraception. *Obstet Gynecol* 1991;78:291–8. (Level III)
69. Sivin I, Stern J. Health during prolonged use of levonorgestrel 20 micrograms/d and the copper TCu 380Ag intrauterine contraceptive devices: a multicenter study. International Committee for Contraception Research (ICCR). *Fertil Steril* 1994;61:70–7. (Level I)
70. Xiong X, Buekens P, Wollast E. IUD use and the risk of ectopic pregnancy: a meta-analysis of case-control studies. *Contraception* 1995;52:23–34. (Meta-analysis)
71. Furlong LA. Ectopic pregnancy risk when contraception fails. A review. *J Reprod Med* 2002;47:881–5. (Level III)
72. Sitruk-Ware R. The levonorgestrel intrauterine system for use in peri- and postmenopausal women. *Contraception* 2007;75(6 suppl):S155–60. (Level III)
73. Chan SS, Tam WH, Yeo W, Yu MM, Ng DP, Wong AW, et al. A randomised controlled trial of prophylactic levonorgestrel intrauterine system in tamoxifen-treated women. *BJOG* 2007;114:1510–5. (Level I)
74. Ozalp S, Kabukcuoglu S, Tanir HM. Should endometrial hyperplasia be regarded as a reason for abnormal uterine bleeding in users of the intrauterine contraceptive device? *Eur J Contracept Reprod Health Care* 2003;8:17–20. (Level III)
75. Bailey AP, Darracott MM. Loop electrosurgical excision procedure with an intrauterine device in place. *Am J Obstet Gynecol* 2010;203:291.e1–291.e3. (Level III)
76. Westhoff C. IUDs and colonization or infection with *Actinomyces*. *Contraception* 2007;75(6 suppl):S48–50. (Level III)
77. Cheng L, Gulmezoglu AM, Piaggio GG, Ezcurra EE, Van Look PP. Interventions for emergency contraception. *Cochrane Database of Systematic Reviews* 2008, Issue 2. Art. No.: CD001324. DOI: 10.1002/14651858.CD001324.pub3. (Systematic Review)
78. Wu S, Godfrey EM, Wojdyla D, Dong J, Cong J, Wang C, et al. Copper T380A intrauterine device for emergency contraception: a prospective, multicentre, cohort clinical trial. *BJOG* 2010;117:1205–10. (Level II-2)
79. Workowski KA, Berman S. Sexually transmitted diseases treatment guidelines, 2010. Centers for Disease Control and Prevention (CDC) [published erratum appears in *MMWR Recomm Rep* 2011;60:18]. *MMWR Recomm Rep* 2010(RR-12);59:1–110. Available at: <http://www.cdc.gov/std/treatment/2010/default.htm>. Retrieved April 6, 2011. (Level III)
80. Mohllajee AP, Curtis KM, Peterson HB. Does insertion and use of an intrauterine device increase the risk of pelvic inflammatory disease among women with sexually transmitted infection? A systematic review. *Contraception* 2006;73:145–53. (Systematic Review)
81. Ladipo OA, Farr G, Otolorin E, Konje JC, Sturgen K, Cox P, et al. Prevention of IUD-related pelvic infection: the efficacy of prophylactic doxycycline at IUD insertion. *Adv Contracept* 1991;7:43–54. (Level I)

82. Sinei SK, Schulz KF, Lamptey PR, Grimes DA, Mati JK, Rosenthal SM, et al. Preventing IUCD-related pelvic infection: the efficacy of prophylactic doxycycline at insertion. *Br J Obstet Gynaecol* 1990;97:412–9. (Level I)
83. Morrison CS, Murphy L, Kwok C, Weiner DH. Identifying appropriate IUD candidates in areas with high prevalence of sexually transmitted infections. *Contraception* 2007;75:185–92. (Level III)
84. Grimes DA, Lopez LM, Schulz KF. Antibiotic prophylaxis for intrauterine contraceptive device insertion. *Cochrane Database of Systematic Reviews* 1999, Issue 3. Art. No.: CD001327. DOI: 10.1002/14651858.CD001327. (Systematic Review)
85. Farley TM, Rosenberg MJ, Rowe PJ, Chen JH, Meirik O. Intrauterine devices and pelvic inflammatory disease: an international perspective. *Lancet* 1992;339:785–8. (Level I)
86. Biswas A, Biswas S, Viegas OA. Effect of etonogestrel subdermal contraceptive implant (Implanon) on liver function tests—a randomized comparative study with Norplant implants. *Contraception* 2004;70:379–82. (Level I)
87. Dilbaz B, Ozdegirmenci O, Caliskan E, Dilbaz S, Haberal A. Effect of etonogestrel implant on serum lipids, liver function tests and hemoglobin levels. *Contraception* 2010;81:510–4. (Level II-2)
88. Nasr A, Nafeh HM. Effect of etonogestrel contraceptive implant (Implanon) on portal blood flow and liver functions. *Contraception* 2009;79:236–9. (Level II-2)
89. Mascarenhas L, van Beek A, Bennink HC, Newton J. Twenty-four month comparison of apolipoproteins A-I, A-II and B in contraceptive implant users (Norplant and Implanon) in Birmingham, United Kingdom [published erratum appears in *Contraception* 1998;58:following 389]. *Contraception* 1998;58:215–9. (Level I)
90. Dorflinger LJ. Metabolic effects of implantable steroid contraceptives for women. *Contraception* 2002;65:47–62. (Level III)
91. Beerthuizen R, van Beek A, Massai R, Makarainen L, Hout J, Bennink HC. Bone mineral density during long-term use of the progestagen contraceptive implant Implanon compared to a non-hormonal method of contraception. *Hum Reprod* 2000;15:118–22. (Level II-2)
92. Bahamondes L, Monteiro-Dantas C, Espejo-Arce X, Dos Santos Fernandes AM, Lui-Filho JF, Perrotti M, et al. A prospective study of the forearm bone density of users of etonogestrel- and levonorgestrel-releasing contraceptive implants. *Hum Reprod* 2006;21:466–70. (Level I)
93. Tolaymat LL, Kaunitz AM. Use of hormonal contraception in adolescents: skeletal health issues. *Curr Opin Obstet Gynecol* 2009;21:396–401. (Level III)
94. Long-term reversible contraception. Twelve years of experience with the TCu380A and TCu220C. *Contraception* 1997;56:341–52. (Level I)
95. Speroff L, Darney PD. A clinical guide for contraception. 5th ed. Philadelphia (PA): Wolters Kluwer/Lippincott Williams & Wilkins; 2011. (Level III)

The MEDLINE database, the Cochrane Library, and the American College of Obstetricians and Gynecologists' own internal resources and documents were used to conduct a literature search to locate relevant articles published between January 1990–February 2011. The search was restricted to articles published in the English language. Priority was given to articles reporting results of original research, although review articles and commentaries also were consulted. Abstracts of research presented at symposia and scientific conferences were not considered adequate for inclusion in this document. Guidelines published by organizations or institutions such as the National Institutes of Health and the American College of Obstetricians and Gynecologists were reviewed, and additional studies were located by reviewing bibliographies of identified articles. When reliable research was not available, expert opinions from obstetrician–gynecologists were used.

Studies were reviewed and evaluated for quality according to the method outlined by the U.S. Preventive Services Task Force:

- I Evidence obtained from at least one properly designed randomized controlled trial.
- II-1 Evidence obtained from well-designed controlled trials without randomization.
- II-2 Evidence obtained from well-designed cohort or case–control analytic studies, preferably from more than one center or research group.
- II-3 Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments also could be regarded as this type of evidence.
- III Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

Based on the highest level of evidence found in the data, recommendations are provided and graded according to the following categories:

- Level A—Recommendations are based on good and consistent scientific evidence.
- Level B—Recommendations are based on limited or inconsistent scientific evidence.
- Level C—Recommendations are based primarily on consensus and expert opinion.

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