



Emergency contraception

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Abstract: Emergency contraception (EC) is defined as the use of any drug or device after unprotected intercourse, including sexual assault, in prevention of unintended pregnancy. Indications for EC include lack of contraceptive use during intercourse, and failure of a barrier or hormonal method of contraception. Unintended pregnancy affects a disproportionate number of adolescents and young adult women compared to adult women. Although teenage pregnancy rates continue to decrease, compared to other industrialized nations, the United States continues to have a higher rate of teen pregnancy. Increasing the knowledge and use of EC is one strategy to reduce unintended pregnancies in adolescents and young adult women. Understanding the methods, benefits, and limitations of available EC methods will assist medical practitioners in counseling these young women on the method that is best for them. Levonorgestrel (LNG) pill, ulipristal acetate (UPA) pill, and the copper intrauterine device (cu-IUD) are currently recommended methods for EC.

Keywords: Copper intrauterine device (cu-IUD); emergency contraception (EC); levonorgestrel (LNG); ulipristal acetate (UPA); unintended pregnancy

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Introduction

Emergency contraception (EC) is defined as the use of any drug or device after unprotected intercourse, including sexual assault, in prevention of unintended pregnancy.

Education on EC should be an integral part of counseling in all childbearing women at risk for pregnancy. The World Health Organization (WHO), Centers for Disease Control and Prevention (CDC), American Academy of Pediatrics, American Academy of Family Physicians, and American College of Obstetricians and Gynecologists (ACOG) recommend and support use of EC when indicated, in all women of childbearing age. The levonorgestrel (LNG) pill, ulipristal acetate (UPA) pill and copper intrauterine device (cu-IUD) are the currently used EC methods.

Teen pregnancy in the United States

Unintended pregnancies make up about half of all pregnancies in the United States. However, this number is disproportionately higher in adolescent females aged 15 to 19 years. Although the rates of teen births have continued to decline, of those teens who do get pregnant, about 4 out of 5 are unintended (1). According to the CDC, the teen birth rates in 2017 was 18.8 per 1,000 women aged 15–19 years, a 7% decrease from 2016 (2). The majority of teen births were among teens aged 18–19 (2–4). This rate is considerably higher than other western industrialized nations (3). The decline in birth rate was observed in most racial groups, with pronounced changes in non-Hispanic Asians (decrease of 15%) and Hispanics (decrease of 9%).

Table 1 Comparison of available emergency contraceptive methods

EC methods	Relative efficacy	Failure rates (%)	Effective period (hours)*	Starting or resumption of contraceptive method
cu-IUD	Most effective	≤0.1%	120	Can be left in place for 12 years for continued contraception
UA pill: 30 mg tablet single dose taken orally	Less effective vs. cu-IUD; More effective vs. LNG pill	0–1.8%	120	Wait 5 days to resume hormonal contraception
LNG pill: 1.5 mg tablet single dose taken orally	Relatively less effective than cu-IUD or UA	0.3–2.6%	72	Immediately start or resume hormonal contraception

*, following unprotected intercourse. LNG, levonorgestrel; UPA, ulipristal acetate; cu-IUD, copper intrauterine device.

Birth rates were highest (32.9%) in American Indian/Alaska Native teens. From 2006 to 2010, 23% of births to teen mothers (ages 15–19 years old) were intended (5).

Disparities exist across the United States, with rates lowest in Massachusetts (8.1%) and highest in Arkansas (32.8%), as well as by density of population, with rates lowest in large urban counties (18.9%) and highest in rural counties (30.9%) (2). Socioeconomic factors including low education, low-income family, few opportunities for positive youth involvement, neighborhood racial segregation, neighborhood physical disorder, and neighborhood-level income inequality, contribute to high teen birth rates as well (2).

Contributing to this teen pregnancy rate decline, there was a decrease in the number of adolescents using no method and an increase in the number of adolescents reporting one or more methods used during last sexual encounter. Additionally, the use of highly effective methods, including cu-IUD, etonogestrel subdermal implant, injectable depot medroxyprogesterone acetate, combined hormonal contraception (pill, patch, and ring), increased (6). Specifically, the use of IUD in teens aged 15–19 increased 1.8%, and use of implant increased 3.9% from 2005 to 2013 (7). The use of long-acting reversible contraception (LARC) varied by region, with the highest use in the West, and lowest in the South (7).

Teen pregnancy has a higher rate of pregnancy-associated complications. Teen pregnancy is associated with higher rates of pre-eclampsia, eclampsia, puerperal endometritis, and systemic infections compared to women aged 20–24 (8). Infants born to teen mothers are more likely to have low birth weight, undergo preterm delivery, have severe neonatal conditions, and suffer from intra-hospital early neonatal mortality (death within 7 days of delivery) (8).

EC

More than half a century ago, use of high-dose oral estrogen was primarily recommended for EC, then came the Yuzpe method and insertion of the cu-IUD. Other effective methods such as the LNG taken in high doses and mifepristone were later developed. But with advancing knowledge, safer and effective methods have been established. The single dose LNG pill, UPA pill, and the cu-IUD are currently the recommended emergency contraceptive methods of choice for female adolescents and young adult women (*Table 1*). If these preferred methods are not easily accessible, the combined hormonal contraceptive pills can be used.

LNG pill

Originally approved by the FDA in 1999, the LNG pill is currently the most commonly used oral EC, and is taken in a 1.5-mg tablet as a single dose. LNG is effective up to 120 hours following unprotected intercourse; however, efficacy decreases between the 72- and 120-hours. As of 2013, it can be purchased over the counter without a prescription regardless of age (9,10).

LNG takes its effect on follicular development after selection of the dominant follicle. It inhibits or delays the luteinizing hormone (LH) peak when taken two to three days before the LH peak (11,12). LNG EC is effective before ovulation has occurred. It does not prevent implantation of the fertilized egg, is ineffective after implantation of the embryo, hence is not an abortifacient. Thus, the effectiveness of LNG is dependent on timing during the cycle (13). Once the LH peak has occurred, LNG is likely ineffective. It is safe to take a second dose of LNG pill within the same menstrual cycle for another unprotected intercourse. Regular hormonal contraceptive

method can be started or resumed immediately after taking the LNG pill (10).

The failure rate of LNG is 0.3–2.6%. Its efficacy may be decreased if the woman's weight is greater than 75 kg or if the body mass index (BMI) is greater than 26 kg/m². In overweight or obese women, a single dose of 3 mg LNG may be more effective. Hepatic-enzyme inducing drugs including barbiturates, bosentan, carbamazepine, felbamate, griseofulvin, oxcarbazepine, phenytoin, rifampin, St. John's wort, topiramate, and certain anti-retrovirals, can reduce plasma levels of LNG. Known or suspected pregnancy is a contraindication for use of LNG pill because the medication will not be effective once pregnancy is established (10).

Side effects of LNG pill include nausea, vomiting, abdominal pain, fatigue, dizziness, headaches, and breast tenderness. These symptoms usually subside within 24 hours of administration. If the woman vomits within 3 hours of taking the pill, she should take a second dose. The menstrual cycle may be affected depending on when the pill is taken during the cycle; if taken in the preovulatory stage, length of cycle may shorten, and if taken in the peri- or post-ovulatory stage, duration of bleeding in subsequent cycle may be prolonged. There are no contraindications for breastfeeding and no known teratogenic effects or birth defects (10,13).

UPA pill

The most recent EC method approved by the FDA is the UPA pill, commonly known by brand name Ella[®]. It is taken orally in a 30-mg single dose, and should be within 120 hours of unprotected intercourse (14).

UPA is a selective progesterone receptor modulator and acts by delaying ovulation. It can be taken at any point during the menstrual cycle. Unlike LNG, UPA can delay ovulation when administered during the LH peak. This is likely due to ulipristal's action on inhibiting follicular rupture (15). UPA can only be used for one episode of unprotected intercourse within the same menstrual cycle, thus additional methods will be required for any subsequent unprotected intercourse within the same menstrual cycle. The woman should wait at least 5 days after taking UPA, before starting or resuming ongoing hormonal contraception. Use of a barrier method is recommended until woman's next menstrual cycle. UPA is likely to compete with ongoing progestin-based contraceptive methods, which is why it is recommended to wait 5 days before starting or resuming hormonal contraception (10,16-18).

The failure rate of UPA is 0–1.8%. There is no decrease in efficacy over the 120-hour window, and it is more effective than LNG in the first 72 hours following unprotected intercourse. The efficacy of UPA is not affected by BMI. Hepatic-enzyme inducing drugs taken in the previous month can reduce efficacy of UPA. Drugs that increase levels of gastric pH, including antacids, H₂ antagonists, and proton-pump inhibitors, reduce efficacy of UPA (10). One prospective study demonstrated reduced efficacy of UPA as an EC when combined oral contraceptive pills (OCPs) was initiated within 2 days (18).

Side effects of UPA include delayed menses, headache, dysmenorrhea, nausea, fatigue, dizziness, lower abdominal pain, upper abdominal pain, and back pain. The FDA recommends avoiding giving of breastmilk in the 24 hours following consumption of UPA. There are no known teratogenic effects or birth defects (10).

cu-IUD

Cu-IUD is a type of LARC and is the most effective form of EC available. Insertion into the intrauterine cavity should be performed within 120 hours of unprotected intercourse. Unlike the oral preparations for EC, effectiveness of cu-IUD does not vary based on timing since intercourse (19). Some studies have shown effectiveness when inserted up to 10 days after unprotected intercourse (20). When left in place, the cu-IUD also serves as an effective LARC method in addition to its use as an EC.

The copper ions released from the cu-IUD enhance the inflammatory response and create a toxic environment for the spermatozoa. Specifically, copper may affect motility, viability, acrosome reaction, and fertilizing capacity of the spermatozoa (21-23). In addition, the cu-IUD may have effects on the oocyte and the endometrium. Pregnancy rates have been reported between 0% and 2% with the use of cu-IUD EC. It can be inserted at any point during the menstrual cycle. The cu-IUD will protect against the current episode of unprotected intercourse and subsequent episodes for up to 12 years, as long as it remains in place (10).

The failure rate of the copper IUD is <0.1%. Efficacy does not vary by BMI (24). There are no known drug interactions with the copper IUD. Pregnancy and medical contraindications must be ruled out prior to insertion. Medical contraindications include untreated cancer of uterus, cervix, or genital tract, unexplained vaginal bleeding, malignant gestational trophoblastic disease,

current pelvic inflammatory disease, Wilson's disease, uterine malformation, pelvic tuberculosis, copper allergy, or active gonorrhea or chlamydia infection. Benign trophoblastic gestational disease, ovarian cancer, human immunodeficiency virus infection, and within 48 hours to 4 weeks postpartum, are all relative contraindications to insertion. However, the cu-IUD can be inserted if no alternative is suitable (10).

Side effects associated with cu-IUD insertion include menstrual cramping, heavier periods, irregular menses, anemia, back pain, and fainting. There are no contraindications for breastfeeding and no evidence of increased birth defects. Some physicians and practices may employ unnecessary protocols, such as requiring two visits for insertion, which increases the cost and affects access to this method (10).

Combined progestin-estrogen pills

Research concerning the use of combined progestin-estrogen pills (i.e., the Yuzpe method) for EC was first published in the 1970's (25). This method consists of the use of combined progestin-estrogen pills equivalent to 100 mcg of ethinyl estradiol and 0.5 mg of LNG taken in two doses 12 hours apart. It can be used within 120 hours of unprotected intercourse. There is no current dedicated combined OCP sold solely for the use of EC, but a combination of available combined progestin-estrogen pills may be used. A prescription is required to obtain these OCPs. Given the advent and availability of the LNG pill, UPA pill, and cu-IUD for EC, the use of combined OCPs as a method for EC, although viable, is used only when access to other methods is limited.

Considerations

The CDC, the Society for Adolescent Health and Medicine (SAHM), the American College of Obstetricians and Gynecologists, and the American Academy of Pediatrics, had released position statements and guidelines in the provision of EC in female adolescents and young adults (26-29). In 2016, the CDC released the US Selected Practice Recommendation for Contraceptive Use based on current scientific evidence and consultation with experts in the United States to help address the multifaceted issues regarding contraception and had revised recommendations on EC (26). In this report, types and initiation of EC, advance provision of EC pills (ECPs), initiation of regular

contraception after using ECPs, and prevention and management of nausea and vomiting secondary to ECP use were discussed. It is not recommended to routinely use of antiemetics before ECP use. The CDC recommends having supply of ECPs as evidence has shown that advance provision of ECPs has been effective in reducing pregnancy rates (26).

SAHM encourages health care providers to increase knowledge on all EC methods and offer confidential counseling to all adolescents and young adults on EC during any clinic visit. The cu-IUD should be strongly recommended given its high efficacy and low failure rates. The individual must be educated about potential barriers to efficacy, such as weight. As noted by the CDC, offering a prescription in advance for EC facilitates timely use. It is prudent to treat all sexually assaulted female adolescents with EC accompanied by appropriate counseling (27). SAHM also provided recommendations to improve access and reduce barriers to EC: issues due to financial and transportation constraints, lack of perceived confidentiality, and access to prescription or over the counter EC. Other participants of interest include legislature, schools and pharmacies (27).

Conclusions

Emergency contraceptive methods are highly effective and can be safely used in female adolescents and young adult women. The recommended methods include the LNG pill, UPA pill, and the copper IUD. The copper IUD remains the most effective method of and has a dual purpose as a very effective contraceptive method. Of the oral methods, UPA pill is more effective but requires a prescription. If these highly effective methods are not readily available, combined OCPs should be considered. Efforts to educate and counsel all women of reproductive age about the options for EC are paramount to assist in decreasing the rate of unintended pregnancies in the female adolescents and young adult women.

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