



## Emergency Contraceptive Pills – A Review

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### Research Article

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### Abstract

**Objective:** This article provides an overview of the clinical management of emergency contraceptive pills (ECPs). Youth, both married and unmarried, are commonly ineffective users of contraceptives as they begin to establish their sexual and birth control practices. Often they are poorly informed about sexuality and reproductive health. They may believe myths, for example, that a woman cannot get pregnant the first time she has sex. It is important that young men and women know about ECPs, so that if they have unprotected sex and find themselves facing the possibility of an unplanned pregnancy and its health and social consequences, they know that they can still act to prevent this occurrence.

**Methods:** Review of articles published in the previous 7 years was done. However, some of the older articles and research papers were also used to portray the historical background Emergency contraception s.

**Conclusion:** Emergency contraception provides women with a last chance to prevent pregnancy after unprotected sex. Women deserve that last chance, and barriers to availability should be eliminated. But it is unlikely that expanding access will have a major impact on reducing the rate of unintended pregnancy, primarily because the incidence of unprotected intercourse is so high, ECPs are only moderately effective, and ECPs are not used often enough.

**Keywords:** Emergency contraceptive pills, Emergency contraception, IUD, Unprotected sex, Combined Oral Pills, Contraception

### Introduction

Worldwide, unplanned pregnancy is a major medical, social, and public health problem. It often results in induced abortion, which occurs at a relatively high rate even when it is illegal<sup>1</sup>. The appropriate use of emergency contraceptive pills (ECPs) or condoms has the potential to reduce abortion numbers by preventing unplanned pregnancies. College students, in particular, might benefit

from ECPs because of the increased prevalence of first-time sexual intercourse, and unreliable or inconsistent primary contraceptive use in this population. Proportion of such unwanted pregnancies is subsequently high in South Asian countries. In India, although the Family Welfare Program has made commendable success in helping couples to achieve their desired family size, unplanned pregnancy continues to be a concern. Women in India, regardless of their age, will no longer need a doctor's prescription to purchase emergency contraceptive pills. Health ministry has decided to make the pill an over-the-counter drug. This decision has been taken to counter and avoid unwanted pregnancies and unsafe abortions.

In India, a baby is born every 1.25 seconds. Couple protection rate is still only 41%. Seventy-eight percent of the pregnancies in India are unplanned and at least 25% are unwanted. Every year 11 million abortions take place and at least half of these are unsafe and associated with a high morbidity and mortality. At least 20,000 women are dying annually due to abortion related complications<sup>2</sup>. It is assumed that most women with unwanted/unplanned pregnancies do not continue the pregnancy to the full-term and try to terminate it, often by traditional and harmful methods leading to serious health consequences. Women have felt the need to control their fertility since time immemorial. Post-coital douching is probably one of the oldest contraceptive methods used and has also mention in the sacred Vedas of India and the Egyptian literature written about 1500 B.C.<sup>3</sup> Self-administration of various herbs, pepper, cabbage seeds<sup>4</sup>, caustic agents, soaps, vinegar, lemon juice, Coca-Cola,<sup>5, 6</sup> etc. and even dangerous articles like sticks, acids and others has caused damage to lives of many women and their health. Modern research on methods to prevent from seeking timely help and intervention when such a need arises.<sup>7-11</sup> In today's modern world, there are various options available for a couple to plan their family. "How to avoid an unwanted pregnancy?" a question that should be answered before starting unprotected sex. There is a wide choice of methods available, includes<sup>12</sup>:

Natural family planning methods.

- Barrier methods.
- Hormonal methods.
- Intrauterine devices.
- Permanent methods for females and for males.
- Emergency contraception.

### EMERGENCY CONTRACEPTION:

Hormonal birth control pills were first approved by the US Food and Drug Administration (FDA) in 1960. In 1966, Morris and Van Wagenen<sup>13</sup> demonstrated that large



doses of estrogen were effective in preventing pregnancy after unprotected intercourse, and this treatment was used for pregnancy prevention in instances of rape.

Emergency contraception (EC) comprises several pharmaceutical products that can be used by a woman to prevent pregnancy when she has had sexual intercourse within the last few hours or days, is afraid she may get pregnant and wants to avoid it. Any woman of reproductive age may need EC at some point in order to avoid an unwanted pregnancy.

This is a method of contraception used before menstruation is missed as an emergency procedure to prevent pregnancy following:

- Unprotected inter course.
- Expected failure of contraceptive method like slippage of condom, bursting of condom, forgotten to take two or more contraceptive pills, premature ejaculation in couples practicing coitus interrupts Link to Natural Family Planning methods regularly.
- When unprotected isolated intercourse happens at some odd moments in couples otherwise using conventional contraceptives.
- In cases of rapes and incest.
- Following a single act of sexual exposure in young girls, as happens sometimes among college and university girls.

There are two methods of emergency contraception:

1. Copper-releasing Intrauterine Contraceptive Devices
2. Emergency contraceptive pills

### 1. Intrauterine Contraceptive Devices (IUCD)

An Intrauterine Contraceptive Devices is a device inserted into the uterine cavity and left for varying periods of time for the purpose of contraception. They are usually made up of polypropylene impregnated with barium sulphate, for visualizing them on x-rays. They are many devices of different design. The commonly used devices are "T" shaped with a horizontal and a vertical arm. The vertical arm has a copper wire wrapped around it and two colored threads at the lower end. These nylon threads (tail) which protrudes through the cervix into the vagina, allows you to check your IUCD whether in place or not. There are hormone-releasing IUCDs available in the market which are suitable for women with special needs<sup>14</sup>. The copper IUD reduces the risk of pregnancy by 99.9%. The frequently used IUD's are

- Copper T 200 (Cu T-200): The effective life span is a minimum of 3 years. However recent studies show it can be used up to 5 years.
- Copper T (Gravigard): The effective life span is 3 years. (Approved by USFDA)
- Multi load copper – 250 (ML Cu – 250): 3 years device.
- Multi load Copper – 375 (ML Cu- 375): 5 years device.

### 2. Emergency Contraceptive Pills:

Emergency contraceptive pills are a hormonal method of contraception. These pills contain the hormones found in oral contraceptive pills but in higher doses. These pills are also called "morning-after" or "post-coital" pills. The phrase "morning-after pill" is a misnomer; ECPs are effective when used shortly before intercourse.

Depending on the drug, they are licensed for use for up to 72 to 120 hours after unprotected sexual intercourse or contraceptive failure<sup>15</sup>. Comparisons of Methods for Emergency contraception are shown in Table 1.

### Characteristics of Emergency Contraceptive Pills<sup>16</sup>:

Emergency contraceptive pills are:

1. Safe and effective.
2. Easy to use and widely available.
3. First dose of emergency contraceptive pills must be taken within 72 hours of an unprotected intercourse and same dose should be repeated exactly 12 hours after the first dose.
4. More effective if taken early, within 12-24 hours of unprotected sex.
5. Can be taken at any time during the monthly cycle.
6. A physical examination is not required.
7. Can be given without a prescription depending on the medical regulations of the country.
8. Can be given to women who have not taken regular oral contraceptive pills for medical reasons, such as a history of heart disease, migraine and liver problems.

### Advantages of ECPs:

- ECPs form an important safety net by providing a backup method in cases of unprotected sex.<sup>17</sup> For young people who are not prepared for a sexual experience or had involuntary sex, ECPs offer a second chance at contraception.
- ECPs provide youth who have not previously sought services with an introduction to reproductive health care.<sup>18</sup>
- Family planning programs can provide ECPs and counseling for sexually active young people either in advance of need, to be kept on hand in case of an emergency, or for use within 72 hours of unprotected sex. Advance distribution with adequate counseling and follow-up is most important for youth using barrier methods, which fail more often than hormonal contraceptives do. Some young adult reproductive health experts advocate the provision of a package of ECPs with condoms, and vice versa.<sup>19</sup> ECPs aid sexually active young people as they move to sustained contraceptive use.<sup>20</sup> ECPs should be viewed as a bridge to regular contraception, because regular contraceptives have higher efficacy rates. For example, the unintended pregnancy rate for condoms, as commonly used, is about 14% of women in the first year of use.<sup>21</sup>

### Drawbacks of ECPs:

- Like all hormonal contraceptives, ECPs do not protect against STDs, including HIV.
- Because many young women do not act until they have missed a menstrual period, they may miss the opportunity to use ECPs to prevent pregnancy.<sup>21</sup>
- Because ECPs are only effective for 72 hours after unprotected sex, it should be made clear to youth that contraception is needed for further acts of intercourse.



ECPs do not provide protection for the rest of a woman's monthly cycle.

**Type of Emergency Contraceptive pills:**

There are three types of ECPs<sup>22</sup>:

1. Combined ECPs containing both estrogen and progestin,
2. Progestin-only ECPs,
3. ECPs containing an antiprogestin (either mifepristone or ulipristal acetate).

**1. Combined Oral Pills**

There are two types of combined oral pills:

**a) Standard/high-dose pills<sup>23</sup>:**

These contain 50 micrograms or more of ethinyl estradiol and 250 micrograms of levonorgestrel, or 500 micrograms of dl-norgestrel.

**b) Low-dose pills<sup>24</sup>:**

These contain 30-35 micrograms of ethinyl estradiol and 150 micrograms of levonorgestrel, or 300 micrograms of dl-norgestrel. Irrespective of whether standard/high dose pills or low dose pills are taken, each dose should contain at least 0.1 mg (100 micrograms) of ethinyl estradiol and 0.5 mg (500 micrograms) of levonorgestrel to be effective as an emergency contraceptive.

**2. Progestin-only ECPs:**

The use of progestins alone for EC was first proposed in 1973. Pills containing only progestin hormone are an alternative to combined oral contraceptive pills. Progestin pills are more effective and are associated with fewer side effects than combined emergency contraceptive pills<sup>25</sup>.

**3: ECPs containing an Antiprogestin:**

The drug mifepristone (RU486, Mifeprex) may be used either as an ECP or as an abortifacient, depending on whether it is used before or after implantation. In the USA, it is most commonly used in 200- or 600-mg doses as an abortifacient, but in China it is commonly used as emergency contraception. As EC, a low dose of mifepristone is slightly less effective than higher doses, but has fewer side effects. As of 2000, the smallest dose available in the USA was 200 mg<sup>27</sup>. Mifepristone, however, is not approved for emergency contraceptive use in the United States. A review of studies in humans concluded that the contraceptive effects of the 10-mg dose are due to its effects on ovulation, but understanding of its mechanism of action remains incomplete<sup>28</sup>. Higher doses of mifepristone can disrupt implantation and, unlike levonorgestrel, mifepristone is effective in terminating established pregnancies<sup>29</sup>. Ulipristal acetate (known as ella in the US and Ellaone in Europe), a drug similar to mifepristone, was approved as an ECP in Europe in early 2009 and in the US in August 2010. It works for up to 120 hours after intercourse<sup>30</sup>. Emergency contraceptive pills (ECPs) are not to be confused with mifepristone, which is used as an "abortion pill". According to the International Federation of Gynecology and Obstetrics, "EC is not an abortifacient because it has its effect prior to the earliest time of implantation." Since ECPs act before implantation, they are considered medically and legally to be forms of contraception<sup>31</sup>.

Method	Time Frame	Dose	Pregnancy Rate	Side effect	Comments
No contraceptive method	-----	-----	4-25 % (Overall 8%)	-----	Risk based on timing of IC
Vaginal douching	Immediately	-----	15-20 %	Allergy	Very low efficacy
High dose estrogen	72 hours	DES 50mgx50 EE 5mgx50	0.3-1.6	N=50% V=25%	Failure to complete regimen
Yuzpe method	72 hours	2 tablet of 50 µg EE+0.25mg LNG Repeat after 12 hours	0.2-3.2	N=51% V=19%	Risk of estrogen use Low efficacy
Levonorgestrel	72-120 hours	1 tablet of 0.75 mg LNG Repeat after 12 hours Single dose-1.5 mg	1.1	N=23% V=6%	Safe and effective cheap

**N = nausea, V = vomiting, I C = Intercourse**

The progestin-only method uses the progestin levonorgestrel in a dose of 1.5 mg, either as two 750 µg doses 12 hours apart, or more recently as a single dose<sup>26</sup>.

**Mechanism of action:**

The precise mechanism of action of emergency contraceptive pills has not been clearly established. However, a number of studies have mentioned that emergency contraceptive pills can inhibit or delay



ovulation. It has also been suggested that emergency contraceptive pills may:

1. Prevent implantation (by altering the inner lining of uterus (endometrium), made unsuitable for implantation)
2. Prevent fertilization
3. Prevent transport of the sperm and ovum

Which mechanism is active in a particular case depends on the time of the menstrual cycle when emergency contraceptive pills are used. Emergency contraceptive pills do not interrupt or abort an established pregnancy. They can only help prevent an unwanted pregnancy. Once implantation (pregnancy) has occurred, emergency contraceptive pills are not any more effective. Emergency contraceptive pills, thus, do not cause any form of abortion or bring about menstrual bleeding.

Several clinical studies have shown that combined ECPs containing the estrogen ethinyl

estradiol and the progestin levonorgestrel can inhibit or delay ovulation.<sup>32,33,34,35</sup> This mechanism of action may explain ECP effectiveness when used during the first half of the menstrual cycle, before ovulation has occurred. Some studies have shown histologic or biochemical alterations in the endometrium after treatment with the regimen, leading to the conclusion that combined ECPs may act by impairing endometrial receptivity to subsequent implantation of a fertilized egg.<sup>36</sup> However, other more recent studies have found no such effects on the endometrium. Additional possible mechanisms include interference with corpus luteum function; thickening of the cervical mucus resulting in trapping of sperm; alterations in the tubal transport of sperm, egg, or embryo; and direct inhibition of fertilization.

#### **Effectiveness:**

Emergency contraceptive pills are fairly effective in preventing pregnancy from unprotected sexual intercourse. However, it is important to recognize that not every woman will become pregnant after an unprotected intercourse even if she does not take any emergency contraceptive pills. Moreover, it is impossible to predict correctly who would become pregnant after an unprotected intercourse. Indeed, every woman has an equal chance of becoming pregnant after an unprotected intercourse. It is estimated that if 100 women have unprotected sexual intercourse during the second or third week of their menstrual cycle, 8 would become pregnant. If the women use as ECPs, instead of 8 women only would become pregnant. If the women used instead of 8 women only would become pregnant. These estimates suggest that the use of emergency contraceptive pills could reduce the probability of becoming pregnant from unprotected sexual intercourse by roughly 75 percent in the case of combined oral contraceptive pills, and 85 percent in the case of progestin-only pills<sup>37</sup>.

Emergency contraceptive pills are not effective as regular contraceptives and should be used only in emergencies. Using high-dose contraceptive pills regularly can cause a number of side effects. Moreover, it is difficult to

ascertain the time of ovulation and menstrual bleeding if emergency contraceptive pills are used frequently as they delay or prevent ovulation. As ovulation could occur very soon after emergency contraceptive treatment has ended, if other method such as condoms are not used during further unprotected intercourses, there is a high possibility that a woman may become pregnant. Further, as the pregnancy rate for emergency contraceptive pills is based on one-time use, it cannot be directly compared to failure rates of hormonal contraceptives used regularly, which represents the risk of failure during a one year period of use. In fact, if emergency contraceptive pills were to be used frequently, the failure rate during a full year of use would be much higher than for regular hormonal contraceptives.

#### **Safety:**

No deaths or serious complications have been causally linked to emergency contraception. The World Health Organization (WHO) lists no medical condition for which the risks of emergency contraceptive pills outweigh the benefits<sup>38</sup>. The American Academy of Pediatrics(AAP) and experts on emergency contraception have concluded that progestin-only ECPs may be preferable to combined ECPs containing estrogen in women with a history of blood clots, stroke, or migraine.

According to the U.S. Medical Eligibility Criteria for Contraceptive Use (US MEC), there are no situations in which the risks of using ECPs outweigh the benefits. The US MEC notes specifically that women with previous ectopic pregnancy, cardiovascular disease, migraines, and liver disease and women who are breastfeeding may use ECPs.

#### **Side effect:**

The most common side effect reported by users of emergency contraceptive pills was nausea (50.5% of 979 Yuzpe regimen users and 23.1% of 977 levonorgestrel-only users in the 1998 WHO trial; 14.3% of 2,720 levonorgestrel-only users in the 2002 WHO trial); vomiting is much less common and unusual with levonorgestrel-only ECPs (18.8% of 979 Yuzpe regimen users and 5.6% of levonorgestrel-only users in the 1998 WHO trial; 1.4% of 2,720 levonorgestrel-only users in the 2002 WHO trial). Anti-emetics are not routinely recommended with levonorgestrel-only ECPs. If a woman vomits within 2 hours of taking a levonorgestrel-only ECP, she should take a further dose as soon as possible.

Changes in bleeding patterns are frequently reported by Implanon users, and are reported to be more common in the first few months of use. One retrospective study from Scotland found that 25% of women discontinued Implanon within the first year of use, mainly because of bleeding problems (62% of removal was for this reason). A further UK retrospective study showed a cumulative removal rate at 3 years of 12%, due to bleeding problems. Overall, about 20% of users can expect amenorrhoea, which will be viewed as beneficial by many women. Around 45% will experience bleeding which is infrequent,



frequent or prolonged. Dysmenorrhoea is usually improved. Women who present with persistent problematic bleeding with Implanon, or with a change in bleeding pattern, should be assessed for risk of sexually transmitted infection, and have significant gynaecological pathology excluded. There is little evidence on strategies to manage problematic bleeding with Implanon, but there is some evidence from Norplant users that mefenamic acid or ethinyl oestradiol (can be given as combined contraceptive pill) offer some benefit. Other common side effects (each reported by less than 20% of levonorgestrel-only users in both the 1998 and 2002 WHO trials) were abdominal pain, fatigue, headache, dizziness, and breast tenderness. Side effects usually do not occur for more than a few days after treatment, and they generally resolve within 24 hours<sup>39,40</sup>.

#### Timing of Use:

The sooner treatment is started, the better. There is reduction in the efficacy of method with increase in coitus – treatment interval. Therefore, it is given as early as possible for maximum efficacy. The pills have been shown to be effective through five days (120 hours) after intercourse. No data are available establishing efficacy if ECPs are taken more than 120 hours after intercourse.

The first dose should be taken no later than 72 hours after an unprotected intercourse. The second dose should follow 12 hours after the first dose. Nowadays, it is recommended that two tablets (single dose) of levonorgestrel should be given within 72 hours of intercourse.<sup>41</sup> Women who request ECPs more than 72 hours after unprotected intercourse may be given pills, but they should be told that pregnancy might already have begun, and therefore ECPs may not be effective. For women who request emergency contraception between 72 and 120 hours and are appropriate IUD candidates, a copper IUD may be a better option.

#### ECPs Prescription:

ECPs are safe for virtually all women, including those who may have health conditions that rule out daily use of oral contraceptive (OCs). Prescription of more than the recommended dosage of ECPs will NOT make ECPs more effective. The extra pills will only cause more nausea. ECPs have not been found to increase the risk of the complication associated with ongoing OC use. 'WHO medical eligibility criteria' for contraceptive use list no medical conditions that rule out use of ECPs. The confirmation of pregnancy status is not required before writing a prescription of ECPs. There is no harm to a pregnant woman or to her pregnancy. The routine screening tests, any examination, pregnancy test and blood tests are not necessary. ECPs are not indicated in women with confirmed pregnancy because they will not have any effect. The pill will not make menstruation start immediately. The next period may come a few days earlier or later than expected. The pregnancy should be suspected, if:

- The menstrual period is more than one week later than expected,
- There is no menstruation within three weeks after treatment, or
- The menstrual period is unusually scanty.

#### Information to be provided to customers:

Information about ECPs and related issues may be provided in person, over the telephone, in writing, or by a combination of these approaches. At a minimum, the following messages should be conveyed:

- The clients should start treatment as soon as possible after intercourse.
- Following ECP use, if the client's menstrual period has not come within a week after it was expected; she should seek evaluation and care for possible pregnancy.
- If the client has irregular bleeding and lower abdominal pain, she should contact a health care provider for possible evaluation for ectopic pregnancy.
- The client should use another form of contraception after using ECPs. ECPs are not suited for ongoing contraception.

ECPs do not protect against HIV or other sexually transmitted infection (STIs).

#### Conclusion

Emergency contraception provides women with a last chance to prevent pregnancy after unprotected sex. Women deserve that last chance, and barriers to availability should be eliminated. But it is unlikely that expanding access will have a major impact on reducing the rate of unintended pregnancy, primarily because the incidence of unprotected intercourse is so high, ECPs are only moderately effective, and ECPs are not used often enough. Both progestin only and combined estrogen-progestin formulations are effective.

ECPs are not as effective as correct and consistent use of most other modern contraceptive methods. They are more likely to cause nausea and vomiting than OCs taken daily. Therefore ECPs should not be used regularly as a substitute for ongoing contraception. Women and providers lack sufficient knowledge of the method and misconceptions abound, especially regarding the mechanism of action of EC. The need for a prescription and cost also limit the use of ECPs<sup>42</sup>. It is incumbent on health care providers to supply women with the information they need to make informed decisions about all aspects of their reproductive health care, including the decision of whether or not to use ECPs.

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#### **AUTHORS' CONTRIBUTIONS**

Athors contributed equally to all aspects of the study.

#### **PEER REVIEW**

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#### **CONFLICTS OF INTEREST**

The authors declare that they have no competing interests