

## EMERGENCY CONTRACEPTION

The following guideline has been reviewed by the Clinical Practice Gynaecology and Social and Sexual Issues Committees and approved by Executive and Council of the Society of Obstetricians and Gynaecologists of Canada (SOGC).

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### Abstract

**Objective:** To review current knowledge about emergency contraception (EC), including available options, their modes of action, efficacy, safety, and the effective provision of EC within a practice setting.

**Options:** The combined estradiol-levonorgestrel (Yuzpe regimen) and the levonorgestrel-only regimen, as well as post-coital copper intrauterine devices, are reviewed.

**Outcomes:** Efficacy in terms of reduction in risk of pregnancy, safety, and side effects of methods for EC and the effect of the means of access to EC on its appropriate use and the use of consistent contraception.

**Evidence:** MEDLINE and the Cochrane Database were searched for English-language articles published from January 1998 through March 2003, to update the previous SOGC guidelines published in 2000. Clinical guidelines and position papers developed by health or family planning organizations were also reviewed. Key words used were: emergency contraception,

post-coital contraception, emergency contraceptive pills, post-coital copper IUD.

**Values:** The studies reviewed were classified according to criteria described by the Canadian Task Force on the Periodic Health Exam and the recommendations for practice were ranked based on this classification.

**Benefits, Harms, and Costs:** These guidelines are intended to help reduce unintended pregnancies by increasing awareness and appropriate use of EC.

### Recommendations:

1. Women who have had unprotected intercourse and wish to prevent pregnancy should be offered hormonal EC up to 5 days after intercourse. (II-2A)
2. A copper IUD can be used up to 7 days after intercourse in women who have no contraindications. (III-B)
3. Women should be advised that the levonorgestrel EC regimen is more effective and causes fewer side effects than the Yuzpe regimen. (I-A)
4. Either 1 double dose of the levonorgestrel EC regimen (1.5 mg) or the regular 2-dose levonorgestrel regimen (0.75 mg each dose) may be used, as they have similar efficacy with no difference in side effects. (I-A)

### Key Words

Emergency contraception, post-coital contraception, emergency contraceptive pills, post-coital copper IUD

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5. Hormonal EC should be started as soon as possible after unprotected sexual intercourse. (II-2B)
6. Women of reproductive age should be provided with a prescription for hormonal EC in advance of need. (I-A)
7. The woman should be evaluated for pregnancy if menses have not begun within 21 days following EC treatment. (III-A)
8. A pelvic examination is not indicated for the provision of hormonal EC. (III-A)

**Validation:** These guidelines have been reviewed by the Clinical Practice Gynaecology and Social and Sexual Issues Committees of the Society of Obstetricians and Gynaecologists of Canada.

**Sponsor:** The Society of Obstetricians and Gynaecologists of Canada.

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## INTRODUCTION

Emergency contraception (EC) refers to all methods of contraception that are used after intercourse and before implantation. The most commonly used methods can reduce the risk of pregnancy by 75% to 89%.<sup>1-3</sup> The EC methods are not abortifacients since they work prior to implantation, and are intended only for occasional use as a back-up to regular methods of birth control.

Emergency contraception has been available in Canada for almost 30 years, but as of 1998 only 46% of Canadian women were familiar with it and only 1% of sexually active women had used it in the preceding 6 months.<sup>4</sup> Forty to 50% of pregnancies in Canada remain unplanned despite the wide availability of contraceptive methods,<sup>5,6</sup> and in 2000, over 105 000 abortions were performed in Canada.<sup>7</sup> If used when

indicated, EC could significantly help to reduce these abortion numbers.

Herein is reviewed current knowledge about EC, including available options, their modes of action, efficacy, safety, and the effective provision of EC within a practice setting. MEDLINE and the Cochrane Database were searched for English-language articles published from January 1998 through March 2003, to update the previous SOGC guidelines published in 2000. Clinical guidelines and position papers developed by health or family planning organizations were also reviewed. Key words used were "emergency contraception," "post-coital contraception," "emergency contraceptive pills," and "post-coital copper IUD." The level of evidence and quality of recommendations made are described using the Evaluation of Evidence from the Canadian Task Force on the Periodic Health Examination (Table 1).<sup>8</sup>

These guidelines are intended to help reduce unintended pregnancies by increasing awareness and appropriate use of EC.

## METHODS OF EMERGENCY CONTRACEPTION

There are two methods of emergency contraception: hormonal methods, also known as emergency contraceptive pills, and insertion of a copper intrauterine device (IUD) post-coitally.

Two types of hormonal EC are available in Canada. One type is a regimen of 2 oral doses of 750 µg levonorgestrel, a progestin, taken 12 hours apart. Marketed as Plan B, this levonorgestrel-only EC was introduced into Canada in 2000, and is the only product approved by Health Canada for EC.

TABLE 1 QUALITY OF EVIDENCE ASSESSMENT <sup>8</sup>	CLASSIFICATION OF RECOMMENDATIONS <sup>8</sup>
<p>The quality of evidence reported in these guidelines has been described using the Evaluation of Evidence criteria outlined in the Report of the Canadian Task Force on the Periodic Health Exam.</p> <p>I: Evidence obtained from at least one properly randomized controlled trial.</p> <p>II-1: Evidence from well-designed controlled trials without randomization.</p> <p>II-2: Evidence from well-designed cohort (prospective or retrospective) or case-control studies, preferably from more than one centre or research group.</p> <p>II-3: Evidence obtained from comparisons between times or places with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of treatment with penicillin in the 1940s) could also be included in this category.</p> <p>III: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.</p>	<p>Recommendations included in these guidelines have been adapted from the ranking method described in the Classification of Recommendations found in the Canadian Task Force on the Periodic Health Exam.</p> <p>A. There is good evidence to support the recommendation that the condition be specifically considered in a periodic health examination.</p> <p>B. There is fair evidence to support the recommendation that the condition be specifically considered in a periodic health examination.</p> <p>C. There is poor evidence regarding the inclusion or exclusion of the condition in a periodic health examination, but recommendations may be made on other grounds.</p> <p>D. There is fair evidence to support the recommendation that the condition not be considered in a periodic health examination.</p> <p>E. There is good evidence to support the recommendation that the condition be excluded from consideration in a periodic health examination.</p>

The other hormonal EC, known as the Yuzpe method,<sup>1</sup> has been in use since the 1970s, and consists of 2 doses of 100 µg of ethinyl estradiol (EE) and 500 µg of levonorgestrel taken orally 12 hours apart. Ovral is the most commonly used product, with 2 tablets of Ovral being equivalent to 1 dose of the Yuzpe regimen. Other products can be substituted if they are more readily available, as they are considered to offer equivalent efficacy,<sup>9</sup> although they may not deliver an exactly equivalent dose (Table 2). None of these combined hormonal products have been approved for use in Canada as EC; nonetheless, they are widely used for this purpose.

The antiprogesterin mifepristone (RU 486) has been shown to be a highly effective post-coital contraceptive,<sup>10-14</sup> but this product is unlikely to be available to Canadian women in the near future.

The insertion of a copper IUD within 5 days of unprotected intercourse has been shown to prevent pregnancy<sup>15,16</sup> and is an important option for women having no contraindications who present after the 72-hour time frame of when hormonal EC is most effective.<sup>15,16</sup> The use of a post-coital copper IUD between 5 and 7 days is less well studied, although early trials extended the treatment window to 7 days.<sup>17</sup> Since it is well accepted that implantation occurs 6 to 7 days after ovulation, extending insertion of an IUD up to 7 days after unprotected intercourse may be acceptable if it falls within 5 days of the ovulation day. The post-coital IUD may remain in place to provide ongoing contraception.

#### **MECHANISM OF ACTION OF EMERGENCY CONTRACEPTION**

The exact mechanisms of action of emergency contraceptives are unclear, but EC could theoretically interfere with follicle maturation, the ovulatory process, cervical mucus, sperm migration, corpus luteum sufficiency, endometrial receptivity, fertilization, or zygote development, transport, or adhesion.<sup>18</sup> The mechanism of action may differ not only with the different EC regimens, but

also within each regimen, depending upon when it is given relative to the time of both intercourse and ovulation.<sup>18</sup>

Statistical evidence of the effectiveness of hormonal EC agrees with clinical data suggesting that the main mechanism of action is related to interference with ovulation.<sup>18-24</sup> When given before ovulation, combined EC as well as levonorgestrel-only EC and mifepristone appear to suppress or delay ovulation<sup>18-22</sup>; if ovulation does occur, it appears to be dysfunctional.<sup>19,21,22</sup> When EC is given at the time of or after ovulation, no effect on ovulation can be seen.<sup>19,20,22</sup> The effect of EC on the luteal phase is unclear.<sup>18-22</sup>

Studies of the effects of combined EC and levonorgestrel-only EC on the endometrium are not consistent, however, most recent studies have failed to show major alterations in the mechanisms associated with endometrial receptivity.<sup>18,19,21-23</sup> Since the effect on ovulation cannot explain the total effectiveness of hormonal EC,<sup>25,26</sup> more clinical data are required to assess the contribution of other mechanisms of action such as inhibition of sperm motility or transport.

#### **EFFECTIVENESS OF EMERGENCY CONTRACEPTION**

The Yuzpe and levonorgestrel-only regimens have been shown to reduce the risk of pregnancy by about 75% to 89%, respectively,<sup>1-3,27</sup> but this does not mean that 25% of women using the Yuzpe regimen will become pregnant. Theoretically, if 100 women had unprotected intercourse once during the second or third week of their cycle, about 8 would become pregnant; following treatment with the Yuzpe regimen, only 2 would become pregnant, a reduction of 75%.<sup>28</sup> Recent studies using statistical estimation of the effectiveness of hormonal EC suggest that the risk reduction may not be this great.<sup>29,30</sup> The World Health Organization (WHO) reports a pregnancy rate of 1.1% with the levonorgestrel-only regimen compared to 3.2% for the Yuzpe regimen.<sup>1</sup>

#### **EFFECTIVENESS RELATED TO THE COMPOUND**

Two randomized trials<sup>1,3</sup> compared levonorgestrel given twice 12 hours apart with the Yuzpe regimen, and both showed higher efficacy with levonorgestrel only (85% vs 57% for typical use and 89% vs 76% for perfect use).<sup>1</sup>

A multicentre randomized trial<sup>31</sup> also found clear evidence that a 2-dose regimen, each dose containing EE 100 µg and norethindrone 2.0 mg, was not significantly less effective than the Yuzpe method when taken within 72 hours of unprotected intercourse (60% vs 67% for typical use and 61% vs 73% for perfect use).

Although mifepristone is not available in Canada, it is worth noting that it is 6 times more effective than the Yuzpe regimen,<sup>11</sup> even at low doses,<sup>11-14</sup> and that very low-dose mifepristone (unidosed of 10 mg) is as effective as levonorgestrel only.<sup>32</sup>

Brand	Pills/Dose	EE* (µg)/Dose	LNG† (µg)/Dose
Ovral	2	100	500
Alesse	5	100	500
Triphasil	4 yellow	120	500
Triquilar	4 yellow	120	500
Minovral	4	120	600

\*Ethinyl estradiol  
†Levonorgestrel

## EFFECTIVENESS RELATED TO THE DOSE

In 2002, two large randomized trials<sup>32,33</sup> showed that a single dose of 1.5 mg of levonorgestrel was as effective as the standard 2-dose levonorgestrel regimen.

In a randomized controlled trial,<sup>31</sup> a 1-dose regimen of Ovral was less effective than the 2-dose regimen, but the difference was not significant (54% vs 67% for typical use and 62% vs 73% for perfect use). In a study that assessed effect of Ovral on ovulation,<sup>21</sup> it appeared that 1 dose of Ovral did not suppress ovulation as efficiently as 2 doses.

## EFFECTIVENESS RELATED TO THE TIME AFTER UNPROTECTED INTERCOURSE

Although they have generally been used only up to 72 hours after intercourse, the Yuzpe regimen<sup>34,35</sup> and the 1 double-dose and 2-dose levonorgestrel regimens<sup>32,33</sup> have been shown to be effective when taken between 72 and 120 hours after unprotected intercourse. The range of effectiveness seems to be slightly lower than before 72 hours.

Effectiveness of EC has been shown to decline significantly with increasing delay between unprotected intercourse and initiation of treatment: levonorgestrel prevented 95% of pregnancies for up to 24 hours, 85% for 25 to 48 hours, and 58% for 49 to 72 hours, whereas the corresponding figures for the Yuzpe regimen were 77%, 36%, and 31%, respectively.<sup>1</sup> Although significant in several studies,<sup>1,11,14,33,36</sup> this time-effect relationship was not seen in others.<sup>12,32,35</sup>

## EFFECTIVENESS RELATED TO OTHER FACTORS

Hormonal EC is less effective in women who do not take it according to instructions (non-perfect use) and in those who have other unprotected intercourse after taking it.<sup>1,12,31-33</sup>

Repeat use of hormonal EC as a regular contraceptive has not been found to provide adequate contraceptive efficacy.<sup>37</sup> In one study,<sup>37</sup> in which women were asked to take levonorgestrel 0.75 mg within 1 hour of each act of intercourse during a 6-month period, the overall pregnancy rate over the 6-month period was 6 per 100 women-years, which was twice the failure rate for combined oral contraceptives. Irregular bleeding was a major drawback of this method, as it was experienced by 70% of the participants.<sup>37</sup>

## EFFECTIVENESS OF POST-COITAL INTRAUTERINE DEVICE

A meta-analysis of 20 published papers<sup>38</sup> showed that post-coital IUDs inserted within 5 days of unprotected intercourse are significantly more effective than hormonal EC, with an effectiveness rate of 98.7%. There were no pregnancies in one study comparing 14 emergency IUD users to 219 mifepristone users,<sup>13</sup> and only 1 pregnancy in another descriptive study of 1013 emergency IUD users.<sup>16</sup>

## INDICATIONS

Hormonal EC should be considered for any woman wishing to avoid pregnancy, who presents within 5 days of unprotected or inadequately protected sexual intercourse. A post-coital IUD can be considered up to 7 days after the unprotected intercourse. This includes the following situations:

- failure to use a contraceptive method
- condom breakage or leakage
- dislodgement of a diaphragm or cervical cap
- 2 or more missed birth control pills
- Depo-Provera injection over 1 week late
- ejaculation on the external genitalia
- mistimed fertility awareness
- sexual assault, when the woman is not using reliable contraception

Because it is difficult to determine with certainty the infertile time of the cycle,<sup>39-41</sup> if a woman is concerned about her risk of pregnancy, EC should be provided regardless of the cycle day of exposure. Although hormonal EC is not recommended as a regular form of contraception, repeat use poses no known health risks and should not be a reason for denying women access to treatment.<sup>42</sup>

## CONTRAINDICATIONS

There are no absolute contraindications to the use of emergency hormonal contraception except known pregnancy, and this is only because it is ineffective. Although there have been no studies of births occurring in women using hormonal EC in the presence of a pre-existing pregnancy, studies of pregnancies where the fetus has been exposed to oral contraceptives have shown no evidence of teratogenicity.<sup>43</sup>

According to the WHO, there are no known medical contraindications to the use of hormonal EC, aside from allergy to one of the constituents.<sup>44</sup> Data from the United Kingdom on more than 4 million prescriptions of the Yuzpe regimen showed only 6 serious adverse events (3 venous thrombosis and 3 cerebrovascular events); in none of these was the relationship between the administration of hormonal EC and the event clearly determined.<sup>45</sup> Women who have contraindications to the daily use of oral contraceptives, such as smokers over the age of 35, can safely use either of the hormonal methods of EC, as the duration of hormonal use is very brief.<sup>46</sup> No substantial increased risk for developing venous thromboembolism has been found with combined EC, but studies of safety have frequently excluded women who have contraindications to oral contraception.<sup>47</sup> As the levonorgestrel-only regimen carries no theoretical risk, it may be a preferable option for women with strong contraindications to estrogen, such as women with

known thrombophilia, history of stroke, heart attack, or active migraine with neurological symptoms.<sup>48</sup> As seen with other progestin-only contraceptives,<sup>49</sup> it is possible that an excess risk of ectopic pregnancy may exist should the progestin-only EC fail to prevent pregnancy.<sup>50</sup>

If the IUD is considered, care should be taken to ensure that it is a suitable method for the woman. A pre-existing pregnancy must be excluded. This may require a urine pregnancy test or serum hCG, especially in women who have had sexual intercourse at the beginning of their cycle. There should be no history of recent pelvic inflammatory disease, low risk for sexually transmitted infection, and no apparent vaginal or cervical infection on examination. At the time of insertion, endocervical specimens should be taken to test for gonorrhoea and chlamydia, and consideration given to the use of antibiotics such as doxycycline, azithromycin, and metronidazole to reduce the risk of pelvic infection.<sup>13,16</sup>

### **ASSESSMENT**

Very little information is required to determine whether EC is indicated. History taking must determine that unprotected intercourse occurred within the time frame when EC is effective. The woman's risk for having a pre-existing pregnancy should be assessed by determining the timing of her last menstrual period, that it was normal, and that she is not currently overdue for her expected period. Rarely will a urine pregnancy test be necessary to rule out pregnancy. A history of previous acts of unprotected intercourse during the cycle in question may put a woman at risk for pregnancy that EC cannot prevent, if the therapeutic window has passed.

When seeing women for consideration of EC, health-care providers should use the opportunity to discuss broader sexual health concerns, such as whether the unprotected act was coerced, risks for sexually transmitted infections, and need for ongoing birth control. If nucleic acid amplification techniques are available for chlamydia testing, it should be considered for high-risk groups such as women under 30, as urine testing for chlamydia at the time of presentation for EC has been shown to detect the majority of infected cases.<sup>51</sup>

Women should be informed about the potential side effects of EC and advised that hormonal EC will not prevent pregnancy from unprotected intercourse in the days or weeks following treatment. A barrier method such as the condom can be used for the remainder of the cycle and a different method initiated at the beginning of the next cycle if the woman desires. If a woman with no contraindications wishes to start oral contraceptives, she can be provided with a prescription to start with her next period or the next day following the use of hormonal EC.<sup>49,52</sup> A condom should be used until she has taken the contraceptive pill for 7 consecutive days.<sup>49</sup>

### **FOLLOW-UP**

Women should be advised to have a pregnancy test if they do not experience normal menstrual bleeding by 21 days following EC treatment or by 28 days if an oral contraceptive was started after taking hormonal EC. If indicated, a follow-up appointment can be made to address ongoing birth control issues or to test for sexually transmitted infections.

### **SIDE EFFECTS**

The 2-dose levonorgestrel regimen has a significantly lower incidence of nausea (23.1% vs 50.5%), vomiting (5.6% vs 18.8%), dizziness (11.2% vs 16.7%), and fatigue (16.9% vs 28.5%) than the Yuzpe regimen.<sup>1</sup> In the studies comparing the 2-dose levonorgestrel regimen to the 1 double-dose regimen, the occurrence of side effects was similar.<sup>32,33</sup>

The non-prescription antiemetic meclizine has been demonstrated to reduce the risk of nausea by 27% and vomiting by 64% when 50 mg were taken 1 hour before the first dose of the Yuzpe regimen, but the incidence of drowsiness doubled.<sup>53</sup>

Possible complications of the post-coital IUD include pelvic pain, abnormal bleeding, pelvic infection, uterine perforation, and expulsion.<sup>49</sup>

### **RETURN OF MENSES**

Most women will have their next menses within 3 weeks of taking EC. In the 1998 WHO study,<sup>1</sup> the onset of next menses was similar for women taking the Yuzpe regimen and for those taking the 2-dose levonorgestrel regimen, with 15% of women having an early onset of menses, 57% having menses return within 3 days of the expected day, and 28% experiencing a delay of more than 3 days. In other trials,<sup>31,33</sup> a higher frequency of women tended to have an early onset of menses. The time to resumption of menses may be affected by the timing of EC use related to the expected date of ovulation.<sup>20,31</sup>

### **ACCESS**

From a public health perspective, the promotion of EC can be seen as primary prevention for unintended pregnancy. To maximize the potential for EC to reduce the number of unintended pregnancies, women at risk for pregnancy and their partners need to be knowledgeable about EC before they require it, and be able to access it when needed.

A number of barriers exist that may prevent the appropriate use of EC, such as lack of knowledge, negative attitude towards it, fear of side effects, judgmental attitudes from providers, overstating of health risks associated with EC, requirements of pelvic examinations before prescription, need for a medical prescription, unpractical business hours of medical clinics, and unavailability of

physicians.<sup>54</sup> Circumventing the need for a physician visit to obtain a prescription could improve access. One randomized controlled trial<sup>55</sup> and two controlled trials<sup>56,57</sup> have shown that, compared with women given information only, women provided with hormonal EC in advance of need were more likely to use it, use it appropriately, and were not more likely to abandon regular methods of contraception.<sup>55-57</sup> Therefore, during physician visits for periodic health examinations or reproductive health concerns, any woman in the reproductive age group who has not been sterilized should be offered a prescription for EC in advance of need with detailed information about how and when to use it. Because only limited information is required to safely prescribe hormonal EC, telephone prescription is also an alternative to an office visit.

In British Columbia and Quebec, medical consultation is unnecessary to obtain hormonal EC. Trained pharmacists in these provinces prescribe EC, and if indicated, refer women to other health-care providers for follow-up. Currently, Health Canada is considering a change in scheduling of the levonorgestrel-only EC to a non-prescription product.

## CONCLUSION

Emergency contraception has the potential to safely and effectively reduce the number of unintended pregnancies and abortions. The effective use of EC is dependent on increasing both public and professional awareness and improving access to this important therapeutic intervention. Health-care providers can encourage the appropriate use of EC by discussing it with their patients and by providing women with a prescription for hormonal EC in advance of need. Professionals involved in the promotion of women's health must become advocates for EC, both locally and nationally.

## RECOMMENDATIONS

1. **Women who have had unprotected intercourse and wish to prevent pregnancy should be offered hormonal EC up to 5 days after intercourse. (II-2A)**
  2. **A copper IUD can be used to up to 7 days after intercourse in women who have no contraindications. (III-B)**
  3. **Women should be advised that the levonorgestrel EC regimen is more effective and causes fewer side effects than the Yuzpe regimen. (I-A)**
  4. **Either 1 double-dose of the levonorgestrel EC regimen (1.5 mg) or the regular 2-dose levonorgestrel regimen (0.75 mg each dose) may be used, as they have similar efficacy with no difference in side effects. (I-A)**
  5. **Hormonal EC should be started as soon as possible after unprotected sexual intercourse. (II-2B)**
  6. **Women of reproductive age should be provided with a prescription for hormonal EC in advance of need. (I-A)**
7. **The woman should be evaluated for pregnancy if menses have not begun within 21 days following EC treatment. (III-A)**
  8. **A pelvic examination is not indicated for the provision of hormonal EC. (III-A)**

This document supersedes SOGC Clinical Practice Guideline No. 92, *Emergency Postcoital Contraception*, published in July 2000.

## REFERENCES

1. Task Force on Postovulatory Methods of Fertility Regulation. Randomized controlled trial of levonorgestrel versus the Yuzpe regimen of combined oral contraceptives for emergency contraception. *Lancet* 1998;352:428-33.
2. Trussell J, Rodriguez G, Ellertson C. Updated estimates of the effectiveness of the Yuzpe regimen of emergency contraception. *Contraception* 1999;59:147-208.
3. Ho PC, Kwan MSW. A prospective randomized comparison of levonorgestrel with the Yuzpe regimen in post-coital contraception. *Hum Reprod* 1993;8:389-92.
4. Fisher WA, Boroditsky R, Bridges ML. The 1998 Canadian contraception study. *Can J Hum Sex* 1999;8(3):161-216.
5. The Alan Guttmacher Institute. Sharing responsibility: women, society and abortion worldwide. New York:AGI; 1999.
6. Henshaw SK. Unintended pregnancy in the United States. *Fam Plann Perspect* 1998;30:24-9, 46.
7. Statistics Canada. Accessed at: <<http://www.statcan.ca/daily/English/today/d030328e.htm>>. April 27, 2003.
8. Woolf SH, Battista RN, Angerson GM, Logan AG, Eel W. Canadian Task Force on the Periodic Health Exam. Ottawa: Canada Communication Group; 1994. p. xxxvii.
9. US Department of Health and Human Services. Food and Drug Administration. Prescription drug products; certain combined oral contraceptives for use as post-coital emergency contraception. *Federal Register* 1997;62:8610-2.
10. Glasier A, Thong KJ, Dewar M, Mackie M, Baird D. Mifepristone (RU486) compared with high-dose estrogen and progestogen for emergency post-coital contraception. *N Engl J Med* 1992;327:1041-4.
11. Ashok PW, Stalder C, Wagaarachchi PT, Flett GM, Melvin L, Templeton A. A randomized study comparing a low dose of mifepristone and the Yuzpe regimen for emergency contraception. *Br J Obstet Gynaecol* 2002;109:553-60.
12. Task Force on Postovulatory Methods of Fertility Regulation. Comparison of three single doses of mifepristone as emergency contraception: a randomized trial. *Lancet* 1999;353:697-702.
13. Ashok PW, Wagaarachchi PT, Flett GM, Templeton A. Mifepristone as a late post-coital contraceptive. *Hum Reprod* 2001;16(1):72-5.
14. Xiao BL, von Hertzen H, Ahao H, Piaggio G. A randomized double-blind comparison of two single doses of mifepristone for emergency contraception. *Hum Reprod* 2002;17(12):3084-9.
15. Lippes J, Malik T, Tatum HJ. The postcoital copper-T. *Adv Plan Parent* 1976;11:24-9.
16. Zhou LY, Ziao BL. Emergency contraception with Multiload Cu-375 SL IUK: a multicenter clinical trial. *Contraception* 2001;64:107-12.
17. Fasoli M, Parazzini F, Cecchetti G, La Vecchia C. Post-coital contraception: an overview of published studies. *Contraception* 1989;39:459-68.
18. Croxatto HB, Devoto L, Durant M, Ezcurra E, Larrea F, Nagle C, et al. Mechanism of action of hormonal preparations used for emergency contraception: a review of the literature. *Contraception* 2001;63:111-21.
19. Durand M, Cravioto Ma. del Carmen, Raymond EG, Durán-Sánchez O, Cruz-Hinojosa Ma. De la Luz, Castell-Rodríguez A, et al. On the mechanisms of action of short-term levonorgestrel administration in emergency contraception. *Contraception* 2001;64:227-34.

20. Hapangama D, Glaxier AF, Baird DT. The effects of peri-ovulatory administration of levonorgestrel on the menstrual cycle. *Contraception* 2001;63:123–9.
21. Croxatto HB, Fuentealba B, Brache V, Salvatierra AM, Alvarez F, Massai R, et al. Effects of the Yuzpe regimen, given during the follicular phase, on ovarian function. *Contraception* 2002;65:121–8.
22. Marions L, Hulthenby K, Lindell I, Sun X, Stabi B, Bemzell Danielsson K. Emergency contraception with mifepristone and levonorgestrel: mechanism of action. *Obstet Gynecol* 2002;100:65–71.
23. Raymond EG, Lovely LP, Chen-Mok M, Seppälä M, Kurman RJ, Lessey BA. Effect of Yuzpe regimen of emergency contraception on markers of endometrial receptivity. *Hum Reprod* 2000;15(11):2351–5.
24. Landgren BM, Johansson E, Aedo AR, Kummur A, Shi Ye. The effect of levonorgestrel administered in large doses at different stages of the cycle on ovarian function and endometrial morphology. *Contraception* 1989;39:275–89.
25. Trussell J, Raymond EG. Statistical evidence about the mechanism of action of the Yuzpe regimen of emergency contraception. *Obstet Gynecol* 1999;93:872–6.
26. Kessler E, Garmendia F, Westphal N, Parada J. The hormonal and peripheral effects of dl-norgestrel in postcoital contraception. *Contraception* 1974;10:411–24.
27. Trussell J, Rodriguez G, Ellertson C. New estimates of the effectiveness of the Yuzpe regimen of emergency contraception. *Contraception* 1998;57:363–9.
28. Trussell J, Ellertson C, Stewart F. The effectiveness of the Yuzpe regimen of postcoital contraception. *Fam Plann Perspect* 1993;9:75–82.
29. Trussell J, Ellertson C, Dorflinger L. Effectiveness of the Yuzpe regimen of emergency contraception by cycle day of intercourse: implications for mechanism of action. *Contraception* 2003;67:167–71.
30. Trussell J, Ellertson C, von Hertzen H, Bigrigg A, Webb A, Evans M, et al. Estimating the effectiveness of emergency contraceptive pills. *Contraception* 2003;67:259–65.
31. Ellertson C, Webb A, Blanchard K, Bigrigg A, Haskell S, Shochet T, et al. Modifying the Yuzpe regimen of emergency contraception: a multi-center randomized controlled trial. *Obstet Gynecol* 2003;101:1160–7.
32. von Hertzen H, Piaggio G, Ding J, Chen J, Song S, Bartfai G, et al. Low dose mifepristone and two regimens of levonorgestrel for emergency contraception: a WHO multicentre randomised trial. *Lancet* 2002;360:1803–10.
33. Arowojolu AO, Okewole IA, Adekunle AO. Comparative evaluation of the effectiveness and safety of two regimens of levonorgestrel for emergency contraception in Nigerians. *Contraception* 2002;66:269–73.
34. Rodrigues I, Grou F, Joly J. Effectiveness of emergency contraceptive pills between 72 and 120 hours after unprotected intercourse. *Am J Obstet Gynecol* 2001;184:531–7.
35. Ellertson C, Evans M, Ferden S, Leadbetter C, Spears A, Johnstone K, et al. Extending the time limit for starting the Yuzpe regimen of emergency contraception to 120 hours. *Obstet Gynecol* 2003;101:1168–71.
36. Piaggio G, von Hertzen H, Grimes DA, Van Look PFA. Timing of emergency contraception with levonorgestrel and the Yuzpe regimen. *Lancet* 1999;353:721.
37. United Nations Development Programme/United Nations Population Fund/World Health Organizations/World Bank Special Programme of Research, Development and Research Training in Human Reproduction, Task Force on Post-Ovulatory Methods for Fertility Regulation. Efficacy and side effects of immediate postcoital levonorgestrel used repeatedly for contraception. *Contraception* 2000;61:303–8.
38. Trussell J, Ellertson C. Efficacy of emergency contraception. *Fertil Cont Rev* 1995;4:8–11.
39. Espinos JJ, Rodriguez-Espinosa J, Senosiain R, Aura M, Vanrell C, Gispert M, et al. The role of matching menstrual data with hormonal measurements in evaluating effectiveness of postcoital contraception. *Contraception* 1999;60:215–20.
40. Wilcox A, Dundon D, Weinberg C, Trussell J, Baird DD. Likelihood of conception with a single act of intercourse: providing benchmark rates for assessment of post-coital contraceptives. *Contraception* 2001;63:211–5.
41. Stirling A, Glasier A. Estimating the efficacy of emergency contraception – how reliable are the data? *Contraception* 2002;66:19–22.
42. Shelton JD. Repeat emergency contraception: facing our fears. *Contraception* 2002;66:15–7.
43. Bracken MB. Oral contraception and congenital malformations in offspring: a review and meta-analysis of the prospective studies. *Obstet Gynecol* 1990;76:552–7.
44. Improving access to quality care in family planning: medical eligibility criteria for contraceptive use. 2nd ed. Geneva:WHO; 2000.
45. Glasier A. Emergency postcoital contraception. *N Engl J Med* 1997;337:1058–64.
46. Grimes DA, Raymond EG, Scott Jones B. Emergency contraception over-the-counter: the medical and legal imperatives. *Obstet Gynecol* 2001;98:151–5.
47. Vasilakis C, Jick SS, Jick H. The risk of venous thromboembolism in users of postcoital contraceptive pills. *Contraception* 1999;59:79–83.
48. Webb A. How safe is the Yuzpe method of emergency contraception? *Fert Control Rev* 1995;4:16–8.
49. Hatcher RA, Trussell J, Stewart F, Cates WJ Jr, Stewart G, Guest F, et al. *Contraceptive technology*. 17th ed. New York: Ardent Media Inc.; 1998. p. 851.
50. Sheffer-Mimouni G, Pauzner D, Maslovitch S, Lessing JB, Gamzu R. Ectopic pregnancies following emergency levonorgestrel contraception. *Contraception* 2003;67:267–9.
51. Kettle H, Cay S, Brown A, Glasier A. Screening for Chlamydia trachomatis infection is indicated for women under 30 using emergency contraception. *Contraception* 2002;66:251–3.
52. Consortium for Emergency Contraception. Emergency contraceptive pills: medical and service delivery guidelines. The Consortium; 2000.
53. Raymond EG, Creinin MD, Barnhart KT, Lowvorn AE, Wountree RW, Trussell J. Mefloquine for prevention of nausea associated with use of emergency contraceptive pills: a randomized trial. *Obstet Gynecol* 2000;95:271–7.
54. Ellertson C, Shochet T, Blanchard K, Trussell J. Emergency contraception: a review of the programmatic and social science literature. *Contraception* 2000;61:145–86.
55. Ellertson C, Ambardekar S, Hedley A, Coyaji K, Trussell J, Blanchard K. Emergency contraception: randomized comparison of advance provision and information only. *Obstet Gynecol* 2001;98:570–5.
56. Glasier A, Baird D. The effects of self-administering emergency contraception. *N Engl J Med* 1998;339:1–4.
57. Raine T, Harper C, Leon K, Darney P. Emergency contraception: advance provision in a young, high-risk clinic population. *Obstet Gynecol* 2000;96:1–7.