A decade ago, emergency contraception (EC) captured the imagination of the reproductive health world. Here, we thought, was an “easy fix” that would revolutionize our age-old relationship with unprotected sex and unintended pregnancies. Initial projections of widespread use of EC included dramatic reductions in the need for abortion services [1]. Public health campaigns dedicated to allowing over-the-counter access to EC have rallied large numbers of grass-roots activists. Unfortunately, the return on this investment of time, energy and money has been disappointing. Multiple randomized clinical trials have been conducted in an effort to demonstrate that increasing access to emergency contraceptive pills (ECPs) can reduce rates of unintended pregnancy or abortion. Even a comprehensive review and meta-analysis of the available trials were unable to show any significant impact of increased access to EC on clinically relevant outcomes such as pregnancy or abortion [2,3].

Excellent evidence demonstrates that ECPs are effective. Combined data from two randomized trials that compared the levonorgestrel-only and levonorgestrel plus ethinyl estradiol regimens showed that the chance of pregnancy among women who received the levonorgestrel regimen was about half that among those who received the combined regimen (relative risk of pregnancy of 0.51, 95% confidence limits 0.31, 0.83) [4]. This estimate makes no assumption about the number of pregnancies that would have been observed in the absence of treatment and provides a minimum point estimate for the efficacy of the levonorgestrel regimen of EC of 49%. If the combined (Yuzpe) regimen is completely inefficacious, then the levonorgestrel regimen has an efficacy of 49%; for every additional 2 percentage points of efficacy of the combined regimen, 1 percentage point of efficacy is added to the levonorgestrel regimen.

Emergency contraception is more effective the sooner it is used [5], and a number of interventions demonstrated a reduction in the interval between unprotected intercourse and use of ECPs [3]; moreover, increased access in these trials resulted in increased use of ECPs, often substantially [2,3]. Why then have studies been unable to show that increased access to ECPs reduces rates of pregnancy in any significant way? That is the question we address here.

A consistent finding among all studies is that ECPs were not used every time women had unprotected intercourse. In the San Francisco trial of advance provision of ECPs, 45% of the women in the intervention group who had unprotected intercourse during the study period did not use any ECPs they had been provided [6]. And in the Nevada/North Carolina trial, 33% of women in the advance provision group admitted having unprotected intercourse at least once without using ECPs [7]. It would appear that many women participating in these trials have not considered all acts of unprotected sex to be contraceptive emergencies.

In fact, little is known about what women consider a contraceptive emergency, let alone a contraceptive situation worth addressing. Among women experiencing both mistimed and unwanted births in the 2002 National Survey of Family Growth, the most commonly reported reason offered for not using contraception was that the woman did not think she could get pregnant (personal communication, Jenny Higgins, May 27, 2008). Making an informed decision about what constitutes a contraceptive emergency is a complex undertaking that demands more than rudimentary sex education. Reasons women have given for not using EC at a time when they thought they might have needed it include not only a belief that they were not at risk of pregnancy but also factors as seemingly trivial as the minimal inconvenience of having their ECPs at home instead of with them [8]. It is also known that a significant number of women are ambivalent towards pregnancy [9], and that pregnancy ambivalence is strongly associated with reduced odds of contraceptive use [10]. We should not be surprised that women who are ambivalent towards pregnancy may not use EC the way women truly committed to avoiding pregnancy would.

Unfortunately, unintended pregnancy can result from a single unprotected act of intercourse. Even if women use ECPs on multiple occasions other than the one episode that will actually result in an unintended pregnancy, they will still become pregnant. This scenario introduces the concept of wasted use. We know that most use of ECPs is wasted in the sense that most times when women have intercourse even in the fertile window they will not become pregnant.
But this type of wasted use is not relevant here, because one has no way of knowing which of the particular acts of intercourse would have resulted, by chance, in pregnancy. Another type of wasted use is, however, very relevant: use at a time when no or virtually no risk of pregnancy exists, which may be more likely when ECPs are available free and in advance to keep at home, as they were in the intervention groups. This hypothesis offers one explanation for how studies of interventions to increase access to EC may have found more use of ECPs without seeing a decrease in rates of pregnancy.

Another explanation is that the interventions may have had little true effect on use of ECPs, but that a social-desirability bias led women in the intervention group to overestimate their use of ECPs when discussing their pregnancy and behavior with investigators. Electronic documentation of compliance with oral contraceptive pills has shown that women significantly overestimate their adherence to an oral contraceptive regimen [11].

The most concerning explanation for how studies may have found more use of ECPs without a decrease in rates of pregnancy is the hypothesis that increased access to ECP may have resulted in women having more sex without any other form of contraception. Substantial evidence exists to undermine the hypothesis that increased access to ECP increases sexual risk-taking behavior. In the three studies that examined the impact of easier access to ECP on rates of sexually transmitted infections, women in the intervention group had the same incidence of infection as did women in the control group; multiple trials have also reported that increased access to ECP did not adversely affect use of other forms of contraception. Substantial evidence exists to support the hypothesis that increased access to ECP may have resulted in women having more sex without any other form of contraception.

For how studies of interventions to increase access to EC and in advance to keep at home, as they were in the intervention group, may have been overreported by women in the intervention group; multiple trials have also reported that increased access to ECP did not adversely affect use of other contraceptives [3].

However, reanalysis of one of the trials suggests that easier access to ECPs may have increased the frequency of the highest risk coital act: one with the potential to lead to pregnancy [12]. Because this suggestion was so unexpected to many, we focus in more detail on that finding. By potential is meant that the act either did result in pregnancy or would have resulted in pregnancy had ECPs not been used. To facilitate understanding, we have provided an illustrative numerical example in Table 1. First, the number of cycles with coital acts that resulted in pregnancy was the same in the increased access intervention group and the control group (Row 1). Second, of the women who became pregnant, significantly more reported use of ECPs in the fertile window of that cycle (implying an EC failure occurred) in the intervention group than in the control group (Row 2). If levonorgestrel ECPs are, say, 50% effective, then for every potential pregnancy that became an actual pregnancy because of ECP failure, another potential pregnancy must have occurred that one does not see because it was averted by ECP use (Row 3). Therefore, assuming that women are accurately reporting their use of ECPs, significantly more cycles occurred in which ECPs were used with the potential for pregnancy in the intervention group than in the control group (Row 4). That difference is great enough that significantly more cycles occurred overall with the potential for pregnancy in the experimental group than in the control group (Row 5). In the real world, we suspect that the extent of this form of increased risk taking would be much less than when ECPs were both readily available and free as they were to women in this intervention.

Most likely, the discrepancy between the findings of more ECP use in the intervention group than in the control group, but no lower pregnancy rate in the intervention group, is due to a combination of four relevant factors rather than any single factor alone: (1) the effectiveness of levonorgestrel ECPs is probably fairly low, less than the figure cited in the product labeling in the United States (89%) [5]; (2) ECP use may have been overreported by women in the intervention group; (3) ECPs may have been used at times that never carried a real risk of pregnancy, especially in the intervention group where ECPs were free and readily at hand; and (4) easier access to ECPs may have led some women to substitute ECPs for more reliable contraceptive methods, with a resultant increased potential for pregnancy. Another possibility is that increased use in the intervention group would have resulted in a significant modest decrease in pregnancies if the sample size had been sufficiently large; the negative result may have occurred because the study was underpowered to detect a modest decrease.

Where do we go from here?

Perhaps more efficacious forms of EC can be found. A second-generation progesterone receptor modulator, CDB-2914, has been studied for use as EC and has been shown to be highly effective and well tolerated; it may be more efficacious than levonorgestrel when taken 73–120 h after unprotected sex [13]. A pilot study of 41 women
found that adding a Cox-2 inhibitor (meloxicam 15 mg) to 1.5 mg levonorgestrel significantly increased the proportion of cycles with no follicular rupture or ovulatory dysfunction (88% vs. 66%, p=.012). Adding a Cox-2 inhibitor can disturb the ovulatory process after the onset of the LH surge [14].

Another step is better communication. When messages about EC have strived to distinguish EC from RU-486 and abortion, by stressing that EC was just like all other forms of contraception, that some women would find ECPs their most convenient contraceptive option is perhaps not that surprising. When messages about ECP effectiveness contain only one statistic (89%), how can women understand that ECPs will not work when taken too close to ovulation? [14]. When the family planning community has put little emphasis on the fact that typical use failure rates of available contraceptives differ by orders of magnitude, it is understandable that women may develop the sense that all methods are equally effective [15,16]. In the hopes of helping women and clinicians discuss the gradations of contraceptive efficacy, the WHO has developed a counseling tool to facilitate communication about different tiers of efficacy (Fig. 1) [17,18]. Recent qualitative research on long-acting reversible contraception (LARC: intrauterine contraception or the contraceptive implant) suggests that (1) women tend to choose those contraceptives (oral contraceptives or condoms) with which they are familiar, (2) women have little knowledge about individual LARC methods and are heavily influenced by negative second-hand stories from friends and the media, and (3) giving simple, clear and empowering information about ease of use, reversibility, lack of effect on weight gain, and the positive experiences of other women as well as describing these methods as lasting rather than long-acting (which implied negative effects on return to fertility) may help improve acceptability [19]. If we devote the same energy we have devoted to increasing access to EC to making it easier for women to use highly effective LARC, we may succeed in developing a highly effective long-term solution to the ongoing challenge of unintended pregnancy.

Ambivalence about pregnancy, either because having a child now is not really the right time or because the current partner is not really the ideal father of a child, might seem to pose an insurmountable barrier to use of effective contraception, especially LARC. Perhaps ambivalent women would respond well to a discussion giving the message: “You are not sure whether you want to have a child at this time. To ensure that you do not get pregnant until you really want to get pregnant, a highly effective method that does not require you to do anything to maintain contraceptive effectiveness could be ideal for you. When you want to get pregnant, all you have to do is stop using it: return to fertility is immediate.”

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Fig. 1. Comparing typical effectiveness of contraceptive methods.
In conclusion, even if more efficacious ECPs are developed, it seems unlikely that EC will have a major impact on rates of unintended pregnancy, as long as unprotected intercourse remains as prevalent as it currently is. Efforts to reduce rates of unintended pregnancy will be most effective if they focus on (1) increasing use of highly effective LARC that does not require ongoing attention to adherence (intrauterine contraception and implants) and (2) encouraging those who choose condoms as their contraceptive, because they also protect against sexually transmitted infections, to use a more effective contraceptive simultaneously [20,21]. To be successful, such efforts will require new communication and counseling strategies and messages.

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