Mini-Review

Advance Provision of Emergency Contraception among Adolescent and Young Adult Women: A Systematic Review of Literature

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A B S T R A C T

Objective: The purpose of this review is to summarize the findings of randomized controlled trials assessing the advance provision of emergency contraception (EC) to women 24 years of age or younger.

Design: We conducted a comprehensive search of the PubMed database from 1950 to November 11, 2009. This review includes seven studies that randomly assigned women aged 24 and younger to advance provision of EC or a control group.

Results: All studies reviewed found that women assigned to advance provision were more likely to use EC, though not all reached statistical significance. Furthermore, studies assessing time to EC use (N = 4) found that those with advance provision used EC sooner following intercourse. Most studies found that women assigned to advance provision of EC did not engage in more sexual risk taking behaviors (assessed by reported number of sexual partners, number of episodes of unprotected intercourse, and acquisition of sexually transmitted infections) or switch to less reliable contraceptive methods. Despite increased use and decreased time to use, women who were provided EC in advance did not report significantly lower pregnancy rates.

Conclusions: The existing literature suggests that among women 24 years of age or younger, advance provision has a positive impact on use and time to use of EC. Most findings indicate that increased use of EC does not have significant negative effects for ongoing contraceptive use or sexual risk taking behaviors. Despite increased use, advanced provision of EC has not been associated with a significant corresponding decrease in pregnancy.

Key Words: Adolescents, Contraceptive, Postcoital contraception, Emergency contraception, Pregnancy, Sexually transmitted infection, Advance provision

Introduction

The birth rate for women 15 to 17 and 18 to 19 years of age decreased 45% and 26%, respectively between 1991 and 2005.[1] Unfortunately, this trend has reversed with a 3% increase between 2005 and 2006 for adolescents 15 to 19 years of age. This trend was also observed among 20 to 24-year-olds with a 1% increase between 2004 and 2005, and a 4% increase between 2005 and 2006. Not surprisingly, a large portion of these births were unintended, corresponding to a higher number of abortions.[2,3] Since 1973, the number of abortions per live births has been highest for those $<$15 years of age.[3] Women 15 to 19 years of age have had the second highest ratio since the early 1980s, although the ratio for women $\geq$40 years of age did exceed that of this age group briefly in the early 1990s. The ratio for women 20 to 34 years of age is generally lower than the ratio for those $\geq$40 years of age, but has been higher than that of women 35 to 39 years of age since the late 1990s. Furthermore, women 20 to 24 years of age account for 33% of all legal abortions. The risk of unintended pregnancy among young women is demonstrated by the fact that 26% of women 15 to 19 years of age did not use any contraceptive method the first time they had sex.[4] Further, among women 24 years and younger who were obtaining abortions, less than half reported contraceptive use in the month prior to conception.[5]

While combination oral contraceptive pills and condoms are the most common methods used among women $\leq$24 years of age,[6] intrauterine devices, implantable contraceptive methods, hormonal injectables, the patch, and the contraceptive ring are other contraceptive options young women may consider to prevent unplanned pregnancy. Emergency contraception (EC) may still be warranted for individuals who choose hormonal methods in the event that an injection is not received in a timely manner or if the patch or ring is not applied/inserted on time. EC pills undoubtedly have the most potential for women who choose to use time-sensitive hormonal birth control methods and those who choose to use less reliable, coitally timed methods including barrier methods, spermicides, withdrawal, fertility awareness, or no method at all.

Plan B™, the most commonly used EC pill available in the United States, consists of two tablets, each containing 0.75mg of levonorgestrel; it is estimated to prevent 85% of pregnancies when started within 72 hours of unprotected sexual intercourse. As time passes following unprotected intercourse, the effectiveness of this method diminishes.[7] While the FDA has approved over-the-counter access to Plan B™ for women ages 17 years of age and older, state regulations vary. Some states have passed regulations to

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further restrict EC availability, while others provide less restricted access compared to the federal regulations.[8] Access restrictions impacting adolescent and young adult women may hinder EC effectiveness considering the importance of timely use after unprotected intercourse. One alternative for adolescent women is to provide EC prior to unprotected intercourse, which may overcome some potential access barriers.

We systematically review studies designed to determine the effect of advance provision of EC prior to unprotected intercourse on its rate of and time to use following unprotected intercourse. Changes in sexual risk taking behaviors will be reviewed to determine whether or not advance provision is associated with more frequent reporting of these behaviors. Pregnancy rates will also be assessed given that the ultimate goal of EC use is pregnancy prevention.

Methods

This review includes original, peer-reviewed journal articles that evaluated the impact of advance provision on the use of EC among women ≤24 years of age. Advance provision refers to providing EC before, rather than after, unprotected intercourse. Randomized trials assessing the use of EC among women assigned to advance provision versus a control group were included in this review. Publications were excluded if they did not address the specific intervention mentioned, did not provide stratified results comparing the interventions among women ≤24 years of age, or did not present original research findings.

The original intention of this review was to focus solely on adolescents who often do not have other means to promptly obtain EC, such as pharmacy access. However, all articles on this topic include women 17 years of age and older, so studies of adolescent and young adult women ≤24 years of age were included because this age range constitutes those at highest risk for unplanned pregnancy.

Articles were obtained by searching the PubMed database from 1950 to November 11, 2009. The following search strategy was used: (emergency contracep* OR emergency contraception OR "contraceptives, postcoital" [MESH] OR "contraception, postcoital" [MESH] OR "contraceptives, postcoital" [Pharmacological Action]) AND (advance OR provision). This search was further limited to Humans, English Language, and Randomized Controlled Trials, resulting in 19 articles. After evaluating abstracts and texts to determine which articles assessed the impact of advance provision on use of EC among women ≤24 years of age, six articles remained. The reference lists of the six remaining articles were searched, which yielded one additional article.

Results

Studies assessing the advance provision of EC among adolescent and young adult women are characterized in Table 1 with findings and limitations addressed in Table 2. Several studies have been conducted comparing educational information about EC plus advance provision of EC to information alone.[9–11] The primary aim of a randomized clinical trial conducted by Gold and colleagues was to assess whether providing EC in advance corresponded with an increase in risk-taking behavior among 301 sexually active women 15 to 20 years of age recruited form a hospital-based adolescent health clinic.[9] The young women were randomized to either advance provision or the control group stratified by age (15–16 years, 17–18 years, and 19–20 years). Both groups received information about EC, but women in the intervention group additionally received one package of EC and were told they could obtain up to two more packages during the study period. A high loss to follow-up was observed with 80% of the enrollees available at one month and 64% available at the 6-month follow-up. In addition, a significantly higher proportion of participants from the control group were available for follow-up ($P = 0.02$), but those lost to follow-up did not differ compared to those who completed the study in regard to age, ethnicity, or age at first intercourse. The women in this study had a mean age of 17.1 years, were predominantly African American, and nearly half used public health insurance.

A borderline significant difference in reported EC use was seen between the two groups at the 1-month follow-up (15% intervention vs 8% control, $P = 0.05$) and a nonsignificant difference was observed at the 6-month follow-up (8% vs 6%, $P = 0.54$). This relationship was unchanged after controlling for patterns of contraceptive use, sexual history, or awareness of and expected need for EC. Importantly, young women in the intervention group reported using EC significantly sooner following unprotected intercourse than women in the control group (11.4 hours vs 21.8 hours, respectively; $P = 0.005$). At the 1-month follow-up interview, there were no significant differences between the intervention and control groups with regard to unprotected intercourse, condom use, or any hormonal contraceptive use either at last intercourse or in the past month. Similar results were noted at the 6-month follow-up with the exception of a higher proportion of the intervention group reporting the use of condoms in the past month compared to the control group (77% vs 62%, respectively; $P = 0.02$). This study was not powered to assess sexually transmitted infections (STIs) or pregnancy rates.

During the course of this study, the standard emergency contraceptive administered to women changed, so participants returning to the clinic received Plan B™ instead of the Yuzpe regimen that had been administered in the beginning of the study. This may have important consequences for assessing repeat use and pregnancy rates because the Yuzpe regimen has been found to have more side effects and to be less effective in preventing pregnancy compared to Plan B™.[12]

Belzer and colleagues conducted a randomized clinical trial of 160 parenting female adolescents recruited from a non-medical case management office or at events sponsored by case management programs for adolescent parents.[10] Participants randomly assigned to the advance provision group received one package of EC and were instructed to call the research assistant to obtain additional packages. The participants were mostly Hispanic (83%), had completed 8 years of education or less (84%), were not

Table 1
Characteristics of Studies Assessing Advance Provision and Use of Emergency Contraception among Young Women

Citation	Outcomes	Participants	Study Groups	Assessment	Follow-up
Gold et al, 2004[9]	▪ EC use ▪ Time to EC use ▪ Sexual behavior ▪ Contraceptive behaviors ▪ Pregnancy	301 females aged 15–20 years	▪ Information only ▪ Information and advance EC	▪ Self-report ▪ Telephone interviews	Monthly for 6 months
Belzer et al, 2005[10]	▪ EC use ▪ Sexual behavior ▪ Contraceptive behavior ▪ Pregnancy	160 parenting females aged 13–20 years	▪ Information only ▪ Information and advance EC	▪ Self-report ▪ Telephone interviews	6 and 12 months
Raymond et al, 2006[11]	▪ EC use ▪ Sexually transmitted infections ▪ Sexual behavior ▪ Contraceptive behavior ▪ Pregnancy	1,490 females aged 14–24 years	▪ Information only ▪ Information and advance EC	▪ Self-report ▪ Interview ▪ Computerized questionnaire ▪ Clinic/home visit/telephone interview Biological samples ▪ Urine specimen to test for pregnancy ▪ Self-collected vaginal specimens for Chlamydia, gonorrhea, and trichomonas testing ▪ Medical charts	6 months
Raine et al, 2005[13]	▪ EC use ▪ Sexual behavior ▪ Contraceptive behavior ▪ Pregnancy	1,950 females aged 15–24 years	▪ Clinic access ▪ Advance provision ▪ Pharmacy access	▪ Self-report ▪ Interviewer-administered questionnaire ▪ Clinic/home visit/telephone interview Biological samples ▪ Urine specimen to test for pregnancy and Chlamydia ▪ Finger stick to test for antibodies to Herpes Simplex Virus type 2 (HSV-2) ▪ Medical charts	6 months
Rocca et al, 2007[14]	▪ Acceptability ▪ Time to EC use	1,950 females aged 15-24 years	▪ Clinic access ▪ Advance provision ▪ Pharmacy access	▪ Self-report ▪ Interviewer-administered questionnaire	6 months
Harper et al, 2005[15]	▪ EC use ▪ Sexual behavior ▪ Pregnancy	964 adolescent females aged 15–19 years compared to 1,153 young adult females age 20–24 years	▪ Clinic access ▪ Advance provision ▪ Pharmacy access	▪ Self-report ▪ Interviewer-administered questionnaire	6 months
Ekstrand et al, 2008[16]	▪ EC use ▪ Time to EC use ▪ Sexual behavior ▪ Contraceptive behavior ▪ Pregnancy	420 adolescent females aged 15–19 years requesting EC	▪ EC at first visit ▪ EC at first visit, extra package of EC, 10 condoms, extra information on EC and condoms	▪ Self-report ▪ Telephone interviews	3 and 6 months

Abbreviation: *EC*, emergency contraception.

Table 2
Major Findings and Limitations of Studies Assessing Advance Provision and Use of Emergency Contraception among Young Women

Citation	EC Use	Study Limitations
Gold et al, 2004[9]	▪ At 6 month follow-up: Intervention (8%) vs control (6%) ▪ OR: 1.9 (95% CI: 0.87-4.1) adjusting for contraceptive use and sexual history ▪ Time to Use: Intervention (11.4 hours) vs control (21.8 hours)*	▪ High attrition (64% available at 6 month follow-up) with significantly more control group participants available for 6 month follow-up ▪ Excluded individuals living in foster care, which limits generalizability** ▪ Most women were African American and on public insurance, which could also limit generalizability ▪ Only provide data for 1 and 6 month follow-up ▪ Switched from Yuzpe method to Plan B after study initiation ▪ Interviewers were blinded to participant group
Belzer et al, 2005[10]	▪ 6 month follow-up: Intervention (83%) vs control (11%)* ▪ 12 month follow-up (assessing previous 6 months): Intervention (64%) vs control (17%)*	▪ Small sample size ▪ High attrition with 52% of the advance group and 62% of the control group available at the 12 month follow-up ▪ Did not quantify unprotected sex (Categorical responses coded as Yes/No) ▪ High-risk, predominantly Latina population (adolescent mothers with high rates of unprotected sexual activity) limiting generalizability
Raymond et al, 2006[11]	▪ 1 time use of EC: Increased access (20%) vs standard access (21%) ▪ Median number of EC uses: Increased access (2) vs standard access (0)* ▪ Time to Use: Increased access (12 hours) vs standard access (36 hours)*	▪ Mailed EC if provider with prescribing authority was not available ▪ Women in the standard access group had to pay for EC 80% of the time ▪ Some participants performed the pregnancy test themselves and reported the results over the phone which may have led to bias ▪ No information on women lost to follow-up ▪ Women were recruited from health clinics limiting generalizability to those who seek care
Raine et al, 2005[13]	▪ Pharmacy (24.2%) vs clinic (21.0%) ▪ Advance provision (37.4%) vs clinic (21%)*	▪ Did not assess advance provision vs pharmacy access ▪ Groups were altered partway through the study due to pharmacy access policy changes ▪ Depending on the site, some women had to pay for EC ▪ Only had enough power to detect a 50% difference in pregnancy rates ▪ Report cross-over among the groups ▪ Study staff were blinded to participant group ▪ Population included young, low income, mostly uninsured women recruited from urban health clinics limiting generalizability
Rocca CH et al, 2007[14]	▪ Advance provision (37.4%) vs pharmacy (24.2%) or clinic (21.0%)* ▪ Time to Use: OR: 2.43 (95% CI: 1.24-4.80)	▪ Groups were altered partway through the study due to pharmacy access policy changes ▪ Depending on the site, some women had to pay for EC ▪ Cross-over among the groups ▪ Population included young, low income, mostly uninsured women recruited from urban health clinics limiting generalizability
Harper et al, 2005[15]	▪ Pharmacy (29.8) vs clinic (28.9) OR: 1.21 (95% CI: 0.88-1.67) ▪ Advance provision (44.3%) vs clinic (28.9%) OR: 2.25 (95% CI: 1.64-3.08)*	▪ Groups were altered partway through the study due to pharmacy access policy changes ▪ Depending on the site, some women had to pay for EC ▪ Small number of adolescents <16 years of age (n=90) ▪ Population included young, low income, mostly uninsured women recruited from urban health clinics limiting generalizability
Ekstrand et al, 2008[16]	▪ 3 month follow-up: Intervention (24%) vs control (13%)* ▪ 6 month follow-up: Intervention (31%) vs control (19%)* ▪ Time to EC use at 3 month follow-up: Intervention (13.6 hours) vs control (25.5 hours)* ▪ Time to EC use at 6 month follow-up: Intervention (15.6 hours) vs control (26.4 hours)*	▪ Low percentage with complete follow-up (62.6%) ▪ All participants received EC at enrollment, so the comparability to other studies is limited ▪ Intervention group received condoms which may have impacted condom use and unprotected sex ▪ Women who declined participation were more likely to have a non-Nordic background ▪ Those who were unavailable for follow-up were also more likely to be non-Nordic and to smoke cigarettes ▪ Women enrolled were primarily Nordic and seeking emergency contraception, so generalizability is limited to a similar population

* Significant Finding
** Institutional Review Board required the exclusion of this population

living with a partner (61%), and had one child (79%). Approximately 60% of the young mothers in the study reported unprotected sexual activity in the past 6 months, which was defined as using no hormonal or barrier contraceptive. High loss to follow-up with only 52% of the advance group and 62% of the control group available for 12-month follow-up may have biased the results.

At baseline, the control group was more likely to report being sexually active within the past 6 months (88% vs 77%, $P = 0.05$), using condoms (49% vs 38%, $P = 0.035$), and taking oral contraceptives (26% vs 19%, *P*-value not reported). In contrast, the advance provision group was more likely to report using no contraceptive method at all (26% vs 9%, respectively, *P*-value not reported). Although no *P*-values were provided for differences in some of the individual contraceptive methods, the authors report no overall significant difference in type of contraceptive methods between the advance provision group and control

group ($P = 0.0654$). Analyses controlling for baseline differences were not conducted, which may have biased the study findings. At the 6-month follow-up, young women in the advance provision group were more likely to report using EC than those in the control group (82% vs 11%, respectively; $P < 0.001$) with no differences in frequency of use, family planning visits, or desire for pregnancy between the two groups. The control group was more likely to report a pregnancy at the 6-month follow-up than the advance provision group, but this difference was not significant (18% vs 7%, respectively; $P = 0.0681$). When assessing the previous 6 months at the 12-month follow-up, the intervention group was still more likely to report EC use compared to the control group ($P < 0.01$) but with no significant difference in reported pregnancies (Control: 6% vs Intervention: 14%, $P = 0.2191$).

At the 6-month follow-up there were no significant differences in reported rate of sexual activity within the past 6 months, unprotected sex, or the type of contraceptive used. At the 12-month follow-up, those in the advance provision group were more likely to report having unprotected sex in the past 6 months ($P = 0.02$), but there were no significant differences in the rate of sexual activity or type of contraceptive used.

Raymond and colleagues assessed maximizing access to EC its impact on rates of pregnancy and STIs among 1,490 sexually active women between 14 and 24 years of age recruited from clinics in North Carolina and Nevada.[11] Women were randomized to standard access or increased access with the latter group receiving two packages of EC in advance with the option to obtain more upon request or at the 6-month follow-up visit. Unlike similar studies, women were advised to take both levonorgestrel tablets together. A large percentage of women were available for follow-up 12 months after enrollment (94% standard access group, 95% increased access group). The high-risk nature of this population is demonstrated by several baseline participant characteristics including: 39% had more than one sexual partner in the previous 6 months, more than 25% were in a sexual relationship less than 1 month in duration, and 30% reporting having partners that were definitely or probably not monogamous. Despite these characteristics, only 6% of the population reported having had an STI in the past year with approximately the same percentage testing positive at baseline. This study was strengthened by the use of biological samples to assess STI and pregnancy status. In addition, ultrasound was used to date pregnancies more accurately, and women determined to be pregnant prior to enrollment were excluded.

Similar percentages of young women reported using EC one time in both groups (20% with increased access vs 21% in the standard access group); however, the median number of EC uses per participant was higher in the increased access group compared to the standard access group (2 and 0, respectively; $P < 0.01$). In addition, the increased access group reported a significantly lower median delay to use after unprotected intercourse ($P < 0.001$). However, the incidence of pregnancy was similar between the two groups (hazard ratio: 0.95, 95% CI: 0.68–1.33). No differences in STI rates, sexual activity, or use of contraceptives were reported by study group. An important limitation was that those in the standard access group reported having to pay for approximately 80% of EC pills used. This presents validity concerns because differences observed may have been due to willingness and ability to pay for EC.

Several studies used data originally collected by Raine and colleagues to assess women assigned to pharmacy access, clinic access, or advance provision and found that advance provision was associated with increased use, decreased delay to use, and response to the intervention did not differ between adolescents (age 15–19 years) and young adults (age 20–24 years).[13-15] Women 15 to 24 years of age who had engaged in sexual intercourse during the past 6 months were recruited from four clinics providing family planning services in the San Francisco and Daly, California areas and randomized to one of three study groups: pharmacy access, advance provision, or clinic access (control group).[13] All women were given educational materials and identical looking boxes, which they were instructed not to open until after leaving the clinic to ensure blinding of the staff. The clinic access group was told to return to the clinic if EC was needed, the pharmacy access group was given a list of local pharmacies where they could obtain EC free of charge, and the advance provision group was given three packages of EC to take home. During the course of the study, California legislation made it possible for women to obtain EC from a pharmacy without a physician consultation. In order to adapt to this change, randomization of women to the clinic access group was discontinued and women recruited after this point were randomized to either pharmacy access or advance provision. Analyses were performed among women enrolled before the legislative change to determine what impact this may have had on the study conclusions. These subsample analyses indicated that the findings were the same among women enrolled before the change compared with the overall study findings. Differences in race/ethnicity and clinic site were found by treatment group, so all analyses controlled for these variables. Ninety-two percent of randomized women were available for follow-up.

Approximately half of the 1,920 participants were adolescents (age 15–19 years), and the participants were considered moderately high risk because 27% had had an abortion and 11% tested positive for Chlamydia or Herpes Simplex Virus-2 at baseline. The pharmacy access group was no more likely to report using EC than the clinic access group; however, the women in the advance provision group were significantly more likely than those in the clinic access group to use EC $\geq$1 time ($P < 0.001$) and $\geq$2 times ($P < 0.001$). The authors suggest that perhaps no difference was seen between the pharmacy and clinic access groups due to higher reported use in the clinic access group compared to similar studies. No significant differences were reported between advance provision versus clinic access or pharmacy versus clinic access in regard to reported frequency of intercourse, frequency of unprotected intercourse, number of partners, oral contraceptive use, consistent condom use, frequency of condom use, or STI acquisition. Although advance provision appeared to increase EC use in this population, the percentage of young women who reported a pregnancy in the advance provision group was not

significantly different than the clinic access group (advance provision: 8%, clinic: 8.7%, adjusted OR: 1.10, 95% CI: 0.66–1.84, $P = 0.71$). These analyses were adjusted for clinic site, age, race, previous pregnancy, desire for pregnancy, frequency of unprotected intercourse, and type of contraceptive method used at baseline. Unfortunately, insufficient power due to unequal group sizes resulted in the ability to detect only a 50% difference in pregnancy rates.

Rocca and colleagues assessed time to EC use in this population finding that women in the advance provision group were significantly more likely to use EC within 24 hours compared to women in the clinic access group (OR: 2.43, 95% CI: 1.24–4.80).[14] No significant difference was observed between those in the pharmacy access group compared to the women in the clinic access group (OR: 1.65, 95% CI: 2.35–7.76).

Harper and colleagues also used this study population to conduct analyses comparing the adolescents in the study (ages 15–19 years) to the young adults (ages 20–24 years).[15] Data were available for 964 adolescent and 1,153 young adult women with diverse racial and ethnic backgrounds. The women were at high risk in that 24% had previously experienced a pregnancy and 52% reported having unprotected sex in the past 6 months. Approximately 20% of the women had used EC in the 6 months preceding enrollment. The attrition rate for this study was low with 93% of adolescents completing the study.

Assessment of EC use showed that adolescent women were more likely to use EC compared to women aged 20–24 years, but this finding did not vary significantly by study group. Most adolescents (93%) reported correct use of EC, which was assessed by asking whether or not they took the second pill. Overall, a high percentage of the youngest participants (<16 years of age) reported correct use compared to adults (97% vs 94%, respectively). When comparing advance provision to clinic access among adolescents, there were no significant differences in reported episodes of unprotected intercourse ($P = 0.773$), number of sexual partners ($P = 0.578$), STI acquisition ($P = 0.702$), or contraceptive method used ($P = 0.181$). In addition, there was no significant difference in reported pregnancies by study arm among adolescents 15 to 19 years of age (pharmacy: 7.8%, advance: 12.4%, clinic: 9.9%; advance provision compared with clinic access: $P = 0.416$).

This study addressed the impact of advance provision among very young female adolescents specifically, which importantly considers the access barriers that this particular group faces.[15] However, while there were a fairly large number of participants in the 16–17 year age group (N=393), there were only 90 participants in the <16 year age group, thus limiting the ability to draw meaningful conclusions about the youngest adolescents. This study reported a power of 86% to detect the difference observed (51.7%). As with the study by Raine and colleagues mentioned above, this study was limited in that inadequate power may have prevented detection of smaller differences in pregnancy rates that are still significant to public health.

The group of studies reviewed above that assessed the same study population have similar general limitations that must be noted for accurate interpretation of their respective results. The discontinued randomization of women to the clinic access group due to new legislation resulted in lower power than anticipated and inability to assess less than 50% differences in reported pregnancies as an outcome. Further, women in the advance provision and pharmacy access groups were given EC free of charge, whereas some individuals in the clinic access group incurred a cost for EC. This situation is not consistent with reality and as with the study by Raymond and colleagues reviewed above, may reflect differences in ability and willingness to pay rather than advance provision status. Another very important limitation is the documented cross-over between study groups in that only 67% of women who used EC in the parent study reported obtaining it in accordance with their group assignment.[13] This result contrasts findings reported by Raymond and colleagues who also assessed where women obtained EC but found that only 1% reported obtaining it outside of the study.[11]

Ekstrand and colleagues conducted a study among 15–19-year-old females who were requesting EC at a local youth clinic in Sweden.[16] All participants were given EC and scheduled for contraceptive counseling and a pregnancy test 3 weeks after enrollment. Individuals in the intervention group additionally received an extra dose of EC, 10 condoms, and educational information on EC. Telephone interviews were conducted at 3 and 6 months following enrollment with 78% of young women available for one of the study visits and 62.6% available for both visits.

Adolescents in the advance access group were more likely to report EC use than the control group at both follow-up times (3-month, $P = 0.02$; 6-month, $P = 0.01$). The advance access group also reported using EC more promptly following unprotected intercourse compared to the control group at each follow-up (3-month, $P = 0.007$; 6-month, $P = 0.006$). The control group reported more partner change than the intervention group ($P = 0.03$) and had a higher mean number of partners ($P = 0.014$) at the 3-month follow-up; however, these differences were not observed at the 6-month follow-up. There were no significant differences between the groups in regard to sexual intercourse without contraception, condom use at last intercourse, oral contraceptive use at last intercourse, or condom use at first intercourse with a new partner. Although there were baseline and follow-up differences with respect to Nordic background, the analyses in this study did not appear to control for any potential confounding factors.

In this study, all young women were seeking EC upon enrollment limiting the generalizability of these findings. Further, young women in the intervention group of this study were provided with 10 condoms, which may have impacted the findings for contraceptive use and unprotected sex.

Discussion

The findings of these studies suggest that advance provision increases use of EC and improves promptness of EC use following unprotected intercourse. Most studies found no negative effects in ongoing contraceptive use or risky sexual behaviors. However, Belzer and colleagues found that women in the advance provision group

were more likely to report having unprotected sex at the 12-month follow-up.[10] Although EC use appeared to increase with advance provision, a corresponding decrease in pregnancy was not seen. Several other studies including women >24 years of age have found results similar to those reviewed in this paper.[17–21] A meta-analysis of randomized trials including women both under and over 24 years of age also found advance provision to have a positive effect on EC use (OR: 2.52, 95% CI: 1.72–3.70) with no corresponding decrease in pregnancy (odds ratios ranging from 0.49–1.0 depending on length of follow-up, none significant).[17] In addition, the meta-analysis and several other studies reported that advance provision of EC has no impact on frequency of unprotected intercourse[17–20] or contraceptive-associated behaviors.[17,19–21] A nonrandomized study among 16–24-year-olds also found that advance provision led to increased use but also found that the treatment group was less likely to report consistent pill use at follow-up ($P = 0.03$).[22]

The studies reviewed here were strengthened by the use of randomization and the exclusion of appropriate groups, such as women who desired a pregnancy or those using long-acting contraceptive methods including intrauterine methods or implants. Two studies incorporated age into the randomization or analysis stage.[9,15] Harper and colleagues provided valuable insight that could influence legislation by specifically assessing whether or not the intervention varied by age. While some of the studies suffered from high attrition rates, others maintained high retention rates throughout.[11,13–15]

Important limitations of the studies assessing the impact of advance provision on use of EC must be noted (Table 2). All studies of this nature rely on self-report and interview methods to obtain data.[9–11,15,16] While all of the studies in this review assessed advance provision of EC, the protocols for providing the regimen varied. Some protocols provided a fixed number of packages,[13–16] others allowed acquisition of additional packages upon request,[9,10] and one study actively attempted to maintain two packages at home per participant.[11] These differences make it challenging to compare the results of the studies because the various protocols could have impacted the results observed. Gold and colleagues suggest that a lack of difference in EC use at the 6-month follow-up may be explained by the fact that those in the advance provision group were required to visit the clinic to obtain additional EC, thus making this group more like the clinic access group.[9] The effort by Raymond and colleagues to maintain a supply of EC for each participant demonstrated larger differences in EC use between groups compared to prior literature.[11] However, these methods are likely to be unrealistic compared to how advance provision would be provided in a clinical setting, limiting the practical application of these results.

Some of the studies reviewed here were limited both by a small sample size and by high attrition.[9,10] Due to small sample sizes, even those studies assessing pregnancy may not have had the power to detect small but relevant differences. Of the six studies reviewed here that reported information on pregnancy, two did not provide statistical assessments due to low power,[9,16] two only had the power to assess a 50% difference in pregnancy rates,[13,15] and one had a low sample size and high attrition leading to potentially invalid results.[10]

All participants were recruited from clinics, with many of them being very high risk for unintended pregnancy, so results would be limited to a similar population. In one study, all young women were seeking EC upon enrollment, so these results have additional generalizability limitations.[16]

The results of these studies demonstrate that the advance provision of EC is related to an increase in use. However, pregnancy as an outcome is more important than the use of EC because the ultimate goal is pregnancy prevention. Gold and colleagues found that women with a previous pregnancy were more likely to use EC, whereas Raine and colleagues found that those with a previous pregnancy were more likely to report a pregnancy during the study. These findings may suggest that women who have experienced a prior pregnancy may engage in riskier behaviors, putting them at greater risk for another pregnancy and thus requiring EC use more frequently. Therefore, those with a previous pregnancy are likely to be a high-risk group that may benefit from further intervention.

While the results of these studies seem to indicate no difference in pregnancy rates with advance provision of EC, these results may be unreliable due to small sample sizes and high attrition. Only one study in this review that found no difference in pregnancy rates had a large sample size and low attrition.[11] The authors of this study suggest that perhaps emergency contraceptive pills are not efficacious enough to contribute to a decline in pregnancy rates because they are not used after every act of unprotected intercourse. This statement is supported by the findings of this study and two others showing that a large proportion of the women who reported having unprotected intercourse did not use EC.[11,13,16] Weaver and colleagues further explored the lack of corresponding decrease in pregnancy with advance provision and found a significant interaction between aversion to pregnancy and group assignment. In addition, women in the advance provision group were more likely to use emergency contraception because they did not want to use condoms or other contraceptive methods.[23]

In an effort to examine why a corresponding decrease in pregnancy has not been seen with increase EC use, Baecher and colleagues[24] assessed differences in low versus high-risk women in regard to advance provision. They found that repeated use of EC was more common among women at low risk for unintended pregnancy at baseline. Although advance provision was related to increased EC use, there was not a corresponding decrease in the probability of pregnancy among low-risk women. The authors suggest that perhaps low-risk women took EC as a preventive measure in addition to concurrent use of other contraceptives, which is why it did not result in decreased in pregnancy risk. They also suggest that high risk women are less likely to take EC even when it is readily available.[24] Additional exploration of these hypotheses in other populations could provide valuable insight into why pregnancy decreases have not been observed following increased EC

use. Further study of this topic is warranted to assess the many potential reasons that increased EC use has not appeared to correspond to decreases in pregnancy.

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