Abortion care for adolescent and young women

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1. Introduction

WHO defines adolescents as individuals aged between 10 and 19 years, and young women as those aged between 20 and 24 years. Unintended pregnancy among adolescents is a common global public health problem. Early marriage, coercive sex, and lack of access to and use of contraception contribute to early pregnancy among adolescents.

Adolescents face challenges in accessing sexual and reproductive health information and healthcare services, which increases their risk of unintended pregnancy. Each year, nearly 22 million women have an unsafe abortion. Younger women are more likely to present in the second trimester compared with older women [1]; this decreases access to effective first-trimester medical abortion and has been identified as the most important risk factor for abortion-related complications and mortality [1]. Adolescents often present with severe complications of unsafe abortion because they delay care, seek care from unskilled providers, and do not access services when complications arise [2].

Medical abortion is an effective and safe procedure [2]. When using mifepristone and misoprostol in the first trimester, failure of medical abortion—defined as the need for aspiration owing to complications or ongoing pregnancy—occurs in 4.8% of cases and hospitalization in 0.3% [3]. The effectiveness and safety of first-trimester vacuum aspiration and second-trimester dilation and evacuation (D&E) have been well established [1]. The risk of a minor complication in the first trimester is 8.46 per 1000 vacuum aspirations, and the mortality risk is 0.7 per 100 000 legal abortions [1]. Although complication rates increase in the second trimester, abortion remains safer than childbirth at all gestational ages.

Many studies have included adolescents, but have not focused on them. Accordingly, recommendations regarding abortion services for adolescents are sparse and vague in most guidelines. Because adolescents might benefit from tailored care, the aim of the present systematic review of randomized controlled trials (RCTs) and clinical studies was to investigate abortion care among adolescent and young people, focusing on effectiveness, safety (including long-term complications) and acceptability, post-abortion contraception, and cost.

2. Materials and methods

The data review was prepared in accordance with PRISMA (preferred reporting items for systematic reviews and meta-analyses guidelines) [4] and included the following review protocol.
2.1. Criteria for considering studies for review

In selecting studies for review, the criteria that were considered included participants, interventions, comparisons, outcomes, and study design as outlined below.

2.1.1. Types of study

It was anticipated that RCTs comparing interventions stratified by age would be scarce. Because abortion-related adverse events are rare, a large number of women would be needed to find a significant difference among adolescents, young women, and adults. To increase the evidence base, the review included RCTs, cluster-RCTs, non-randomized cluster controlled trials, controlled before and after studies, interrupted time series, and cohort studies for the primary outcomes.

2.1.2. Types of participant

The review included all studies on adolescents (age 10–19 years) or young women (age 20–24 years) either undergoing medical abortion, vacuum aspiration, or dilation and evacuation (D&E), or receiving treatment for spontaneous abortion at any gestational age of pregnancy.

2.1.3. Types of intervention

Studies on induced abortion or management of spontaneous abortion via vacuum aspiration, D&E, or medical abortion (misoprostol-only regimen or combined mifepristone and misoprostol regimen) were included in the review.

2.1.4. Types of outcome measure

The primary outcomes were defined as follows: effectiveness of abortion method; adverse effects and safety (including pain, need for pain management, and complications); and acceptability.

The secondary outcomes were defined as follows: uptake of post-abortion contraception; psychosocial well-being after induced abortion; long-term reproductive complications (future ectopic pregnancy, pregnancy loss, and adverse obstetric outcome); and cost. To improve data quality, studies for secondary outcomes had to be prospective and published later than 1989.

2.1.5. Types of study design as outlined below.

Discrepancies were resolved by consensus.

2.2. Search methods for identification of studies

2.2.1. Electronic searches

The electronic literature search included the Cochrane Central Register of Controlled Trials (third quarter, 2012), MEDLINE (1946 to November 2012), MEDLINE In-Process and Other Non-Indexed Citations (November 2012), and POPLINE (1927 to October 2012). There was no language preference and the search terms included abortion, vacuum aspiration, or dilation and evacuation (D&E), or receiving treatment for spontaneous abortion at any gestational age of pregnancy.

The search identified 374 articles via the Cochrane Central Register of Controlled Trials (CENTRAL), 4783 articles via MEDLINE, 15 via MEDLINE In-Process and Other Non-Indexed Citations, and 78 articles via POPLINE. Additional articles were identified via reference lists of reviewed articles. Twelve potentially relevant studies were identified through contacts, reference lists, and previous reviews. Overall, 5262 titles and abstracts were reviewed, and the full article of 350 potentially eligible studies was accessed.

In total, 4900 studies were excluded (Fig. 1). The most common reasons for exclusion of studies were lack of a comparison group or lack of detailed reporting.

2.2.2. Searching other sources

Researchers in the field were contacted to identify unpublished or ongoing studies. Reference lists of articles retrieved were hand-searched.

2.2.3. Selection of studies

Two reviewers independently extracted data on participants, interventions, comparisons, outcomes, study design, and (if applicable) randomization, allocation, blinding, and loss to follow-up. Participant characteristics included number, demographics, and gestational age. Discrepancies were resolved by consensus.

2.2.4. Searching other sources

Researchers in the field were contacted to identify unpublished or ongoing studies. Reference lists of articles retrieved were hand-searched.

2.3. Data collection and analysis

2.3.1. Selection of studies

The primary reviewer (R-M.R.) evaluated the articles. A second reviewer (D.B.) evaluated articles for inclusion and, where needed, additional information was sought from a study's author.

2.3.2. Data extraction and management

Two reviewers independently extracted data on participants, interventions, comparisons, outcomes, study design, and (if applicable) randomization, allocation, blinding, and loss to follow-up. Participant characteristics included number, demographics, and gestational age. Discrepancies were resolved by consensus.

2.3.3. Assessment of risk of bias in included studies

Two reviewers independently assessed risk of bias. For RCTs, the assessment included the following: first, assigning a quality score for concealment of allocation (a, adequate concealment of allocation; b, unclear whether adequate concealment of allocation; c, inadequate concealment of allocation; and d, allocation concealment not used). Second, blinding of participants, clinicians, and investigators. Third, protection against exclusion bias. Fourth, appropriate analysis of data.

Risk of bias in cohort studies was assessed via the Newcastle–Ottawa Scale [5], a validated scale for meta-analysis of observational studies. For cohort studies, the Newcastle–Ottawa Scale consists of 3 parameters of quality—selection, comparability, and outcome assessment—and assigns a maximum of 4, 2, and 3 points, respectively (overall maximum 9 points).

Any discrepancies between reviewers were addressed by a joint re-evaluation of the original article.

2.3.4. Measures of treatment effect and assessment of heterogeneity

Because most studies provided only age-related information in their multivariate analysis without giving numbers or percentages, it was not possible to enter the data in standard software for meta-analysis. By using data reported in the original studies, the effects of dichotomous outcomes are presented as an odd ratio (OR) or relative risk (RR) with 95% confidence interval (CI), and were considered statistically significant if the confidence interval did not include 1. Coefficients are reported when continuous data were correlated in the original study. In some studies, only a P value was reported; in others, no effect size or value of significance was reported. Studies were heterogeneous in their design, interventions, and outcomes. It was not possible to assess the heterogeneity on a statistical level.

2.3.5. Missing data

No outcomes were imputed, and thereby the true proportion of complications might have been slightly misestimated. Loss to follow-up was considered via the Newcastle–Ottawa Scale.

2.3.6. Data synthesis

The RCTs and cohort studies were summarized but meta-analyses were not performed because of heterogeneity and lack of detailed reporting.

3. Results

3.1. Results of the search

The search identified 374 articles via the Cochrane Central Register of Controlled Trials (CENTRAL), 4783 articles via MEDLINE, 15 via MEDLINE In-Process and Other Non-Indexed Citations, and 78 articles via POPLINE. Additional articles were identified via reference lists of reviewed articles. Twelve potentially relevant studies were identified through contacts, reference lists, and previous reviews. Overall, 5262 titles and abstracts were reviewed, and the full article of 350 potentially eligible studies was accessed.

In total, 4900 studies were excluded (Fig. 1). The most common reasons for exclusion of studies were lack of a comparison group or lack of age-related data analysis.

3.2. Review studies

In total, 25 studies with 346 020 participants, consisting of 4 RCTs, 1 cluster-RCT trial, 17 prospective cohort studies, 2 retrospective cohorts, and 1 cost-effectiveness analysis, were included in the review (Table 1 and Supplementary Material S2). Studies were conducted worldwide in hospital or clinic settings in the public or private sector.

The studies represented high income (Canada, Denmark, Israel, Finland, New Zealand, Norway, Sweden, USA), upper middle income...
(China, Mexico), lower middle income (Egypt), and lower income (Mozambique) countries. In Mozambique and Egypt, abortion is permitted when the pregnancy threatens the life of the woman. In Mozambique, the Ministry of Health has authorized first-trimester abortion services in selected facilities. In Egypt, the public health system has introduced a post-abortion care program including access to post-abortion contraception, which was the focus of the study included.

The proportion of adolescent and young women in the studies ranged from 4% to 50%, and 20% to 70%, respectively, but often was not reported. Among the 13 studies that did report the number of adolescents, the total was 77,941. Nine studies included only women aged 18 years or older [6–14]. The remaining studies included adolescents, but did not provide information regarding their proportion. In most studies, gestational age at time of abortion was less than 13 weeks (first trimester); only 4 studies included second-trimester abortions [15–18]. Only 1 study included women with spontaneous abortion [19].

Nine studies investigated the effectiveness and safety of medical abortion using mifepristone and misoprostol regimens (7 studies) [6, 9, 10, 18, 20–22], or misoprostol-only regimens (2 studies) [7, 19]. Four studies investigated patient satisfaction with various aspects of medical abortion [8, 9, 13, 14]. Four studies explored adverse effects and safety of vacuum aspiration or D&E [17, 23–25], 4 focused on post-abortion contraception [11, 12, 16, 26], and 4 focused on psychologic sequelae after abortion [27–30]. One study of cost-effectiveness analyzed D&E versus induction of labor in the second trimester [15]. No studies on long-term reproductive outcomes that met the inclusion criteria were found.

3.3. Quality of evidence and risk of bias in included studies

The quality of evidence of the RCTs [10, 11, 19, 22, 26] was assessed by using the Cochrane guidelines (Table 2). Randomization and allocation concealment were properly done in all studies, but 1 study did not report allocation concealment [26]. Blinding was impossible in all studies because a participant’s age might be difficult to guess, but cannot be made blind. This would have introduced only a small risk of bias for more objective outcomes such as success of abortion, but introduced a high risk of bias in counseling women regarding post-abortion contraception [11, 26], especially when not scripted [26]. Loss to follow-up was minimal in 3 studies [10, 19, 22], but decreased the quality of 2 studies, in which 16.2% [11] and 42.4% [26] of participants were lost respectively; 20% loss was considered the cutoff for assigning a high risk of bias.

Risk of bias in the cohort studies [6–9, 12–14, 16–18, 20, 21, 23–25, 27–30] was assessed via the Newcastle–Ottawa Scale [5, 31] (Supplementary Material S3). Only 3 of the cohort studies achieved the highest quality score of 9 [18, 20, 23]; most had a score of 8.

Among the cohort studies, comparability was most often limited by a small percentage of adolescents or young women, and by a lack of detailed age-related data analysis. Only 4 studies were aimed specifically at adolescents and young women [18, 27–29]. Seven studies reported a detailed age-related analysis, comparing an adolescent or young age group with older women [14, 16, 17, 20, 23, 25, 30]. In the remaining 8 studies, age was considered only as a continuous variable in the multivariate analysis [6–9, 12, 13, 21, 24]. Loss to follow-up of 20% or more was considered inadequate [12, 16, 21]. Table 1 shows age-related results by abortion method.

3.4. Primary outcomes

3.4.1. Effectiveness of mifepristone and misoprostol medical abortions (n = 3 studies)

In 3 studies where effectiveness was determined, medical abortion up to 9 weeks of gestation—usually defined as no need for surgical...
intervention—was successful for 84%–98% of women [20–22]. The effectiveness was the same for young and older women in 1 RCT [22] and 1 prospective cohort [20]. In 1 prospective cohort, younger age was associated with decreased abortion failure (OR, 0.027) [21]. In a large retrospective population-based cohort, adolescents experienced incomplete abortion (7.0% vs 10.2%; P < 0.001; OR, 0.68; 95% CI, 0.56–0.81) and surgical evacuation of retained products of conception (11.0% vs 13.0%; P = 0.002; OR, 0.75; 95% CI, 0.64–0.88) significantly less often than adults [18].

3.4.2. Adverse effects and safety of mifepristone and misoprostol medical abortions (n = 4 studies)

In a large retrospective population-based cohort, adolescent women had a significantly lower incidence of total adverse events (19.0% vs 23.1%; P < 0.001) and a significantly lower risk of hemorrhage (12.8% vs 15.4%; P < 0.001; OR, 0.87; 95% CI, 0.77–0.99) [18]. Pain was not associated with age in an RCT comparing the effectiveness of paracetamol and ibuprofen for analgesia [10]. In a prospective cohort study, unacceptable pain reported by 21% of women seeking medical abortion was not associated with age, but correlated with nulliparity and later gestational age [6]. Of note, younger age was associated with delayed initial presentation to the clinic [9].

3.4.3. Effectiveness of misoprostol-only medical abortion (n = 2 studies)

Age was not associated with efficacy (92%) in an RCT on management of failed pregnancies up to 13 weeks (P > 0.1) [19] or with efficacy of medical abortion at 35–77 days gestation in a prospective cohort [7]. The overall effectiveness of the latter study was less than 70%.

Table 1
Age-related results by abortion method.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Medical abortion</th>
<th>Vacuum aspiration or dilation and evacuation</th>
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</thead>
<tbody>
<tr>
<td><strong>Effectiveness</strong></td>
<td>Mifepristone/misoprostol regimen</td>
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<tr>
<td>Age not associated with effectiveness (n = 956; all ≥ 16 y) [22]. Effective in 162/166 (97.6%; 95% CI, 93.9%–99.3%) women ≤ 19 y, and 281/294 (95.6%; 95% CI, 92.6%–97.6%) women 20–24 y. Age not associated with completeness (P = 0.459; 94.9%–94.4%) (n = 1289; 12.9% adolescents, 22.8% young women) [20]. Older age associated with unsuccessful abortion (OR, 6.3; 95% CI, 1.02–38) (n = 377; 10.8% adolescents) [21].</td>
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<tr>
<td><strong>Complications and pain</strong></td>
<td>Mifepristone/misoprostol regimen</td>
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<tr>
<td>Age ≤ 18 y associated with fewer hemorrhages (OR, 0.87; 95% CI, 0.77–0.99), incomplete abortion (OR, 0.68; 95% CI, 0.56–0.81), and surgical evacuation (OR, 0.75; 95% CI, 0.64–0.88) (n = 27 030; 11.2% ≤ 18 y) [18]. Age not associated with pain (n = 120; all ≥ 18 y) [10]. Age not associated with unacceptable pain (reported by 21%) (n = 933; all ≥ 18 y) [6].</td>
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<td><strong>Satisfaction</strong></td>
<td>Age not associated with acceptability (n = 395; all ≥ 18 y) [8]. Younger age associated with presenting to clinic with delay (no data shown) [9]. Age not associated with likelihood of using a home pregnancy test or willingness to self-administer mifepristone. Age negatively associated with reporting more bleeding than expected (coefficient, –0.031; P &lt; 0.01) and positively associated with willingness to self-administer misoprostol (0.027, P &lt; 0.01) (n = 2121; all ≥ 18 y) [9]. Age not associated with rating or service quality (OR, 1.01; 95% CI, 0.98–1.05) (n = 402; all ≥ 18 y) [13]. Women age 18–25 y preferred face-to-face communication with provider compared with older women (OR, 0.58; 95% CI, 1.2–2.09) (n = 578; all ≥ 18 y) [14].</td>
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<td><strong>Contraception use</strong></td>
<td>Age not associated with choosing very effective method (OR, 0.91; 95% CI, 0.43–1.85) (n = 186; all ≥ 18 y) [11]. Age not associated with choice of IUD insertion timing (P = 0.86) (n = 300; all ≥ 18 y) [12]. Age ≤ 19 y associated with lower rates of LARC uptake (51.2%) than age 20–24 y (70.0%; P &lt; 0.05) (n = 1020; before and after study: ≤ 19 y, 27.1% and 24.1%, respectively, 20–24 y, 30.6% and 33.3%, respectively) [16].</td>
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<td><strong>Psychologic wellbeing</strong></td>
<td>Induced abortion among adolescents not associated with depression at age 20 y (OR, 1.0; 95% CI, 0.4–2.2) or 27 y (OR, 0.9; 95% CI, 0.4–2.7) (n = 968 women aged 15–27 y) [41]. Minors were relatively less satisfied with their abortion decision and felt less benefit from the abortion than did adults 1 month after abortion, but did not differ from adults in adjustment 2 y after abortion. No significant associations in multivariate analysis. Age was not associated with depression at either time point (n = 615; 8.6% 15–17 y) [28]. Age ≤ 18 y associated with less comfort with decision (P &lt; 0.05); not associated with other outcomes. Age not associated with post-abortion adjustment (n = 96 women; 24% 14–18 y, 41.7% 18–21 y; 63 women with follow-up) [29]. Younger age associated with negative emotions (P &lt; 0.001), less-positive emotions (P &lt; 0.05), less relief (P &lt; 0.05), less decision satisfaction (P &lt; 0.001), and less harm appraisal (P &lt; 0.001) at 2 y (n = 882; 23% ≤ 19 y, 54.3% 20–29 y) [30].</td>
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<td><strong>Cost-effectiveness</strong></td>
<td>Age did not affect cost-effectiveness for dilation and evacuation versus induction of labor with misoprostol [15].</td>
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Abbreviations: CI, confidence interval; IUD, intrauterine device; LARC, long-acting reversible contraception; OR, odds ratio.
which is likely to be related to the advanced gestational age, or the short wait time and strict ultrasound criteria mandating intervention.

3.4.4. Satisfaction with medical abortion (n = 4 studies)
Although none of the studies assessing satisfaction included women younger than 18 years, age was not associated with women’s acceptance of home misoprostol administration in a prospective cohort [8]. Younger women were less willing to self-administer misoprostol (P < 0.01), and reported more bleeding than expected (P < 0.01) [9]. Ratings of several domains of service quality, including patient–staff interaction, information provision, and technical competence, were not age-related in a prospective cohort of women undergoing medical abortion or vacuum aspiration [13]. In another prospective cohort study, medical abortion via video telemedicine was compared with a face-to-face physician visit [14]. Although success was the same in both groups, being aged 18–25 years was associated with preferring face-to-face communication compared with 26 years or older (OR, 1.58; 95% CI, 1.20–2.09) [14].

3.4.5. Adverse effects and safety of vacuum aspiration and D&E (n = 4 studies)
In a large prospective population-based cohort of first-trimester abortion, age under 20 years was not associated with complications, whereas age 30 years or older was protective (OR, 0.77; 95% CI, 0.69–0.85) [23]. Three publications on various complications observed in a large prospective cohort of 164,000 women in the United States, including approximately 50,000 adolescents undergoing abortion, were included in the current review [17,24,25]. Major surgery and uterine perforation during first-trimester vacuum aspiration were less common among younger women (P < 0.001 and P < 0.05, respectively) [24]. Other complications did not differ by age. Mortality was 1.3 per 100,000 among women aged 19 years or younger compared with 2.2 per 100,000 among women aged 20 years or more [24]. In a subpopulation of 69,142 women at up to 24 weeks of gestation, age 17 years or younger was not associated with perforation (RR, 0.91; 95%CI, 0.34–2.4); however, previous delivery increased the risk (RR, 3.4; 95%CI, 1.9–6.3) [17]. Cervical injury during first-trimester abortion was associated with age 17 years or younger (incidence, 5.5 in 1000 for ≤17 years versus 1.7 in 1000 for ≥30 years, P < 0.001; RR, 1.9; 95%CI, 1.2–2.9) [24,25].

3.5. Secondary outcomes

3.5.1. Post-abortion contraception (n = 5 studies)
In a cluster-RCT on adolescents and young women only, provision of a comprehensive contraceptive package (counseling and provision of free contraceptive materials) increased use of an effective contraceptive method (OR, 2.03; 95% CI, 1.04–3.98), but did not reduce unwanted pregnancies (OR, 0.84; 95% CI, 0.29–2.39) or subsequent abortions (OR, 1.01; 95% CI, 0.33–3.13) [26]. Age was not associated with choosing an effective method of contraception after a first-trimester vacuum aspiration in a RCT comparing standard counseling with non-directive counseling using the WHO Decision-Making Tool flipchart [11].

Timing of intrauterine device (IUD) insertion after surgical abortion, immediate versus 2-week delayed, was not age-associated in a prospective cohort [12]. Age under 19 years was associated with lower rates of long-acting reversible contraception (LARC) uptake (70.0%) compared with age 20–24 years in a prospective cohort that studied the impact of a 10-week intervention on increased information about and access to long-acting methods [16].

3.5.2. Psychologic sequelae after abortion (n = 4 studies)
In a population-based cohort of women aged 15 to 27 years, abortion among adolescents was not associated with depression at age 20 years [27]. In 2 studies, adolescents were less comfortable with their decision in the month after abortion but were the same as other age groups thereafter [28,29]. Psychologic response overall improved after abortion in 1 study [29]; however, minors who perceived more parental conflict had lower self-efficacy appraisals for coping and used avoidant coping strategies more than adults [28]. In 1 prospective cohort with 50% loss to follow-up, younger age was associated with negative emotions (P < 0.001), less-positive emotions (P < 0.05), less relief (P < 0.05), less decision satisfaction (P < 0.001), and less harm appraisal (P < 0.001) 2 years after abortion [30].

3.5.3. Cost-effectiveness (n = 1 study)
One analysis of the cost-effectiveness of D&E versus induction of labor in the second trimester in the United States showed that varying age from 15 to 45 years did not change the outcome that D&E was more cost-effective than induction of labor [15].

4. Discussion
The present systematic review has summarized the data available on clinical abortion care for adolescent and young women—a population that faces challenges in accessing safe abortion services. Although several studies (n = 25) with 346,020 women were included in the review, data were limited because most studies did not focus on the impact of age on abortion care and most of the data included in the review have been derived from multivariate analyses including age. At least 77,941 adolescents were included in the review studies, and age-related results are summarized in Table 1.

The effectiveness and safety of medical abortion with combined mifepristone and misoprostol regimens, in addition to misoprostol-only regimens, in the review studies were comparable to other data [2,32]. However, 1 retrospective registry-based study reported high rates of complication in adults, which were probably related to the registry limitations and experiencing a learning curve [18]. In the present
review, effectiveness was the same for young and older women, although 1 study showed increased rates of successful abortion for younger women [21].

Overall, satisfaction with medical abortion among women aged 18 years or older was not associated with age, and medical abortion has been shown to be physically and emotionally acceptable to adolescents [33]. In 1 study, however, younger women were less willing to administer misoprostol at home after mifepristone [13], which is inconsistent with a study documenting young women’s acceptance of home-administered misoprostol [34]. In another study, adolescents were more comfortable with a face-to-face physician visit than with a video telemedicine encounter [14]. There might be several reasons for this, including preference for more clinical support or concern about privacy from family members at home. Given the proven effectiveness and safety of medical abortion for adolescents during both clinic and home misoprostol administration, we recommend providing options about where to undergo medical abortion. Age-stratified data on satisfaction with vacuum aspiration and D&E are lacking.

In the present review, adverse effects and complications of vacuum aspiration and D&E, specifically uterine perforation [17] and mortality [24], were less frequent among younger women than among older women. This may be due to the overall increased health status of younger women compared with older women.

Of note, in a large retrospective analysis of abortion cases in the United States, mortality was not associated with age [35]. Despite retrospective case series indicating increased pain with vacuum aspiration and D&E at a younger age (13–17 years) [11], pain with medical abortion was not associated with age [6,10] but it did increase with nulliparity [6]. Younger women had an increased risk of cervical laceration [24,25], as has been described before [36], even after controlling for parity [24]. This finding supports the concept that young age is not a proxy for nulliparity, but confers other risk factors related to cervical compliance.

Both WHO and the Royal College of Obstetrics and Gynaecology recommend that cervical preparation should be considered among women at high risk for cervical laceration, including young women [2,37]. WHO routinely recommends cervical preparation after 12–14 weeks of gestation [2]. On the basis of retrospective data, young women have an increased risk of cervical injury during vacuum aspiration at less than 12 weeks of gestation, and therefore may benefit from cervical preparation even prior to 12–14 weeks [37]. However, prospective clinical trials in this patient population are lacking, and the benefits of cervical preparation should be weighed against possible adverse effects and service delivery implications. Consistent with previous publications [1], adolescents included in the current review presented at a later gestational age [9]. Given that increasing gestational age is a major risk factor for morbidity and mortality from abortion, we strongly recommend support for adolescents in diagnosing a pregnancy, decision making, and accessing abortion services as soon as possible.

Among women younger than 19 years, there was less uptake of LARC, but otherwise age did not affect contraceptive method update after vacuum aspiration or D&E. Evidence supporting the safety of LARC for adolescents, especially IUDs, continues to grow. Two reviews concluded that the levonorgestrel [38] and the copper IUD [39] are safe and effective among nulliparous women, dispelling the concern regarding infection and future infertility secondary to IUD use in this patient group. We strongly recommend offering adolescents the full range of contraceptive options including LARC.

In the present review, psychologic short- and long-term effects of abortion were not found to differ among age groups, but 3 of the 4 studies included did not specify the method of abortion. Two studies were conducted before FDA approval of mifepristone [28,30], and 1 study included women seeking first-trimester outpatient aspiration procedures [29]. A systematic review of long-term mental health outcomes after abortion among women of all ages noted that the highest quality studies had mostly neutral findings, suggesting that there are few, if any, differences among women undergoing abortion in their respective comparison groups [40]. Conversely, studies with the most flawed methodology found negative mental health sequelae [40].

In conclusion, limited evidence indicates that abortion is effective, safe, and acceptable among adolescent and young women. Adolescents may benefit from cervical preparation prior to 12 weeks gestation. There is no evidence to suggest that abortion results in poor physical or mental health outcomes. We recommend that providers should be educated about the effectiveness and safety of abortion among adolescents, and should offer the full range of contraceptive options including LARC. We also strongly recommend investing in programs to increase the knowledge, skills, and ability of adolescents to detect pregnancy, and to make and act on pregnancy-related decisions; and in programs to increase adolescents’ access to abortion care, including safe second-trimester abortion services.

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Conflict of interest

The authors have no conflicts of interest.

References


