Time to second abortion or continued pregnancy following a first abortion: a retrospective cohort study

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STUDY QUESTION: What proportions of women have a second abortion or continued pregnancy within 12–46 months of a first abortion?

SUMMARY ANSWER: Estimated return rates for a second abortion were 5, 10.9 and 19.8% at 12, 24 and 46-months, respectively, and rates of continued pregnancy were 5.6, 12.9 and 24.3% at the same intervals.

WHAT IS KNOWN ALREADY: Studies attempting to identify women at risk for ‘repeat abortion’ for intervention purposes have described a range of demographic and behavioural characteristics associated with presentation for more than one abortion, but few have taken timing of abortions into account.

STUDY DESIGN, SIZE, DURATION: Retrospective cohort study involving women presenting for a first abortion at a public hospital abortion clinic in New Zealand (2007–2010).

PARTICIPANTS/MATERIALS, SETTING, METHODS: Electronically stored records were analysed for women discharged from a public hospital abortion clinic in New Zealand. Outcome measures were the proportion of women having a second abortion or continued pregnancy within 24 months of a first abortion, and characteristics associated with shorter time to subsequent pregnancy. Cox proportional hazards modelling was used to detect factors associated with time to a second abortion or continued pregnancy, and Kaplan–Meier survival analyses were used to estimate time to one of these two pregnancy outcomes.

MAIN RESULTS AND THE ROLE OF CHANCE: A total of 6767 women had a first abortion between 2007 and 2010. Some data were missing for 11 women so were excluded from the cohort and analyses. Return rates for a second abortion estimated from survival analyses were 5, 10.9 and 19.8% at 12, 24 and 46 months, respectively. Estimated rates of continued pregnancies were 5.6, 12.9 and 24.3% at 12, 24 and 46 months, respectively. Younger age, non-European ethnicity and greater parity were significantly associated with shorter time to a second abortion and to a subsequent continued pregnancy (P < 0.01 for all factor P-values). Hazard ratios (HR) for a second abortion were highest among those aged 16–19 years (HR 1.6, 95% confidence interval (CI) 1.3–1.9, Reference 20–24), of Pacific Island (HR 1.35, 95% CI 1.1–1.7) or Maori ethnicity (HR 1.26, 95% CI 1.1–1.5, Reference New Zealand European), and with 1 (HR 1.41, 95% CI 1.1–1.7) or 2 (HR 1.41, 95% CI 1.1–1.9, Reference nulliparous) children at the time of the first abortion. Both pregnancy outcomes were observed among 120 women (1.8%), with 60% of these women having a second abortion before the continued pregnancy.

LIMITATIONS, REASONS FOR CAUTION: This study was limited to analysis of routinely collected clinical and demographic data for women presenting for abortion over a 4-year period. Conclusions could not be drawn about a wider range of personal and situational factors influencing pregnancy and pregnancy outcomes. Data were drawn from only one clinic but characteristics of the study sample were broadly representative of those reported nationally. Loss to follow-up for women seeking a second abortion elsewhere in the country cannot be ruled out and would serve to underestimate return rates reported here.

WIDER IMPLICATIONS OF THE FINDINGS: To date, the most effective public health measure known to reduce abortion return rates within 24 months is the initiation of long-acting reversible contraception (LARC) at the time of an abortion. The high proportion of women seeking a second abortion <4 years after a first abortion (20%) could be significantly reduced by use of LARC, as could unintended pregnancies that are continued soon after a first abortion, particularly among teenaged and young women. Barrier-free access to a range of LARC methods should be prioritized to prevent unintended and mistimed pregnancies.
Introduction

Up to half of all women undergoing an elective abortion have had one or more abortions at some time in the past (Jones et al., 2006). Women presenting for a second or subsequent abortion are often described as having ‘repeat abortions’ despite the fact that circumstances surrounding each event are often markedly different, and events occur at different times of a woman’s life (Weitz and Kimport, 2012). Reported rates of repeat abortion vary markedly from around 30% in Finland (Heikinheimo et al., 2008), 37% in the UK (UK Department of Health, 2014), 38% in New Zealand (Abortion Supervisory Committee, 2013) and 47% in the USA (Jones et al., 2006). Variation between countries could reflect overall differences in abortion rates, differences in methods of data collection and reporting, legal differences that determine access to abortion as well as factors that impact on rates of unintended pregnancies such as access to contraception (Finer and Henshaw, 2006; Rowlands, 2007).

Numerous studies have been undertaken to identify characteristics of women seeking more than one abortion, often to assist with the identification of those likely to be at-risk, to inform counselling, service delivery and the development of strategies or interventions aimed at reducing the incidence of multiple abortion (Fisher et al., 2005; St John et al., 2005; Jones et al., 2006; Prager et al., 2007; Heikinheimo et al., 2008, 2009; Das et al., 2009; Niinimaki et al., 2009; Mentula et al., 2010; Bleil et al., 2011; Stone and Ingham, 2011). Factors found to be associated with an increased risk of multiple abortion include age (younger age is a risk factor for future abortions whereas who have already had multiple abortion are typically older), greater parity, non-white ethnicity, socio-economic deprivation, lower levels of education or early age at school leaving, living in rented accommodation, smoking, alcohol and drug use, childhood adversity, early age at sexual debut, a greater number of sexual partners and partner violence (Fisher et al., 2005; Prager et al., 2007; Heikinheimo et al., 2008, 2009; Niinimaki et al., 2009; Mentula et al., 2010; Bleil et al., 2011; Stone and Ingham, 2011; Picavet et al., 2013).

A common approach in past studies has been to compare and contrast characteristics of women who have had one or more previous abortions at a given point in time with those who are presenting for a first time (Fisher et al., 2005; St John et al., 2005; Heikinheimo et al., 2008, 2009; Das et al., 2009; Niinimaki et al., 2009; Bleil et al., 2011; Picavet et al., 2013). This approach fails to take into account the fact that women in the comparison group (first abortion) are still at risk for future abortion(s). An important omission in many cross-sectional study designs is consideration of the timing of multiple abortions. The characteristics and circumstances of women seeking more than one abortion within different time frames are likely to differ markedly. Data on the timing of multiple abortions are difficult to obtain at a population level—the reproductive period of a woman’s life potentially spans 30 years or more; therefore analysis of self-reported retrospective data has obvious limitations (Rowlands, 2007; Stone and Ingham, 2011), as does the ability to accurately track dates of abortions through hospital or clinic records over this long time frame.

Three studies including two cross-sectional surveys of women of reproductive age in the USA (Jones et al., 2006) and in the Britain (Stone and Ingham, 2011) and an analysis of the national registry of abortions in Finland (Niinimaki et al., 2009) suggest that over half of women presenting for more than one abortion do so within 5 years of a previous one. The British study found that only 10% of women reporting more than one abortion had them more than 15 years apart, so concluded that abortions are more commonly sought within a 3–5 year period than at beginning and end of the reproductive lifespan (Stone and Ingham, 2011).

In New Zealand, 62% of women presenting for an abortion in 2012 were doing so for the first time, 25% for the second time, 8.5% for the third time and just under 5% for the fourth time or greater (Abortion Supervisory Committee, 2013). Abortion statistics (absolute numbers and rates per 1000 women of reproductive age) are reported annually in New Zealand, and numbers of previous abortions are reported by age but otherwise little else is known about the characteristics of women seeking more than one abortion, nor the time frames within which they are sought. To better understand the timing of multiple abortions and implications for prevention strategies, the present study described rates of a second abortion or continued pregnancy within 12–46 months of a first abortion and factors associated with shorter time to subsequent pregnancy outcome.

Materials and Methods

Participants and study location

This retrospective chart review analysed data from a public hospital abortion clinic in Wellington, New Zealand. This clinic provides a regional abortion service and is the second largest of 21 abortion services throughout the country, performing 16% of all abortions annually in New Zealand (Abortion Supervisory Committee, 2013). Abortion is legal in New Zealand (up to 19 weeks) providing two certifying consultants agree that one of several grounds are met—most commonly ‘danger to mental health’ (Abortion Supervisory Committee, 2013). The clinic offers surgical abortion (for gestations 6–19 weeks), and medical abortion (up to 9 weeks). Patient-centred contraceptive counselling is provided before the procedure and women are encouraged to have a contraceptive plan in place at discharge. Approval was granted to undertake this research by the Central Regional Ethics Committee on 21 December 2009 (CEN/09/11/084), and the Capital and Coast District Health Board Women’s Health Service Clinical Audit and Research Committee (20 February 2010).

Data collection

Data have been collected electronically at the clinic since February 2004. An initial review of the data revealed that 80% of records for the years
2004–2006 were missing information on pregnancy history, so the present study restricted analyses to women presenting for elective abortion between January 2007 and 18 November 2010. Analyses included only those women presenting for the first time (no previous abortions) to avoid methodological issues faced in past research where timing of previously sought abortions is unknown. The first abortion was designated the ‘index abortion’. Data for women having a termination for fetal abnormality were excluded.

Electronic hospital records included National Health Index numbers (NHI, a unique patient number assigned to every person in the country) (New Zealand Health Information Service, 2010), date of birth, date and type of procedure (medical or surgical), gestational age (first or second trimester) and obstetric history (parity, previous abortions). NHI record linkage was used to identify women having multiple abortions at the same clinic during the data collection period. Second abortions were recorded up until November 2010 (giving a maximum of 46 months follow-up). Data were collected on continued pregnancies resulting in a live birth (subsequent to the index abortion) by linking patient NHI numbers to nationally held maternity datasets where dates of delivery are recorded for all births in New Zealand. Dates of delivery were recorded up until 31 June 2011 allowing us to include all women who were at least 8 weeks pregnant by 18 November 2010.

Ethnicity data and level of socio-economic deprivation (NZDep06) were also obtained from national datasets. Ethnicity refers to the ethnic group to which an individual belongs and is collected via self-report using the standardized New Zealand 2001 census question (Statistics New Zealand, 2006). NZDep06 is a validated, census-derived, area-based index of deprivation, measured on a decile scale from 1 to 10, where 1 represents least deprived (low SES), scores 4–7 categorized as ‘medium deprivation (med SES) and scores 8–10 as ‘most deprived’ (low SES).

Analyses
Sociodemographic and clinical characteristics of women presenting for their first (index) abortion between 2007 and 2010 were described. Kaplan–Meier estimates that account for differential durations of follow-up were used to calculate 24-month rates for subsequent abortion and continued pregnancies following the index abortion, and these were reported by sociodemographic and clinical characteristics. Cox proportional regression analyses were used to estimate hazard ratios for the association of demographic and clinical factors with either time to return for a second abortion or continued pregnancy resulting in a live birth (as two separate analyses). All characteristics were defined at the time of the index abortion, and all candidate sociodemographic and clinical variables were included in the model. Results were reported as hazard ratios with 95% confidence intervals (CI), and P-values from likelihood-ratio tests that examine the overall impact of a factor on the outcome (e.g. whether there are any differences by age group). Data contributing to analyses were limited to those women with complete data on all variables aside from ethnicity, where the category not known was retained as a distinct group. Time to ‘continued pregnancy’ was regarded as the time to reach 8 weeks gestation. Data on gestational age at delivery were not available so direct comparisons of time to subsequent pregnancy (that is, time to conception) could not be made for the two pregnancy outcomes. The median gestational age at second abortion was 8 weeks, so this was chosen as the point at which to compare timing for the two pregnancy outcomes. Gestation at delivery was assumed to be 40 weeks, and 32 weeks subtracted from date of delivery to determine the date at 8 weeks pregnancy. All subsequent abortions were included in the analysis (including those performed later than 8 weeks).

Survival analyses were conducted separately for a second abortion (analysis one) and for a continued pregnancy following the index abortion (analysis two). These survival analysis methods ensured that we could use maximal data in our analysis (even if women did not have a complete 24 months of follow-up time). Event times were calculated from the index abortion date to the time of the outcome or censoring; events were a second abortion (analysis one) or 8 weeks gestation for continued pregnancies (analysis two); censoring was applied if the woman reached the end of the follow-up period without an event (to 18 November 2010). Estimated return rates for a second abortion or continued pregnancy were calculated from survival analyses together with 95% CIs at 12, 24, 36 and 46-month follow-up.

The two pregnancy events reported on can be considered as competing risk outcomes, and the reported analyses do not censor on the other event (i.e. the analysis of subsequent abortion does not censor women who had a continued pregnancy)—this is because the outcomes are not independent (i.e. both outcomes can only occur amongst women who become pregnant following their index abortion, which will be driven by common factors around fertility and choice of contraception). The number of women having both a second abortion and a continued pregnancy in the follow-up period was relatively small (reported in results section). The proportional hazards assumption was examined for each analysis using scaled Schoenfeld residuals (Grambsch and Therneau, 1994), firstly using plots of residuals (for each model parameter) and formal hypothesis tests (global test across all parameters). Neither approach suggested departures from proportionality. All analyses were conducted in R 3.0.1 (R Foundation, Vienna), using the survival package (Therneau and Grambsch, 2000; Therneau, 2013). For hypothesis tests, a P-value < 0.05 was considered significant.

Results
Abortions and births during follow-up
Between January 2007 and November 2010, 6767 women presented for a first abortion (67.1% of the 10 091 individual women who had an abortion at the clinic over this period). Eleven women had missing data so were excluded from the cohort and analyses. The median time to follow-up was 21 months (72% of the cohort had at least 12 months of follow-up), and maximum follow-up 46 months. Among women having a first abortion, 696 had a second abortion at some time during the study period, and 899 had a continued pregnancy that reached 8 weeks during follow-up. A total of 120 women (1.8% of the sample) had a second abortion and a continued pregnancy during follow-up, of whom 60% (71/120) had a second abortion prior to their continued pregnancy.

Table I describes the characteristics of 6767 women who presented for a first abortion in the study period, with estimated rates for a second abortion or continued pregnancy within 24 months of follow-up. Proportions presented alongside numbers of events are unadjusted estimates drawn from the Kaplan–Meier model which takes into account the differential time to follow-up across the cohort, i.e. censoring of women with <24 months of follow-up. Similar proportions of women had a second abortion (10.9%) or a continued pregnancy (12.9%) at 24 months, and variation in rates of events across demographic subgroups was broadly similar for the two pregnancy outcomes.

Figure I presents the Kaplan–Meier survival curve for the cumulative proportion of women who had a second abortion or continued...
pregnancy (timed to 8 weeks gestation) during follow-up (these curves are estimated separately from each other). Estimated return rates for a second abortion were 5% at 12 months (95% CI 4.5–5.7), 10.9% at 24 months (10.0–11.8), 15.3% at 36 months (14.2–16.5) and 19.8% at 46 months (17.4–22.0). Proportions of women with a continued pregnancy were 5.6% at 12 months (5.0–6.2), 12.9% at 24 months (12.0–13.9), 21.1% at 36 months (19.8–22.5) and 24.3% at 46 months (22.6–26.0).

Table II presents the results of Cox proportional hazards models to detect factors associated with (i) time to a second abortion and (ii) time to a continued pregnancy following the index abortion. These analyses provide adjusted estimates of subsequent pregnancy events for demographic subgroups within the cohort over time and show that age, ethnicity and parity were significantly associated with shorter time to a second abortion or continued pregnancy. A significantly higher rate of second abortions were sought by 16- to 19-year-olds (Reference 20- to 24-year-olds), women of New Zealand Maori and Pacific Island ethnicities (Reference NZ European) and women who had one or two children at the time of their first abortion (Reference nulliparous women). Women aged 25 years and older were significantly less likely to present for a second abortion than those aged 20–24 years, and women who already had one or two children were more likely than nulliparous women to present for a second abortion.
This study showed that second abortions were sought by 11% of women within 24 months and by 20% of women less than 4 years after a first abortion. Continued pregnancies were common, with 13% continuing a pregnancy within 24 months and 24% less than 4 years after a first abortion. Younger age, New Zealand Maori or Pacific Island ethnicity and having one or two children at the time of a first abortion were significantly associated with shorter time to a second abortion or continued pregnancy. Proportionately fewer women had a second abortion than a continued pregnancy during follow-up, and beyond 12 months, the outcome of a subsequent pregnancy was more likely to be a birth than second abortion.

Strengths and weaknesses
A strength of this study was the inclusion of only those women who were presenting for a first abortion and for whom pregnancy history was known. Prospective follow-up was used to ascertain timing of subsequent abortions as well as continued pregnancies, rather than cross-sectional analysis that has commonly been used to compare women with or without a history of abortion at a given point in time. The large cohort of women presenting to a public hospital abortion clinic over a 4-year period and ability to capture all abortions from hospital records using NHII-linkage avoided the possibility of selection and recall bias associated with analysis of self-reported abortions reported in past survey-based studies (Jones et al., 2006). The inclusion of continued pregnancies identified from a complete national maternity dataset was a strength of our analysis and added further context to pregnancy outcomes following a first abortion. Although data were drawn from only one clinic, the clinic serves a large regional catchment area and the study sample had a similar demographic profile to that of women undergoing abortion nationally (Abortion Supervisory Committee, 2011). Kaplan–Meier survival analyses were undertaken to allow for differential follow-up times among women in the cohort and ensured we could maximize the use of data for all individuals in the cohort even if they had not yet reached 24 months of follow-up.

Our analysis took into account demographic and clinical data that are routinely electronically recorded at the clinic, but it was not possible to examine those factors that have an important explanatory role in determining whether a subsequent pregnancy occurs, and whether or not that pregnancy ends in abortion or birth (such as contraceptive use, frequency and timing of sexual intercourse and the wide range of personal and situational factors that have been identified in past research). Loss to follow-up for women who moved, and might therefore have had a subsequent abortion elsewhere in New Zealand, may have occurred for a small number of women, resulting in an underestimate of second abortions. Pregnancies ending in miscarriage are not always reported nor routinely recorded in a single database in New Zealand so our results might also undercount subsequent pregnancies.

Although a different analytical approach was taken in present study, demographic risk factors predictive of subsequent abortion were consistent with those reported in past research in the UK, the USA, Canada and Finland, including younger age, non-European ethnicity and greater parity (Fisher et al., 2005; Jones et al., 2006; Das et al., 2009; Mentula et al., 2010; Bleil et al., 2011; Stone and Ingham, 2011). Our findings contrast with those of a study in Finland involving 1269 women seeking medical abortion between 2000 and 2002 that also looked at factors predicting subsequent abortion or continued pregnancy (Heikinheimo et al., 2009). The Finnish study showed that while age, parity and previous abortion were associated with a greater likelihood of subsequent abortion, only age predicted likelihood of a subsequent pregnancy. Women aged 24 years and under were most likely to seek a subsequent abortion and those aged 25–29 years were most likely to give birth (Heikinheimo et al., 2009). In our study, the
demographic characteristics of women with a continued pregnancy were broadly similar to those of women seeking a second abortion; both outcomes were highest among women under 25 years at the index abortion.

Our findings suggest that the demographic characteristics (age, ethnicity, parity) of women seeking a second abortion do not differ from those of women continuing a pregnancy soon after a first abortion in New Zealand. Rather than there being something unique about the demographics of women having a second abortion or a subsequent continued pregnancy, they more likely reflect characteristics associated with patterns of sexual activity, fertility, use or non-use of contraception and attitudes towards childbearing. Differences observed in post-abortion pregnancy outcomes between our study and that of Heikinheimo et al. (2009) in Finland might be explained by differences in the demographic characteristics of the cohorts, access to contraception and societal and behavioural factors that impact on pregnancy rates and likelihood of continuing or terminating a pregnancy. The rate of births to teenage mothers in New Zealand is approximately three times the rate in Finland (UNICEF, 2001). The higher rate of second abortion (as well as births soon after an abortion) among younger and teenage women in our study cohort is concerning, and highlights challenges that need to be addressed in New Zealand, such as improved sexuality education, access to youth-friendly health services for family planning/sexual health advice and contraception, as well as the binge drinking culture that contributes to failure to use contraception or to use it effectively (Clark et al., 2013; Connor et al., 2013).

Timing of multiple abortions is a critical factor to take into consideration when thinking about ways to effectively reduce the incidence of subsequent abortions. In most instances the complex range of personal, social and situational circumstances that impact on women’s motivation to avoid pregnancy is not easily measured nor modified to reduce rates

<table>
<thead>
<tr>
<th>Characteristics at index abortion</th>
<th>Event: second abortion</th>
<th>Event: continued pregnancy</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Hazard ratio (95% CI)</td>
<td>Factor P-value</td>
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<tr>
<td>Age-band (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13–15</td>
<td>1.21 (0.8–1.8), .001</td>
<td>1.59 (1.1–2.2), .001</td>
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<tr>
<td>16–19</td>
<td>1.6 (1.3–1.9)</td>
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<tr>
<td>20–24</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>25–29</td>
<td>0.55 (0.4–0.7)</td>
<td>1.08 (0.9–1.3)</td>
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<td>30–34</td>
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<td>0.92 (0.7–1.2)</td>
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<td>0.4 (0.3–0.6)</td>
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<td>Dep 4–7 (med)</td>
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<td>Dep 8–10 (most)</td>
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<td>0.98 (0.7–1.3)</td>
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CI, confidence interval.
of unintended pregnancy. To date, the only strategy shown to consistently reduce the likelihood of returning for a subsequent abortion is the initiation of long-acting reversible contraception (LARC) immediately following an abortion. A growing body of international evidence shows that post-abortion initiation of a contraceptive implant or intrauterine device (IUD) significantly reduces the rate of return for subsequent abortion within 12–24 months (Stevens-Simon et al., 2001; Roberts et al., 2010; Ames and Norman, 2012; Cameron et al., 2012; Peipert et al., 2012; Rose and Lawton, 2012).

Ensuring that women have barrier-free access to affordable long-acting contraception, with strategies to optimize uptake and retention, is undoubtedly the most effective public health measure known to reduce unintended pregnancies. LARC methods including IUDs and contraceptive implants have very low failure rates (<1%) and are not reliant on user compliance for efficacy (Hatcher et al., 2011). Although effective for 3–5 years or longer, early removal due to intolerance of side effects poses a risk for a subsequent pregnancy if no other contraception or a less effective method is utilized. Removal rates at 24 months among women in the US contraceptive CHOICE project were 31, 23 and 21% for implants, IUDs and intrauterine systems, respectively (O’Neill-Callahan et al., 2013). The extent to which LARC use reduces the incidence of subsequent abortion beyond 24 months is not currently known due to an absence of studies with longer follow-up.

Although conclusions cannot be drawn about abortions sought over a life course in this study, we saw that 20% of women returned for a second abortion within 4 years of a first—so might have benefitted from use of a LARC method during that period. Given the extremely low failure rate of LARC, few of the pregnancies observed during follow-up in the present study would have occurred in women with a LARC in place. This study showed there was a high rate of continued pregnancies soon after a first abortion, particularly among teenaged and younger women. Although pregnancy intent was not known, a significant proportion of continued pregnancies beginning soon after a first abortion might have been unintended or mistimed and potentially prevented with LARC use. This finding highlights the importance of counselling to ensure women understand that LARC methods not only prevent unwanted pregnancies, but also help to delay or space intended pregnancies. A qualitative study at this abortion clinic in 2010 found that women would be less inclined to initiate a method prescribed for 5 years use if they thought they might want a baby sometime within that time frame (Rose et al., 2011). Counselling about LARC should therefore highlight the fact that devices can be removed at any time with a rapid return to fertility. Further research with longer durations of follow-up would improve our understanding of closely spaced versus time-distant first, second and subsequent abortions and the potential public health impact of LARC use on unintended and mistimed pregnancies.

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Authors’ roles

All authors were involved in the conception and design of the study. S.B.R. cleaned and coded the data prior to analysis. J.S. provided statistical advice and conducted the analyses. S.B.R., J.S. and B.A.L. interpreted the results. S.B.R. wrote the first draft of the manuscript, J.S. and B.A.L. read and revised drafts and reviewed the final manuscript.

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Conflict of interest

None declared.

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Timing of pregnancies following a first abortion


