Survival Analysis of Patient Contraceptive Choice Method at Time of Abortion — Honolulu, Hawai'i, May 2010–December 2016

Kristen Valencia MPH; Ghazaleh Moayedi DO, MPH; Shandhini Raidoo MD, MPH; Reni Soon MD, MPH; Bliss Kaneshiro MD, MPH; and Mary Tschann PhD, MPH

Abstract

The relationship between contraceptive method choice at the time of abortion and risk for subsequent abortions is not well understood. This article uses an existing data set from the University of Hawai'i Women's Options Center between May 2010 and December 2016 to examine if such a relationship exists. A multivariate Cox proportional hazards regression survival analysis was used to evaluate contraceptive method prescribed or provided at index abortion encounters and likelihood of additional abortions. Patients who received a prescription of oral contraceptive pills, patches or rings at their index abortion were 61% more likely to have an additional abortion than those who had no contraceptive method recorded (hazard ratio [HR], 1.61; 95% confidence interval [CI], 1.14-2.28). Patients who received a long-acting reversible contraceptive method at their index abortion were 59% less likely to have an additional abortion when compared with a patient receiving no method (HR, 0.41; 95% CI, 0.20-0.86). The findings show that patients who were prescribed oral contraceptives pills, patches, or rings were more likely than patients who had no contraceptive method prescribed or provided to have more than one abortion during the data collection period. Contraceptive method choice at time of abortion is complex and providers should be thorough in their counseling about failure rates, while also remaining vigilant in supporting patient autonomy and avoiding coercive or stigmatizing language.

Keywords

abortion; contraception; survival analysis; reproductive autonomy

Abbreviations

CI = confidence interval
DMPA = Depot medroxyprogesterone acetate
HR = hazard ratio
LARC = long-acting reversible contraceptive
PPR = oral contraceptive pills, patches, or rings
REDCap = Research Electronic Data Capture
SD = standard deviation

Introduction

Unwanted pregnancies that result in abortion can be personally disruptive and costly, and pregnancy is associated with medical risks. Multiple abortions are not inherently problematic as abortion is a safe procedure and has lower associated morbidity and mortality than pregnancy or childbirth. However, procedures can be a burdensome experience, particularly if the patient must overcome financial, legal, or geographic barriers to access care.[1] Using contraception to avoid additional unwanted pregnancies that result in abortion may reduce these impacts on patients and their families. According to a 2008 study by the Guttmacher Institute, 50% of patients having an abortion have already had a prior abortion.[2]

Contraceptive counseling is a preventive health measure endorsed by the World Health Organization and the United States Preventive Services Task Force; nevertheless, the evidence demonstrating the efficacy of such practices in conjunction with abortion is limited.[3,4] The Contraceptive CHOICE Project, which provided structured counseling and no-cost access to all methods of contraception to all participants, demonstrated increased uptake of highly effective methods of contraception, but the conditions of this intervention (highly structured counseling and no-cost contraception) are not reflective of most clinical settings.[5] Other studies have demonstrated that contraceptive counseling alone, even using a highly structured approach, did not improve uptake and continuation of contraceptive methods after abortion.[4,6] A focused contraceptive counseling intervention in England resulted in more patients leaving their abortion visit with a contraceptive method, but no difference in the number of patients returning for an additional abortion within 2 years.[7]

Patients may not want to discuss contraception at the time of their abortion, or they may find the conversation to be stigmatizing or coercive.[8–11] Provider promotion of long-acting reversible contraception (LARC) as a low maintenance, highly effective method may be interpreted by patients as a judgmental message about the importance of avoiding additional pregnancies.[9,11]

Access to contraception and its relationship to subsequent pregnancy has also been explored. Immediate provision of LARC and contraceptive injections after abortion increases uptake of these methods and has been shown to reduce rates of pregnancy in subsequent years when offered within the context of a research study.[12,13] These experimental settings may not reflect real-world conditions in which a variety of factors, including cost, method availability, the influence of a partner or guardian, and time constraints for the patient or clinic may impact contraceptive decision-making.

The University of Hawai'i Women's Options Center (referred to hereafter as the Women's Options Center) in Honolulu, Hawai'i has a detailed database of all abortion patients seen between May 2010 and December 2016. This database includes information about patients' contraceptive method prescribed or provided during the abortion encounter and data on subsequent abortions during the data collection period. The Women's Op-

tions Center is not the sole abortion provider in the state, but it is the only provider for pregnancies greater than 18 weeks and is the largest referral-based center with a catchment area that includes all islands. The goal of this study was to examine the relationship between a patient's post-abortion contraceptive method choice, including those who chose not to initiate a method, and the likelihood for more than 1 abortion over the 6-year period.

Methods

Data Collection

Data from the Women's Options Center Abortion Database was used for this survival analysis. Patients who had an abortion with the Women's Options Center during May 2010 and December 2016 (the data collection period) were identified using *International Classification of Diseases, Ninth Revision* (*ICD-9*) and Current Procedural Terminology (CPT) codes in the electronic health record. Immediately following the abortion or at a follow-up visit, the provider would document the contraceptive method(s) the patient had selected. Patient records were excluded from this analysis if the record had missing data for post-abortion contraceptive method, age, race, or insurance type. Patients who had abortions for fetal or maternal indications were also excluded, and encounters for the third or higher-order abortion for a patient were not included in this analysis.

Data Abstraction

Trained data abstractors reviewed each abortion encounter in the electronic health record and entered data into the Women's Options Center Abortion Database using Research Electronic Data Capture (REDCap), an online database system for tracking and storing research data.[14] Data entered for each encounter included demographic information such as age, race, and insurance type. Patients provided information on race and could select more than 1 racial group. Race categories included Alaskan Native/Native American, Asian, Native Hawaiian/Pacific Islander, African American, white, and no answer. Patients who identified more than 1 racial group were categorized as multiracial for the analysis.

Abstractors documented clinical encounter details such as gestational age, procedure type, complications, and contraceptive methods prescribed or provided during the abortion encounter or the abortion follow-up visit. Contraceptive method was confirmed with prescription records for oral, pill, patch, or ring contraceptives or procedure notes for LARC, injection, and sterilization methods. Patients were also categorized as having one or greater than 1 abortion in the database by a dichotomous variable ("Patient in the database more than once? Yes/No") and the encounter was numbered accordingly (first, second, third encounter, etc) in the database for reference. The primary investigator audited the data entries at regular intervals to ensure accuracy of data abstraction.

Statistical Analysis and Primary Outcome

The patient's first (or only) abortion encounter with the Women's Options Center (referred to hereafter as the "index" abortion) was analyzed. Insurance type was categorized as private (eg, Hawai'i Medical Services Association, United Health Association, etc), public (eg, Medicare, Medicaid), or uninsured (patients who reported no insurance or who self-paid). Contraceptive methods prescribed or provided were categorized into 7 different groups: no contraception; non-hormonal, less effective birth control methods (abstinence, withdrawal, natural family planning, condoms, diaphragm/cervical cap/sponge); depot medroxyprogesterone acetate (DMPA), more commonly known as Depo-Provera; oral contraceptive pills, patches, or rings (PPR); LARC; and plans for sterilization. A patient was categorized as a LARC recipient only if there was documentation of a device (implant or intrauterine device) being placed. Patients whose clinician reported plans for patient sterilization or partner's sterilization were documented without confirmation of the sterilization procedure. It is standard practice in this clinical setting to provide or prescribe contraception after any abortion encounter. The primary outcome was the risk for more than 1 abortion based on contraceptive method prescribed or provided at the index abortion visit.

A multivariate Cox proportional hazards regression, or survival analysis, was used to assess the association between contraceptive method prescribed or provided after the index abortion and the time to presenting for an additional abortion. Survival analyses are helpful when patients have unequal periods of follow up during the study period and allow for calculation of conditional probability of an event (in this case, a second abortion) based on time to event or no event occurring during the study period.[15] Patients who did not have an additional abortion during the data collection period were censored, whereas patients who had an additional abortion during the data collection period were analyzed in days between their index abortion and additional abortion. The primary independent variable was contraceptive method prescribed or provided at the index abortion encounter. The multivariate model also included 3 variables anticipated to cause confounding: age, race, and insurance type. The primary outcome was the likelihood of an additional abortion during the 67 months of data reflected in the database, reported as a hazard ratio (HR) with 95% confidence intervals (CI), both adjusted and unadjusted. Significance level was set at $P < .05$. Analysis was performed using SAS University Edition 3.6 (SAS Institute, Cary, North Carolina).

Results

Characteristics of Subjects

Of the 2544 records in the database, 292 encounters that were a patient's third or higher-order abortion, 179 encounters that were for maternal or fetal medical indications and 5 encounters for missing data were excluded. The remaining 2068 encounters

were included in the analysis (Figure 1). Of these, 158 (7.6%) patients were seen for more than 1 abortion at the Women's Options Center during the period of data collection.

The demographics of patients, grouped by single abortion or more than 1 abortion, are summarized in Table 1. The racial distribution reflects the racial and ethnic makeup of Hawai'i, and the 94% of patients had health insurance. The majority of the patients were either Asian or Native Hawaiian/Pacific Islander (74%). The average age of participants was 26.57 years (standard deviation [SD], 6.85), with a range of 12-49 years. Patients aged 19-25 represented the largest percent of the population (n = 790, 38.2%), with 65 (8.2%) patients having an additional abortion at the Women's Options Center.

Statistical Analyses

Frequency of more than 1 abortion by contraceptive method are shown in Table 2. The average time from index abortion to second abortion was 583 days. Patients who were prescribed PPR had a higher frequency of more than one abortion than patients in the other 6 contraceptive categories. Patients who received a LARC method immediately post-abortion, at their follow-up visit or who reported plans for personal or partner sterilization had the lowest rate of more than 1 abortion.

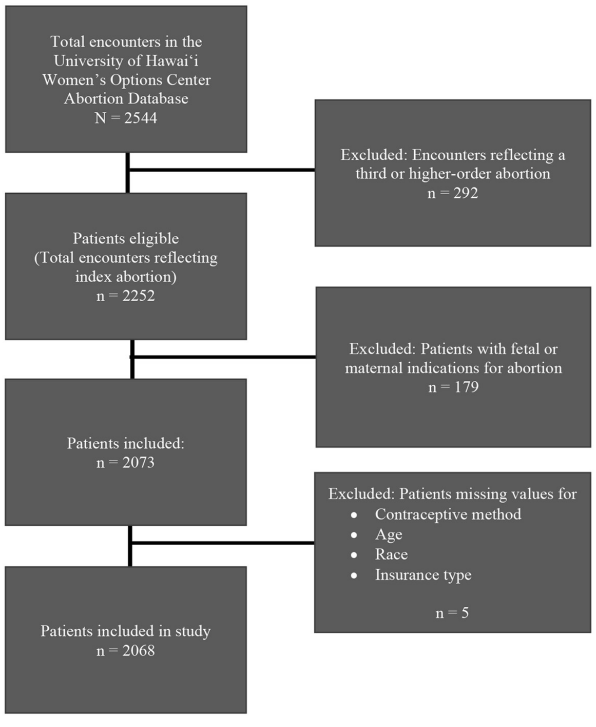

Figure 1. Schematic of Patient Selection and Exclusion Criteria

Figure 2 shows the difference between all contraceptive type groups is statistically significant using a Kaplan Meier Plot, with a $P = .0006$. The survival function depicts the probability a patient will only have 1 abortion given the contraceptive method.

Table 3 shows the crude and adjusted hazard ratios from the survival analysis. Patients who did not initiate a contraceptive method at the time of index abortion were the reference group. Those who were given PPR, LARC, or reported plans for sterilization were significantly associated with risk for more than 1 abortion after adjusting for age, race, and insurance type. Patients who received a prescription for PPR at their index abortion were 61% more likely to have more than 1 abortion than those who did not initiate a method for PPR (HR, 1.61; 95% CI: 1.14-2.28). In contrast, the participants who received a LARC method at their index abortion were 59% less likely to have more than one abortion when compared with patients receiving no method (HR, 0.41; 95% CI: 0.20-0.86). Patients receiving a prescription PPR were 293% more likely to have more than one abortion than those receiving a LARC at their index abortion (HR, 3.93; 95% CI: 1.88-8.21).

Table 1. Characteristics of Patients Seen at the University of Hawai'i Women's Options Center for 1 or More Abortion, May 2010–December 2016

Characteristic	Abortion visits	
	Patients seen for 2 abortions (N = 158)	Total patients (N = 2068)
	n (%)	n (%)
Race		
Alaskan Native/Native American	2 (25.0)	8 (0.4)
Asian	56 (7.0)	795 (38.4)
Native Hawaiian/Pacific Islander	60 (8.3)	725 (35.1)
African American	2 (6.1)	33 (1.6)
White	21 (7.1)	297 (14.4)
No answer	9 (8.3)	109 (5.3)
Multiracial[a]	8 (7.9)	101 (4.9)
Age (years)		
12-18	11 (4.9)	225 (10.9)
19-25	65 (8.2)	790 (38.2)
26-30	47 (9.7)	487 (23.6)
31-35	24 (7.5)	318 (15.4)
36 and older	11 (4.4)	248 (12.0)
Insurance type		
Private[b]	66 (6.8)	967 (46.8)
Public[c]	89 (9.1)	980 (47.4)
Uninsured	3 (2.5)	121 (5.9)

[a] Multiracial means that more than 1 race was selected.
[b] Private: Hawai'i Medical Service Association (HMSA), Hawai'i Mainland Administrators (HMA), University Health Alliance (UHA), Hawai'i Medical Assurance Association (HMAA), Aetna.
[c] Public: Medicaid, Medicare.

Table 2. Type of Contraceptive Method Prescribed or Provided at the Time of Index

Variable	Abortion visits	
	Patients seen for 2 abortions (N = 158)	Total patients (N = 2068)
Contraceptive type	n (%)	n (%)
No contraception	69 (7.4)	937 (45.3)
Less effective methods[a]	2 (4.9)	41 (2.0)
Depot medroxyprogesterone acetate injection[b]	14 (5.7)	246 (11.9)
Oral contraceptive pill, patch, or ring	65 (11.1)	569 (27.5)
Long-acting reversible contraception[b]	8 (3.0)	263 (12.7)
Sterilization	0 (0.0)	12 (0.6)

[a] Includes abstinence, withdrawal, natural family planning, condoms, diaphragm, cervical cap, sponge
[b] Commonly known as Depo-Provera and LARC, respectively

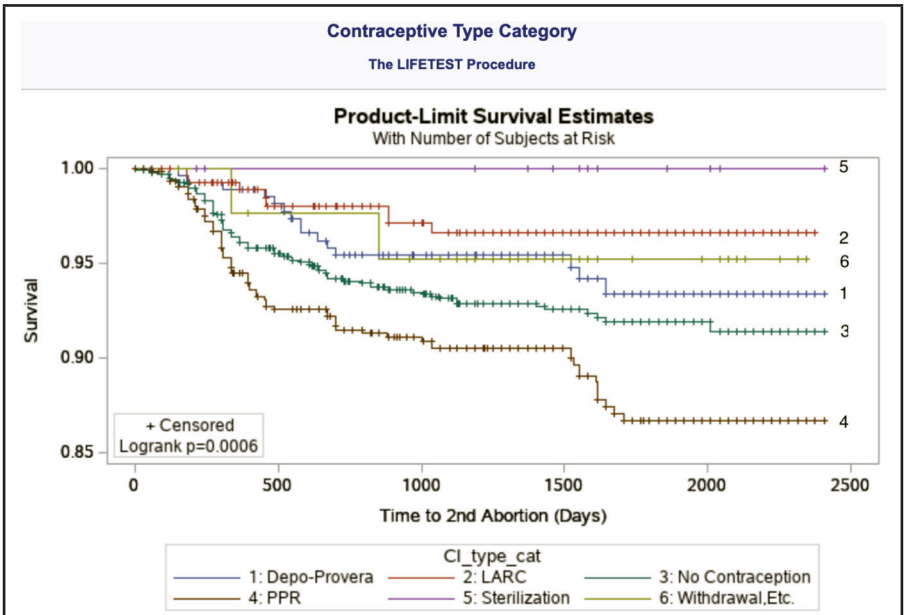

Figure 2. Likelihood of Having a Second Abortion by Type of Contraceptive Method Chosen at Time of First Abortion, May 2010–December 2016[a,b,c,d]

[a] Contraceptive type categories (CI_type_cat): Depo-Provera (depot medroxyprogesterone acetate injection), LARC (long-acting reversible contraceptive); no contraception; PPR (oral contraceptive pills, patches, or rings); sterilization (male or female); withdrawal, etc (abstinence, withdrawal, natural family planning, condoms, diaphragm/cervical cap/sponge).
[b] Second abortion represented by tick on the graph.
[c] Survival estimates represent the probability of patients only having 1 abortion given contraceptive type.
[d] *P*=.0006 represents the difference between contraceptive type categories and is considered statistically significant (*P*<.01).

Table 3. Crude and Adjusted Hazard Ratios of Type of Contraceptive Method and Additional Abortion, May 2010–December 2016

	Crude HR (95% CI)	Adjusted HR[a] (95% CI)
Contraception method		
No contraception	Reference	Reference
Less effective methods[b]	0.64 (0.16-2.67)	0.73 (0.18-3.01)
Depot medroxyprogesterone acetate injection[c]	0.73 (0.41-1.29)	0.69 (0.39-1.23)
Oral contraceptive pill, patch, ring	1.58 (1.13-2.62)**	1.61 (1.14-2.28)**
Long-acting reversible contraception[c]	0.43 (0.21-0.89)*	0.41 (0.20-0.86)*
Sterilization	0.00**	0.00**
Race		
Alaskan Native/Native American	4.73 (1.15-19.37)*	4.85 (1.17-20.11)*
Asian	Reference	Reference
Native Hawaiian/Pacific Islander	1.20 (0.83-1.72)	1.15 (0.80-1.65)
African American	0.85 (0.21-3.48)	0.89 (0.22-3.68)
White	0.99 (0.60-1.64)	0.94 (0.57-1.55)
No answer	1.24 (0.61-2.50)	1.16 (0.57-2.35)
Multiracial[d]	1.15 (0.55-2.42)	1.07 (0.51-2.24)
Age (years)		
12-18	0.58 (0.31-1.10)	0.58 (0.31-1.11)
19-25	Reference	Reference
26-30	1.20 (0.83-1.75)	1.21 (0.83-1.77)
31-35	0.95 (0.60-1.52)	1.03 (0.64-1.64)
36 and older	0.52 (0.27-0.98)*	0.61 (0.32-1.16)
Insurance type		
Private[e]	0.77 (0.50-1.05)	0.71 (0.50-0.99)*
Public[f]	Reference	Reference
Uninsured	0.29 (0.09-0.91)*	0.26 (0.08-0.82)*

Abbreviations: HR, hazards ratio; CI, confidence interval
[a] Adjusted for race, age, and insurance type
[b] Includes abstinence, withdrawal, natural family planning, condoms, diaphragm, cervical cap, sponge
[c] Commonly known as Depo-Provera and LARC, respectively
[d] Multiracial means more than 1 race was selected
[e] Private: Hawai'i Medical Service Association (HMSA), Hawai'i Mainland Administrators (HMA), University Health Alliance (UHA), Hawai'i Medical Assurance Association (HMAA), Aetna
[f] Public: Medicaid, Medicare
* $P<.05$
** $P<.01$

Discussion

This study found that the type of contraceptive method prescribed or provided at the time of index abortion was significantly associated with likelihood of having an additional abortion. The risk was highest among patients who received a prescription for PPR. This was higher than for patients who elected to use a method known to be less effective or no method at all.

This analysis reflects the real-world conditions in which patients make decisions about contraception use after an abortion, which includes the values and circumstances surrounding the patient and the contraceptive counseling and provision practices of the clinical setting. Contraceptive counseling is routine during abortion visits in these offices and the vast majority of patients have insurance coverage for contraception. Despite this, almost half (45.4%) of patients in the database had no method prescribed or provided at the end of their index visit.

This study was not able to determine why patients who selected PPR methods had a higher rate of more than 1 abortion. Previous literature found that patients who had more than 1 abortion were likely to have been using some form of contraception at the time of conception, implying that patients who experience an additional abortion are attempting to avoid pregnancy but may have experienced method failure caused by improper use, access issues, or other challenges reflecting a user-method mismatch.[16]

It is possible that in the clinical setting some patients who would have preferred to leave the visit with no method felt pressured to pick a method to satisfy their clinician and chose a method they were familiar with but had little or no intention to use, as has been demonstrated in other studies.[9,11] Recent data suggests that many patients would prefer not to discuss their contraceptive options with their abortion providers.[8] Because PPR are among the most well-known contraceptive method types in the United States, it is possible that these patients chose a method because it was familiar and they felt pressured to choose something, even if it did not meet their needs or plans.

Some patients certainly chose the PPR with the intention of using the method. Contraceptive failure contributes to 48% of unintended pregnancies in the United States.[17] The typical-use failure rate for PPR is known to be approximately 9%, while LARCs have a failure rate ranging from 0.05% to 0.8%.[4] Patients who were prescribed these PPR methods at their index visit may have experienced this typical-use failure, resulting in an additional unwanted pregnancy and abortion. Additionally, because the average time to a second abortion was greater than 1 year (538 days) it is also possible that patients who elected to start PPR at the time of their index abortion had run out of their initial prescription after 12 months, putting them at risk for another unwanted pregnancy.

While the typical-use failure rate of PPR may explain some of the additional abortions in this cohort, it does not explain how the risk for an additional abortion was higher than that seen among patients who left the visit with no method prescribed or provided. The risk for pregnancy among patients who use no method is estimated at 85%, almost 10 times the risk for patients using a PPR.[6] While these patients were not prescribed or provided with a method at their abortion visit, they may have received contraceptive counseling and initiated a method with a different provider. A recent survey of abortion patients noted that almost 20% of respondents indicated that they had already received counseling about a method from another provider; and therefore, they were uninterested in further counseling during their abortion visit.[8] While prescription records and follow-up notes from referring providers were used whenever possible to reflect patient's contraceptive uptake after the index visit it is possible that some patients in the "no method" group received contraception from another provider subsequent to their index abortion. It is also true that some patients decline contraception because they know that they have a low risk of pregnancy due to planned abstinence or a medical diagnosis of reduced fertility.

Limitations

This cohort study relies on data abstracted from patients' electronic health records. Although data abstractors were extensively trained, and data entry was regularly audited for accuracy, some data may have been incorrectly recorded. Abstractors were trained to review the electronic health record comprehensively, including prescriptions, follow-up visits, and referring providers' documentation to identify all data points, but some data may not have been available. Very few patients in this cohort reported plans for sterilization or use of the least effective contraceptive methods so data for theses contraceptive types should be interpreted cautiously.

Changes in contraceptive method types or changes in insurance status are also not accounted for after the index abortion. However, it is known to be standard practice in this office to prescribe patients a 12-month supply of their preferred contraceptive method, and the state of Hawai'i allows patients to fill up to 12 months of a prescription contraceptive at once. Both of these practices should support uninterrupted continuation of a method if a patient chooses to use it.

This data only reflects abortions at the Women's Options Center during the 67 months of data collection. Patients who had an abortion at the Women's Options Center may have visited another provider for a subsequent abortion which would not have been captured in the database. The same limitation applies to contraceptives prescribed, as it is only possible to capture contraceptive methods given at the Women's Options Center or prescriptions documented by another provider in the patient's electronic medical record.

Conclusion

Having more than 1 abortion is not inherently problematic; however, some patients may prefer to avoid having more than 1 abortion, due to emotional, financial, legal, or geographic burdens these procedures can present. Prescription for PPR after an abortion significantly increased the likelihood of more than 1 abortion compared to a patient who did not have a method prescribed or provided after their index abortion in this study. Patients who were provided with a LARC method or who reported plans for sterilization were significantly less likely to be seen for more than 1 abortion. These differences persisted after adjusting for age, race, and insurance type. To some extent, these increased hazard ratios are explained by typical-use failure rates. However, it is also possible that patients who are uninterested in contraceptive counseling at the time of abortion will elect to be prescribed a familiar method, with no intention of using the method, in order to end the counseling session. Abortion providers should be vigilant in supporting their patient's reproductive autonomy and be conscientious to avoid counseling approaches or language that implies a patient must choose a contraceptive method. Providers should inquire about and be respectful of a patient's desire to discuss contraception at the time of abortion and counsel patients who do elect to use PPRs about the typical-use failure rate of these methods.

Conflict of Interest

None of the authors identify any conflict of interest.

Authors' Affiliations:
- Office of Public Health Studies, University of Hawai'i, Honolulu, HI (KV)
- Department of Obstetrics, Gynecology and Women's Health, John A. Burns School of Medicine, University of Hawai'i, Honolulu, HI (KV, GM, SR, RS, BK, MT)

Correspondence to:
Kristen Valencia MPH; Email: ktvalenc@hawaii.edu

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