

Influence of Pregnancy Intention on Postpartum Contraceptive Choice at an Urban Academic Medical Center

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Abstract

Objective This study aimed to describe postpartum contraception preferences in the context of pregnancy intention (PI).

Study Design A prospective cohort study analyzing postpartum contraceptive choice (PCC) in 431 postpartum women who delivered at a single academic medical center. PCC in women with an unintended or mistimed pregnancy was compared to contraceptive choice in women with an intended pregnancy using the adapted National Survey of Family Growth categorization. Mistimed and unintended pregnancies were grouped for analysis. Generalized linear modeling estimated the relative influence of PI on PCC adjusting for maternal age, race, and parity.

Results Nearly three out of four (71.9%) pregnancies were mistimed or unintended. These pregnancies were more likely in women who were non-Hispanic Black (62.3%), unmarried (86.3%), 18 to 24 years (51.3%), and insured by Medicaid or Medicare (82.1%), compared to women with an intended pregnancy, p -value <0.001 . Women with mistimed or unintended pregnancy were 83% more likely to choose highly effective, user-independent methods compared to any other or no method, adjusted relative risk (aRR) = 1.83 (95% confidence interval [CI]: 1.36, 2.47), and more likely to desire voluntary sterilization, aRR = 2.70 (95% CI: 1.58, 4.59). Additionally, women with these pregnancies were 56% more likely to use user-independent methods compared to user-dependent methods, aRR = 1.56 (95% CI: 1.18, 2.06).

Conclusion Women with mistimed or unintended pregnancies are 83% more likely to choose highly effective postpartum contraception or voluntary sterilization, and thus initiatives are necessary to increase access and affordability to these methods before hospital discharge after delivery.

Keywords

- ▶ postpartum
- ▶ contraception
- ▶ intention
- ▶ LARC
- ▶ pregnancy intention

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Key Points

- Nearly three out of four pregnancies in this study were mistimed or unintended.
- Women with mistimed or unintended pregnancies are more likely to choose highly effective postpartum contraception or voluntary sterilization.
- Public health initiatives to improve access to family planning services and postpartum contraception, including surgery for bilateral tubal ligation before discharge from the hospital postdelivery, are important areas of focus to help attenuate the rates of unintended pregnancy in the United States.

The timing and intent of pregnancy are fundamental to both women's reproductive rights and reproductive health. Unintended pregnancy is defined by the National Survey of Family Growth (NSFG) as a pregnancy that occurs when the mother does not want to become pregnant.¹ These pregnancies are more likely to occur in low-income women, women between 18 and 24 years old, women unmarried but cohabitating, and women who are non-Hispanic Black or Hispanic.² The adverse public health-associated outcomes include maternal psychological distress, short interpregnancy interval (IPI), low birth weight and preterm delivery, neonatal intensive care unit (NICU) admission, and delayed initiation of prenatal care.^{3–6} According to NSFG data between 2006 and 2015, over one-third of unintended pregnancies occurred less than 18 months after delivery.⁷

The relationship between pregnancy intention (PI) and postpartum contraceptive choice (PCC) has been previously studied with variable results. In a cohort of women with HIV in Zimbabwe unintended pregnancy was associated with the uptake of long-acting reversible contraception (LARC), in a similar cohort of Ugandan women with HIV no association was found between PI and postpartum contraception.^{8,9} There are similar discrepancies between studies in the United States. One, using data from the 2011 to 2015 NSFG, which included primarily non-Hispanic White married women, found that women with seriously mistimed and unwanted births were more likely to desire highly effective birth control methods such as sterilization and LARCs compared to women with intended or slightly mistimed pregnancies.¹⁰ However, a more recent study using 2016 to 2017 data from health facilities in Arizona, New Jersey, New Mexico, South Carolina, and Texas, found that while women wanting to avoid pregnancy were more likely to use contraceptives, this was not associated with contraceptive methods in particular.¹¹ Given these inconsistent results, the aim of this study is to understand better the association between PI and PCC within the first day after delivery in a population at a large urban academic medical center in the United States. We hypothesize based on existing data that women with unintended pregnancy will choose highly effective birth control such as LARCs and voluntary sterilization.

Materials and Methods

We performed a hospital-based prospective cohort study of postpartum women at the University of Cincinnati Medical Center between 2011 and 2019. This study was approved by the Institutional Review Board at the University of

Cincinnati, Cincinnati, Ohio. Data on sociodemographic information, medical and pregnancy characteristics, and delivery outcomes were collected from the medical records of enrolled participants. Study personnel interviewed study participants using structured questions to determine postpartum women's experiences with their social determinants of health. All participants were postpartum women in the hospital after pregnancy. Race was self-reported as non-Hispanic Black, non-Hispanic White, Hispanic, or Asian. Due to low response rates, all other self-reported races and ethnicities were grouped as "other." Participants were eligible if they were at least 18 years old and spoke English. Participants were not compensated.

The primary exposure was PI which we defined using an adaptation of the Pregnancy Risk Assessment Monitoring System and NSFG's construct, **Fig. 1**.^{1,12,13} Current literature varies regarding the classification of mistimed pregnancies, and many analyze mistimed and unintended pregnancies together.^{12,13} Others distinguish between moderately and seriously mistimed pregnancies.¹⁴ With this in mind, mistimed and unintended pregnancies were grouped together in our study. Pregnancies were classified as intended if a woman conceived at the right time or had wanted to conceive earlier. Pregnancies were classified as unintended if she wanted to be pregnant but not at that time if she did not want to be pregnant then or at any time in the future, or if she did not think about getting pregnant.

The primary outcome was PCC. Contraceptive methods were placed into one of the five categories based on their effectiveness at preventing pregnancy, determined by the American College of Obstetricians and Gynecologists and the Center for Disease Control and Prevention.^{15–17} The categories were very effective methods (subdermal implant, intrauterine device (IUD), sterilization) which result in <1 pregnancy per 100 women per year, quite effective methods (injections, oral birth control pills, contraceptive patches, vaginal rings, diaphragms) which result in 6 to 12 pregnancies per 100 women per year, less effective methods (male condoms, female condoms, withdrawal, cervical caps, sponges, fertility awareness-based methods, and spermicides) which result in 18 or more pregnancies per 100 women per year, unsure of which method, and no method. Given our hypothesis that very effective methods (LARCs and sterilization) will have higher postpartum uptake in women following unintended pregnancy, we defined the primary outcome group as women opting to use very effective methods and our referent group included women using any less effective method, including no method. Women who responded to more than one postpartum birth

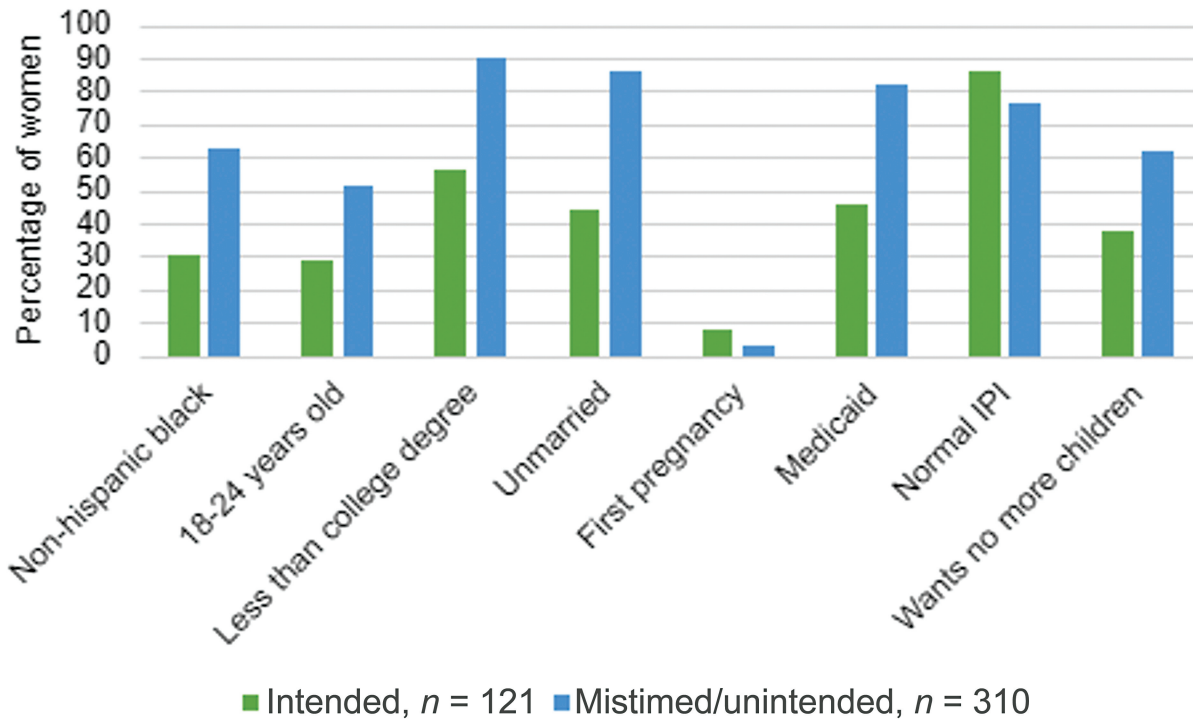


Fig. 1 Selected demographic characteristics stratified by final pregnancy intention classification. IPI, interpregnancy interval.

control method were coded as using the most effective method. For example, a woman who reported using both condoms and the subdermal implant were coded as using the subdermal implant. The secondary outcome was neonatal health approximated by rates of preterm birth (defined as <37 weeks gestation), very low birth weight (defined as <1,500 g), and frequency of NICU admission.

Differences in sociodemographic factors, pregnancy characteristics, as well as social determinants, were compared using χ^2 . Generalized linear modeling (GLM) was used to estimate the adjusted relative risk (RR) of PI on PCC adjusting for maternal age, race and ethnicity, and parity, which were chosen using backward selection until a final model of statistically significant and biologically plausible covariates consistent with the current literature was identified.¹⁸ Each outcome was treated as dichotomous, and we used a log-binomial model, GLM, with a log link for each. This linear model approach is well-suited to estimate relative risk with binary outcomes. Data were collected and managed with Research Electronic Data Capture electronic data capture tools hosted by the Center for Clinical & Translational Science & Training at the University of Cincinnati.¹⁹ Analysis was performed with STATA software (version 15.1; Stata Corporation, College Station, TX).

Results

Four hundred and forty-six women were enrolled in the study. Of those, 431 (96.6%) were included in this analysis after excluding those who did not provide answers to questions about PI or PCC ($n = 15$, 3.4%). Of these 431 participants,

there were missing data for education level ($n = 1$, 0.2%), marital status ($n = 4$, 0.9%), religious affiliation ($n = 6$, 1.4%), health insurance status ($n = 4$, 0.9%), future pregnancy intent ($n = 30$, 7.0%), and IPI among women with at least two pregnancies ($n = 124$, 27.8%). Among all participants, 71.9% of pregnancies were unintended, **Table 1**. Women with unintended pregnancy were more likely to be non-Hispanic black, unmarried, 18 to 24 years old, and insured by Medicaid or Medicare compared to women with intended pregnancies, $p < 0.001$, **Table 1** and **Fig. 1**. The mean age at delivery was 26.2 years (± 5.8). Thirty-three percent of women with unintended pregnancy and 66% of women with intended pregnancy were planning to have another child, $p \leq 0.001$, **Table 1**.

Nearly all women (97.4%) enrolled in the study planned to use postpartum contraception, with 98.7% of women with unintended or mistimed pregnancies and 94.2% of women with intended pregnancies having plans for postpartum contraception, $p = 0.016$. The most popular contraceptive methods among all women were IUDs (21.4%), female sterilization (20.7%), and Depo-Provera (20.2%), **Table 2**. Interestingly, there were no statistically significant differences between women with intended and unintended pregnancy regarding individual PCC except for female sterilization and male condom use. Women with unintended pregnancies were more likely to desire female sterilization and less likely to desire male condoms. These differences between postpartum birth control (PPBC) in women with unintended versus intended pregnancy were driven by overall PCC effectiveness groups. For example, women with unintended pregnancy were 83% more likely to choose highly effective birth control compared to any

Table 1 Maternal sociodemographic data

Characteristic	Total	Pregnancy intended	Pregnancy mistimed/unintended	p-Value
Race and ethnicity	n = 431	n = 121	n = 310	0.000
Non-Hispanic White	175 (40.6%)	73 (60.3%)	102 (32.9%)	
Non-Hispanic Black	230(53.4%)	37 (30.6%)	193 (62.3%)	
Hispanic	13 (3.0%)	2 (1.7%)	11 (3.6%)	
Asian	10 (2.3%)	8 (6.6%)	2 (0.7%)	
Other	3 (0.7%)	1 (0.8%)	2 (0.7%)	
Maternal age	n = 431	n = 121	n = 310	0.000
<18	10 (2.3%)	–	10 (3.2%)	
18–24	194 (45.0%)	35 (28.9%)	159 (51.3%)	
25–34	189 (43.9%)	72 (11.6%)	117 (37.7%)	
>34	38 (8.8%)	14 (11.6%)	24 (7.7%)	
Education level	n = 430	n = 121	n = 309	0.000
<High school	119 (27.7%)	13 (10.7%)	106 (34.3%)	
High school or GED	120 (27.9%)	31 (25.6%)	89 (28.8%)	
Some college, no degree	107 (24.9%)	24 (19.8%)	83 (26.7%)	
College degree or greater	84 (19.5%)	53 (43.8%)	31 (10.0%)	
Marital status	n = 427	n = 120	n = 307	0.000
Married (ref)	109 (25.5%)	67 (55.8%)	42 (13.7%)	
Parity	n = 431	n = 121	n = 310	0.001 ^a
1	18 (4.2%)	9 (7.4%)	9 (2.9%)	
2	151 (35.0%)	54 (44.6%)	97 (31.3%)	
3	108 (25.1%)	27 (22.3%)	81 (26.1%)	
4 to 5	110 (25.5%)	28 (23.1%)	82 (26.5%)	
6+	44 (10.2%)	3 (2.5%)	41 (13.2%)	
Insurance	n = 427	n = 120	n = 307	0.000
Medicaid or Medicare	307 (71.9%)	55 (45.8%)	252 (82.1%)	
Other (ref)	120 (28.1%)	65 (54.2%)	55 (17.9%)	
IPI	n = 289	n = 73	n = 216	0.015
Short, <18 months	61 (21.1%)	10 (13.7%)	51 (23.6%)	
Planning to have another child	n = 401	n = 110	n = 291	0.000
Yes	180 (44.9%)	69 (62.7%)	111 (38.1%)	

Abbreviation: GED, General Educational Development; IPI, interpregnancy interval.

^aStatistically significant.

other or no method, adjusted relative risk (aRR) 1.83 (95% confidence interval [CI]: 1.36, 2.47), and were additionally 69% less likely to desire less effective methods of birth control compared to any other or no method, aRR = 0.311 (95% CI: 0.14, 0.68). Preferences for highly effective PPBC were primarily driven by an uptake in female sterilization instead of reversible contraceptive methods such as implants and IUDs, **Table 2** and **Fig. 2**. Women with unintended pregnancy were 170% more likely to prefer female sterilization than their counterparts with intended pregnancy.

The rates of neonatal outcomes were not significantly different between intended and unintended pregnancies, **Table 3**.

Discussion

In this study of postpartum women at the University of Cincinnati Medical Center, we found that nearly all women planned to use contraception. In contrast to our hypothesis that women with unintended pregnancy would prefer all highly effective contraceptive methods, there were no statistically significant differences between women with intended and women with unintended pregnancy regarding individual postpartum contraception except for an increased interest in female sterilization for women with unintended pregnancy. There was, however, a statistically significant

Table 2 Contraceptive choices for women with mistimed or unintended pregnancies compared to intended pregnancies

Postpartum birth control	Pregnancy intended <i>n</i> = 121	Pregnancy mistimed/unintended <i>n</i> = 310	Adjusted RR (95% CI) ^a
Not going to use a method ^b	7 (5.8%)	4 (1.3%)	0.22 (0.06, 0.80)
Will use a method, unsure which type ^b	19 (15.7%)	15 (4.8%)	0.32 (0.16, 0.64)
Very effective methods^b	37 (30.6%)	166 (53.6%)	1.83 (1.36, 2.47)
Hormonal implant	3 (2.5%)	13 (4.2%)	1.44 (0.39, 5.26)
IUD, coil, loop	16 (13.2%)	76 (24.5%)	1.50 (0.90, 2.50)
Female sterilization ^b	14 (11.6%)	75 (24.2%)	2.70 (1.58, 4.59)
Vasectomy	4 (3.3%)	2 (0.77%)	0.39 (0.07, 2.12)
Quite effective methods	41 (33.9%)	114 (36.8%)	1.02 (0.76, 1.37)
Oral birth control pills	23 (19.00%)	34 (11.0%)	0.70 (0.42, 1.17)
Depo-Provera	13 (10.8%)	74 (23.9%)	1.63 (0.93, 2.87)
Diaphragm	–	–	–
Lunelle injectable	1 (0.8%)	1 (0.3%)	0.39 (0.02, 7.37)
Emergency contraception	–	–	–
Vaginal contraceptive ring	4 (3.3%)	5 (1.6%)	0.50 (0.13, 1.97)
Less effective methods^b	17 (14.1%)	11 (3.6%)	0.311 (0.14, 0.68)
Male condoms ^b	11 (9.1%)	5 (1.6%)	0.22 (0.07, 0.66)
Withdrawal	–	–	–
Rhythm, safe period by calendar	1 (0.8%)	1 (0.3%)	0.60 (0.03, 10.53)
Natural family planning	4 (3.3%)	2 (0.7%)	0.27 (0.04, 1.70)
Female condom, vaginal pouch	–	–	–
Spermicides	–	–	–
Cervical cap	–	–	–
Today Sponge	–	–	–
Other	1 (0.8%)	3 (1.0%)	0.97 (0.09, 10.17)

Abbreviation: RR, relative risk.

Note: Bold values are statistically significant.

^aAdjusted for maternal age, race and ethnicity, and parity.

^bSignificantly significant.

difference between groups of contraception based on effectiveness. For example, women with unintended pregnancy were statistically more likely to use very effective methods of contraception, although again, this is likely largely driven by uptake in female sterilization. Additionally, although unintended pregnancy was more common among pregnancies with higher parity >2, female sterilization remained significantly associated with unintended pregnancy even after adjusting for the confounding influence of parity in the adjusted analysis. Regarding our secondary outcomes, we found no difference between women with intended and unintended pregnancy for rates of preterm birth, very low birth weight, or NICU admission. However, we did not have sufficient power to detect these secondary outcome differences. Our study's strengths include the structured in-person administration of a comprehensive survey detailing participants' social determinants of health. These details are especially important to take into consideration when addressing how to improve birth control access to reduce unintended pregnancies.

Researchers have investigated the association between PI and PCC, but results have been inconsistent. Some studies show that unintended pregnancy is associated with increased uptake of highly effective postpartum contraception while others found that it is associated with increased contraceptive uptake in general but not with a particular method.^{8–10} There are some studies that demonstrate there is no association between PI and postpartum contraception.¹¹ One study using data from the 2010 Colombia and 2012 Peru Demographic and Health Surveys is particularly interesting because it highlights the influences of family planning and cultural backgrounds.²⁰ While this study found that women in both Peru and Colombia with unintended pregnancy were more likely to switch to a contraceptive method with higher effectiveness instead of resuming their previous methods, there were distinct differences in postpartum LARC uptake between women in these two countries.²⁰ One possible explanation is a lack of accessibility or information around LARCs for women in Peru. However, another explanation emerges when considering Peru's

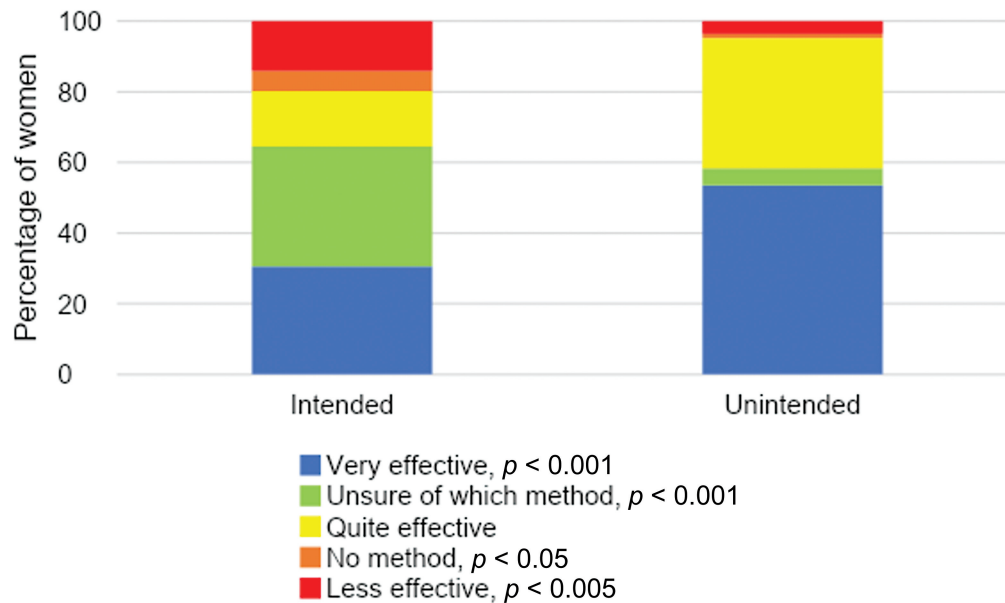


Fig. 2 Distribution of postpartum contraceptive choices by pregnancy intention.

Secondary outcomes	Pregnancy intended, n = 121	Pregnancy mistimed/unintended, n = 310	Adjusted RR (95% CI) ^a
Preterm birth, <37 weeks	26 (21.5%)	54 (17.5%)	0.90 (0.58, 1.39)
Very low birth weight infant, <1,500 g	15 (12.4%)	17 (5.5%)	0.50 (0.25, 1.00)
Neonatal intensive care unit admission	29 (24.0%)	66 (21.3%)	0.94 (0.63, 1.41)

Abbreviation: RR, relative risk.

^aAdjusted for maternal age, race and ethnicity, and parity.

cultural background. First, Peru’s population is largely composed of indigenous groups who tend to use less effective contraceptive methods.²⁰ Second, as recently as 2000, hundreds of thousands of Peruvian women were sterilized without informed consent as part of a government-run antipoverty drive to decrease birth rates among Peru’s poorest citizens.²¹

When considering PCC among women at the study institution, it is particularly interesting that women with unintended pregnancy overwhelmingly desired female sterilization. Importantly, while an increased uptake of tubal sterilization among minority women is well-documented independent of PI, there is also evidence that these women may experience unintended pregnancy more frequently and then subsequently choose tubal sterilization, which is consistent with the results of our study.^{22–24}

This study has limitations. First, there is controversy about how to best classify PI.¹² Second, compared to other studies using NSFG survey data, our sample size is relatively small (n = 431). Due to limited availability of research volunteer staff, there was inconsistent enrollment during the study period. Three-hundred and ninety-one surveys (90.3%) were administered between June 2011 and July 2014, and 40

(9.3%) were administered between June and July 2019. Our small sample size makes it difficult to draw many conclusions, particularly regarding individual birth control preferences, such as condoms. Additionally, our study only investigates postpartum contraceptive behavior in unintended pregnancies with live births. While we assess women’s desired PCC, we do not assess their uptake. There is a paucity of literature that specifically examines planned versus uptake of PPBC, however, there are a few existing studies that examine general knowledge of contraception versus its uptake. These generally find that awareness of birth control methods, whether from health care providers or families, does not necessarily translate into use.^{25,26} Our sample population is from an urban academic health center in the midwestern United States and is limited to English-speaking patients, which may limit its external validity to women who reside elsewhere. Finally, we were not able to identify physician counseling regarding PPBC and how that may have influenced PCC.

Despite these limitations, this study provides important insight into women’s PCCs. Our finding that these choices did not differ by PI suggests that women have multifaceted preferences regarding birth control methods that cannot be

explained by PI alone. Indeed, while health care professionals may be more likely to choose contraceptive methods based on their effectiveness at preventing pregnancy, in general, women's contraceptive preferences are multifaceted and influenced by psychological, relational, sexual, and cultural factors.²⁷ To this point, a survey of 488 female family planning providers found that these practitioners were significantly more likely to use LARC compared to the general population (41.7 vs. 12.1%, $p < 0.001$).²⁸ Contraceptive choice may also be influenced by implicit bias. A randomized trial of 524 health care providers showed videos of patients with varying race and ethnicity and socioeconomic status demonstrated that low socioeconomic status Hispanic and non-Hispanic Black patients were more likely to have IUD recommended than low socioeconomic status White patients.²⁹ Finally, it is important for family planning providers to consider how the historical background of contraception, such as Norplant insertion requirements in exchange for Welfare benefits and forced sterilization, might influence their patients.³⁰ All this highlights the need for individualized, patient-centered contraceptive counseling. Furthermore, public health initiatives to improve access to family planning services and postpartum contraception, including surgery for bilateral tubal ligation before discharge from the hospital postdelivery, are important areas of focus to help attenuate the rates of unintended pregnancy in the United States. Further research in this area could focus on PI and contraception following other pregnancy outcomes such as miscarriage, stillbirth, and pregnancy termination, as well as more comprehensive assessments of women's contraceptive goals.

Note

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Conflict of Interest

None declared.

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