

How Long-Acting Reversible Contraception Knowledge, Training, and Provider Concerns Predict Referrals and Placement

Charee M. Thompson, PhD, MA; Jane Broecker, MD; Maggie Dade, OMS IV

From the Department of Communication in the College of Liberal Arts and Sciences at University of Illinois in Urbana (Dr Thompson); and the Department of Obstetrics and Gynecology (Dr Broecker) at the Ohio University Heritage College of Osteopathic Medicine in Athens (Student Doctor Dade).

Financial Disclosures: Dr Broecker has received honoraria from Merck & Co. for being a Nexplanon trainer.

Support: This work was supported by an internal research grant through the Ohio University Heritage College of Osteopathic Medicine.

Address correspondence to: Charee M. Thompson, PhD, MA, Department of Communication, College of Liberal Arts and Sciences, University of Illinois at Urbana-Champaign, 702 S Wright St, Urbana, IL 61801-3631.

E-mail: charee@illinois.edu

Submitted
November 29, 2018;
revision received
February 5, 2019;
accepted
March 11, 2019.

Context: Providing long-acting reversible contraception (LARC; eg, subdermal implants and intrauterine devices [IUDs]) can help mitigate rates of unintended pregnancy because they are the most effective reversible contraceptive methods. However, many varied barriers to LARC placement are reported. Medical education and training can be tailored if there is a better understanding of how barriers predict LARC referral and to predicting LARC placement.

Objective: To understand how a variety of key barriers to LARC placement are related to one another; to identify which of the barriers, when considered simultaneously, predict LARC referral and LARC placement; and to assess the barriers to LARC placement that persist, even when a major barrier, training, is removed.

Methods: We recruited providers (obstetricians and gynecologists, family physicians, pediatricians, internal medicine physicians, certified nurse practitioners, and certified nurse midwives) across the state of Ohio. Participants were compensated with a \$35 Amazon gift card for completing an online survey comprising 38 Likert-type items, an 11-item knowledge test, LARC placement and referral questions, and demographic questions. We conducted data analyses that included correlations, odds ratios, and independent samples *t* tests.

Results: A total of 224 providers participated in the study. Long-acting reversible contraception knowledge, training, and provider concerns were correlated with one another. Training was found to positively predict placement and negatively predict referral when other barriers, such as knowledge and provider concerns, were considered simultaneously. Of providers who were trained to place implants, 18.6% (*n*=16) said they referred implant placement, and 17.4% (*n*=15) said they did not place implants. Of providers who were trained to place IUDs, 26.3% (*n*=26) said they referred IUD placement, and 27.3% (*n*=27) said they did not place IUDs. Those who referred placement and those who did not place LARCs reported greater barriers (in type and magnitude) to LARC placement than those who did place LARCs.

Conclusion(s): Long-acting reversible contraception knowledge, training, and provider concerns about barriers to LARC placement were interdependent. Even when providers were trained to place LARCs, a significant portion referred or did not place them. Efforts to increase LARC placement need to address multifaceted barriers.

J Am Osteopath Assoc. 2019;119(11):725-734
doi:10.7556/jaoa.2019.122

Keywords: contraception, intrauterine device, LARC, women's health

Forty-five percent of all pregnancies in the United States are unintended.¹ Unintended pregnancies continue to be a public health concern because of their economic costs, their links to poor infant and maternal health, and the hardships they present to women, children, and families.² Government agencies (eg, Department of Health and Human Services' Healthy People 2020 initiative on family planning) and medical professional organizations (eg, the American College of Obstetrics and Gynecology,³⁻⁶ the American Academy of Pediatrics⁷) recommend the provision of long-acting reversible contraception (LARC; eg, subdermal implants and intrauterine devices [IUD]) to mitigate rates of unintended pregnancy because they are more than 99% effective in preventing pregnancy when compared with other contraceptive methods.⁸ Despite LARC effectiveness and steady increases in their use in recent years, LARC use among women remains relatively low, with 12% of women who use contraceptives relying on IUDs and 3% on implants.⁹

There are many studies that document providers' (ie, obstetricians and gynecologists, family physicians, pediatricians, internal medicine, certified nurse practitioners, and certified nurse midwives) barriers to LARC placement. Our goal was not to uncover novel barriers. Instead, we sought to integrate some of the most commonly mentioned provider barriers into 1 study and understand how they are associated with one another and how they uniquely predict LARC referral and placement when considered together. Research findings have demonstrated that these barriers do not exist in isolation.¹⁰⁻¹² Our reading of the literature, which included professional bulletins and opinions,³⁻⁷ systematic reviews,¹²⁻¹⁴ and empirical studies,^{15,16} revealed 3 major barriers to LARC placement: (1) lack of LARC knowledge, including eligibility criteria for LARCs^{11-14,16-25}; (2) lack of training and skill in placing LARCs^{12-15,22,24}; and (3) provider concerns.

We included 4 subtypes of provider concerns in this study: (1) perceptions of patients' worries that LARCs

are risky and unsafe^{5,6,12,17-19,23,25,26}; (2) concerns about LARCs as safe and appropriate choices for patients^{5,6,11,17,19,27-29}; (3) concerns about procedural risks and complications^{5,6,18,19,25}; and (4) concerns about resource constraints, including cumbersome reimbursement processes and inadequate supply and personnel.^{11,12,22-25,28} Despite this burgeoning literature, statistical evidence derived from a larger sample of providers of how these barriers are associated with one another is lacking.

The current study assessed the relative weight of these barriers when they are considered together in predicting physicians' LARC referral and placement. Most studies^{10,17,27} documented the barriers to LARC placement using an inductive approach by interviewing different providers caring for varied patient populations. These studies were limited in their capacity to predict which barriers were most closely associated with LARC referral and placement. Medical education and training can be tailored and prioritized if there is a better understanding of the specific barriers impeding LARC referral and placement.

Some providers who have training continue to refer rather than place LARCs themselves. In other words, the interdependent nature of the barriers to LARC placement means that even in the absence of some barriers—and arguably the most commonly cited, training—there are still obstacles inhibiting providers from placing LARCs.

Four research questions emerged from our literature review: (1) How are LARC knowledge, training, and concerns correlated with one another? (2) Which barriers (knowledge, training, and 4 sources of provider concern), relative to one another, are the strongest predictors of whether providers refer LARC placement to other providers? (3) Which of the barriers, relative to one another, are the strongest predictors of whether providers currently place LARCs? (4) Among providers who were trained to place LARCs, how did the barriers differ between those who did or did not place and those who did or did not refer?

Methods

This study and its protocol were approved by Ohio University's institutional review board. We collected data during the summer and fall of 2016. Providers (ie, obstetricians and gynecologists, family physicians, pediatricians, internal medicine, certified nurse practitioners, and certified nurse midwives) who provided care to adolescent and adult women (aged 13-55 years) were recruited from across the state of Ohio to participate in this study. As part of a larger project about providers and LARCs, we recruited broadly within the state of Ohio (about half of Ohio's 88 counties). Providers need not have placed a LARC to participate. The only exclusion criterion was that providers could not be a current resident physician.

Using standard conventions ($\beta=.80$; $\alpha=.05$) and expecting a medium effect size (odds ratio, 1.72), we used G*Power³⁰ to determine that the sample size needed was 139. To achieve this minimum sample size, recruitment was done in 4 phases. First, we located publicly available practice and provider information to obtain 19 providers' email addresses. Second, we contacted program managers and directors at these sites to request access to provider emails or to request that they share the survey on our behalf. Third, we used the Centers for Osteopathic Research Education directory to obtain 2539 provider emails. Fourth, we posted an advertisement for the study in the weekly Ohio Osteopathic Association newsletter. In our recruitment materials and in the questionnaire, we defined LARCs as subdermal etonogesterel implants and levonorgesterel and copper IUDs.

Upon accessing the online survey via Qualtrics software, providers were presented with informed consent. If they agreed to participate, they continued to the questionnaire. Participants received a \$35 Amazon gift card for their participation.

Measures

Our questionnaire contained a series of measures designed to assess providers' LARC knowledge and training and to understand their perceived concerns about LARC placement. The order of these measures

was randomized to prevent order effects. At the end of the questionnaire, providers were asked to report demographic information and information about their practice.

Knowledge

We developed 11 multiple-choice and true/false questions to assess providers' knowledge of LARCs. The items were based on research concerning common misconceptions about LARCs and current eligibility criteria for LARC placement. We asked, "Based on current data, what percentage of patients request removal of implant due to bleeding?" We also asked participants to identify the contents of various LARCs, as well as their recommended length of placement (eg, 1, 3, 5, or 10 years). Scores were calculated as the sum of the participants' correct answers.

Training

Two items on a Likert-type scale (1=strongly disagree to 5=strongly agree) assessed training for LARCs: "I am trained to place implants/IUDs" and "I know how to access training to insert implants/IUDs." Scores were computed as the mean of the items.

Concerns

Concerns comprised patient, provider, procedural, and resource concerns. We measured providers' perceptions of patients' concerns with 4 items on a Likert-type scale (1=strongly disagree to 5=strongly agree). Items included, "I think patients are concerned about device malplacement/migration" and "I think patients believe implants/IUDs increase risk of infertility." Scores were computed as the mean of the items.

We measured providers' general concerns with 3 items on a Likert-type scale (1=strongly disagree to 5=strongly agree). Items included, "I believe implants discourage condom use" and "I am concerned it can migrate or shift/be displaced." Scores were computed as the mean of the items.

We measured providers' procedural concerns with 4 items on a Likert-type scale (1=strongly disagree to 5=strongly agree). Items included, "I am concerned

about immediate procedural risks and device complications” and “I believe placement procedure is complicated.” Scores were computed as the mean of the items.

We measured providers’ resource concerns with 6 items on a Likert-type scale (1=strongly disagree to 5=strongly agree). Items included, “I think they take too much time for counseling,” “I do not have the necessary equipment and/or adequate supply of implants,” and “I believe the process of precertifying and ordering for the implant devices is cumbersome.” Scores were computed as the mean of the items.

Outcome Variables

We asked providers whether they refer placement of implants and IUDs to other providers (yes or no), and whether they currently place implants and IUDs (yes or no).

Statistical Analysis

We conducted all statistical tests using SPSS statistical software version 25.0 (IBM) and used a significance level of $\alpha=.05$. We used a combination of correlation, regression, cross-tabulation, and independent-sample *t* test analyses to answer our 4 research questions.

Results

A total of 224 providers participated in the study. Demographics and practice characteristics are presented in [Table 1](#). Long-acting reversible contraception referral and placement rates for the sample and by provider specialty are presented in [Table 2](#).

Our first research question asked how LARC knowledge, training, and concerns were correlated with one another. [Table 3](#) provides the bivariate correlations among the variables. Knowledge, training, and concerns were all significantly related to one another with a few exceptions.

Our second and third research questions asked which barriers (knowledge, training, and the 4 sources of concern) mattered most (relative to one another) in predicting whether providers referred placement to

other providers and whether they currently place implants and IUDs. Because the outcome variables were dichotomous in nature, we conducted 2 binary logistic regressions each for implants and LARCs, 1 for each outcome variable (0=no and 1=yes for both referring and placing). Training, knowledge, perceived patient concerns, provider concerns, procedure concerns, and resource concerns were entered together as predictors for each of the 4 models (referral and placement for implants and IUDs).

When the outcome variable was LARC referral to other providers, we found that only implant training significantly and negatively predicted implant referrals ([Table 4](#)). The inclusion of knowledge, training, and barriers to the model improved the accuracy of predicting which providers did and did not refer implant placement by 23%, from 64.1% to 87.4%. Intrauterine device training negatively predicted IUD referral. The inclusion of knowledge, training, and barriers to the model improved the accuracy of predicting which providers did and did not refer IUD placement by 25%, from 61.6% to 86.9%.

When placing LARCs was the outcome variable, we found that only implant training predicted placing implants ([Table 4](#)). The inclusion of knowledge, training, and barriers to the model improved the accuracy of predicting which providers did and did not place implants by 26%, from 66% to 92.5%. Intrauterine device training and LARC knowledge predicted placing IUDs. The inclusion of knowledge, training, and barriers to the model improved the accuracy of predicting which providers did and did not place IUDs by 27%, from 65% to 92.4%.

Our fourth research question asked how, among providers who are trained to place LARCs, knowledge, training, and concerns differed between those who did or did not refer or place LARCs. Cross-tabulations revealed that 86 providers in the sample reported implant training (ie, they selected 4=somewhat agree or 5=strongly agree on the item, “I am trained to place implants”). Of the providers trained to place implants, 18.6% (*n*=16) said they refer implant placement, and

Table 1.
Demographics and Practice Characteristics of
Ohio Providers Participating in LARC Placement
Study^a (N=224)

Demographics and Characteristics	No. (%)
Age, Mean (SD), y	45.24 (10.44)
Years in Practice, Mean (SD)	13.81 (9.54)
Sex	
Men	87 (43.3)
Women	113 (56.2)
Ethnicity	
White	166 (82.2)
Asian	21 (10.4)
Hispanic	7 (3.5)
Black/African American	3 (1.5)
Other	5 (2.5)
Provider Type	
Osteopathic physician	93 (46.0)
Allopathic physician	85 (42.1)
Certified nurse practitioner	19 (9.4)
Certified nurse midwife	4 (2.0)
Provider Specialty	
Family medicine	115 (51.3)
OB/GYN	40 (17.9)
Pediatrics	37 (16.5)
Internal medicine	32 (14.3)
Practice Type	
Hospital	76 (37.6)
Private	43 (21.3)
Group	37 (18.3)
Academic	25 (12.4)
FQHC	15 (7.4)
Other	6 (3.0)
Distance to Inpatient Facility	
<25 miles	195 (98.0)
Mean Percentage of Patient Population by Patient Age, y	
<13	18.4
13-18	17.3

(continued)

Table 1. (continued).
Demographics and Practice Characteristics of
Ohio Providers Participating in LARC Placement
Study^a (N=224)

Demographics and Characteristics	No. (%)
19-50	41.8
>50	32.8

^a Providers are defined as obstetricians and gynecologists (OB/GYN), family physicians, pediatricians, internal medicine, certified nurse practitioners, and certified nurse midwives

Abbreviations: FQHC, federally qualified health center; LARC, long-acting reversible contraception.

17.4% (n=15) said they did not place implants. Ninety-nine providers in the sample reported IUD training (ie, they selected 4=somewhat agree or 5=strongly agree on the item, “I am trained to place IUDs”). Of them, 26.3% (n=26) said they refer IUD placement, and 27.3% (n=27) say they did not place IUDs. We conducted a series of independent samples *t* tests comparing those who do/do not refer and those who do/do not place LARCs and knowledge and concerns. For both implants and IUDs, those who were trained and referred or did not place LARCs had significantly higher provider, procedure, and resource concerns and scored significantly lower in knowledge, than those who were trained and did not refer or place. [Table 5](#) provides results from the mean comparisons.

Discussion

We found that all of the barriers to implant placement assessed in this study were moderately to strongly correlated with one another, which suggests interdependence among training, knowledge, and provider concerns. The current study is consistent with more descriptive studies,^{11,22} finding that within a given sample, providers report a variety of barriers. As an exception, no significant relationship was found between providers' LARC knowledge and their

Table 2.
Long-Acting Reversible Contraception Placement and Referral Frequencies by Provider Type^a
(N=224)^{b,c}

	OB/GYN	Family Medicine	Internal Medicine	Pediatrics	Total
Refer Implants	7 (17.5)	66 (57.4)	27 (84.4)	31 (83.8)	131 (64.5)
Refer IUDs	1 (2.5)	68 (59.1)	24 (75.0)	33 (89.2)	126 (61.5)
Current No. of Implants Placed per mo	32 (80.0)	33 (28.7)	1 (3.1)	3 (8.1)	69 (33.7)
1-5	23 (71.9)	28 (84.8)	1 (100)	3 (100)	55 (78.3)
6-10	6 (18.8)	4 (12.1)	0 (0)	0 (0)	10 (14.5)
11-25	3 (9.4)	0 (0)	0 (0)	0 (0)	3 (4.3)
Current No. of IUDs Placed per mo	38 (95)	33 (28.7)	0 (0)	1 (2.7)	72 (35.3)
1-5	19 (50)	24 (72.7)	0 (0)	1 (100)	44 (61.1)
6-10	14 (36.8)	5 (15.2)	0 (0)	0 (0)	19 (26.4)
11-25	5 (13.2)	0 (0)	0 (0)	0 (0)	5 (6.9)

^a Providers are defined as obstetricians and gynecologists (OB/GYN), family physicians, pediatricians, internal medicine, certified nurse practitioners, and certified nurse midwives.

^b Specialty percentages reflect within specialty frequencies, not overall sample.

^c Data are given as No. (%).

Abbreviations: IUD, intrauterine device.

perceptions of patient concerns about implants. One might think that knowledge would assist providers in dispelling myths patients might have, and we would see a significant, negative correlation. However, this same reasoning may explain our finding that was not significant: providers may have little to no control over patients' concerns about implants and the information they receive from other sources, including family, peers, and media.

We found that when the barriers to LARC placement are considered together, training was the only consistent predictor of whether a provider placed LARCs and whether they referred their placement. Generally, LARC knowledge was positively related to training and negatively related to concerns, with the exception that knowledge was not significantly related to perceptions of patients' concerns about implants and IUDs. Long-acting reversible contraception training was negatively related to all 4 sources of concerns, with the exception that IUD training was not significantly

related to perceived patients' concerns about IUDs. Moreover, all implant-related and IUD-related concerns were positively related to one another.

Providers who reported any training were more likely to place LARCs and less likely to refer. The barriers selected for inclusion in this study improved the capacity to predict LARC placement and referral by 23% to 27%, underscoring the significant influence of providers' knowledge, training, and perceived concerns about LARC placement and referral. Finally, we found that even when providers were trained, some still referred patients to other providers. Approximately one-fifth of providers who were trained to place implants said that they still referred implant placement to other providers or that they did not place implants. These percentages were higher for IUDs; about one-fourth of trained providers said that they still referred IUD placement to other providers or that they did not place IUDs. When we compared trained providers who placed LARCs with those who were trained but did not place or with those

Table 3.
Mean (SD) and Correlations Among the Variables of LARC Knowledge, Training, and Concerns of Health Care Providers,^a
(N=224)

LARC Variables	Mean (SD)	Cronbach α	LARC Knowledge	Implant					IUD			
				Training	Patient Concerns	Provider Concerns	Procedure Concerns	Resource Concerns	Training	Patient Concerns	Provider Concerns	Procedure Concerns
LARC Knowledge	7.44 (2.46)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Implant Training	3.07 (1.48)	0.71	0.49 ^b	NA	NA	NA	NA	NA	NA	NA	NA	NA
Implant Concerns												
Patient	3.04 (0.76)	0.73	−0.09	−0.22 ^b	NA	NA	NA	NA	NA	NA	NA	NA
Provider	2.34 (0.83)	0.65	−0.37 ^b	−0.39 ^b	0.40 ^b	NA	NA	NA	NA	NA	NA	NA
Procedure	2.01 (0.93)	0.89	−0.45 ^b	−0.46 ^b	0.43 ^b	0.72 ^b	NA	NA	NA	NA	NA	NA
Resource	2.51 (0.95)	0.84	−0.52 ^b	−0.67 ^b	0.37 ^b	0.60 ^b	0.67 ^b	NA	NA	NA	NA	NA
IUD Training	3.02 (1.36)	0.77	0.54 ^b	.73 ^b	−0.06	−0.30 ^b	−0.32 ^b	−0.55 ^b	NA	NA	NA	NA
IUD Concerns												
Patient	3.13 (0.99)	0.87	−0.03	−0.08	0.46 ^b	0.24 ^b	0.21 ^b	0.21 ^b	−0.08	NA	NA	NA
Provider	2.79 (0.76)	0.64	−0.28 ^b	−0.30 ^b	0.37 ^b	0.55 ^b	0.48 ^b	0.44 ^b	−0.20 ^b	0.45 ^b	NA	NA
Procedure	2.30 (0.98)	0.88	−0.43 ^b	−0.43 ^b	0.35 ^b	0.54 ^b	0.64 ^b	0.59 ^b	−0.42 ^b	0.46 ^b	0.63 ^b	NA
Resource	2.58 (0.98)	0.85	−0.50 ^b	−0.57 ^b	0.28 ^b	0.53 ^b	0.58 ^b	0.81 ^b	−0.55 ^b	0.33 ^b	0.48 ^b	0.72 ^b

^a Providers are defined as obstetricians and gynecologists (OB/GYN), family physicians, pediatricians, internal medicine, certified nurse practitioners, and certified nurse midwives.

^b $P < .001$.

Abbreviations: IUD, intrauterine device; LARC, long-acting reversible contraception.

who referred, we found a pattern that held for both implants and IUDs. Trained providers who did not place and providers who referred had less LARC knowledge and greater concerns (provider, procedure, and resource) than providers who placed LARCs.

The importance of our findings can be understood holistically as pointing to a need to address barriers to LARC more comprehensively when possible. Several intervention studies^{21,31-33} have documented the relative success of LARC training in the form of knowledge and skills for LARC provision. Likewise, other studies have found that increasing LARC supply and affordability to encourage same-day placement has increased LARC use, which is particularly important

among vulnerable populations.^{34,35} In particular, we note the efficacy of interventions that take a multifaceted approach to reducing barriers to LARC placement and addressing LARC knowledge, LARC placement, and counseling patients about LARC.^{32,33} While it may not be feasible to address all barriers with 1 intervention, the literature and the findings of the current study suggest that training may be the most important barrier to overcome. In particular, future efforts to address training should consider how consistency and varied requirements may affect providers' perceived barriers and placement of LARCs (eg, providers receiving implant training from a pharmaceutical company vs IUD training from a senior provider).

Table 4.
Logistic Regressions Predicting LARC Placement and Referrals by Providers^a in Ohio, (N=224)

LARC Variables	Refer Placement, OR ^b	95% CI	Place, OR ^b	95% CI
Implants				
Knowledge	0.86	0.70-1.06	1.16	0.90-1.50
Training	0.29 ^c	0.19-0.45	7.46 ^c	3.74-14.90
Concerns				
Patient	1.02	0.54-1.91	0.95	0.41-2.21
Provider	0.97	0.48-1.96	0.78	0.32-1.87
Procedure	1.18	0.55-2.50	0.75	0.27-2.07
Resource	1.33	0.63-2.80	0.53	0.20-1.45
IUDs				
Knowledge	0.88	0.71-1.09	1.47 ^d	1.08-2.01
Training	0.31 ^c	0.20-0.49	5.64 ^c	2.70-11.80
Concerns				
Patient	0.59	0.36-0.97	1.43	0.75-2.72
Provider	1.14	0.55-2.40	1.31	0.49-3.51
Procedure	1.41	0.68-2.90	0.54	0.21-1.40
Resource	1.72	0.84-3.54	0.44	0.17-1.17

^a Providers are defined as obstetricians and gynecologists, family physicians, pediatricians, internal medicine, certified nurse practitioners, and certified nurse midwives.

^b An odds ratio (OR) >1.0 is a positive association to referral and to placement; an OR <1.0 is a negative association, or greater likelihood of not referring and not placing.

^c $P < .001$.

^d $P < .05$.

Abbreviations: IUD, intrauterine device; LARC, long-acting reversible contraception.

Moreover, efforts to improve training and education for LARCs should begin in medical school by teaching students the current recommendations regarding LARCs as first-choice contraceptives for adolescents and women of reproductive age. In residency settings, program directors can ensure early training for residents (ideally as first-year residents) so they have several years to develop their knowledge and procedural skills with the mentorship and supervision. For providers who have been in practice for years and are being trained in LARC placement for the first time, it is important to ensure mentorship and support from colleagues experienced in LARC placement as they work to develop the new procedural skills and knowledge required to provide LARC.

One of the limitations of this study was the sample, which comprised only providers in Ohio. It does not represent the knowledge, training, and perceived concerns of all providers in the United States. Because we recruited participants through a professional network, the sample may not represent all Ohio providers either. Despite these limitations, this research demonstrates the highly interdependent nature of the barriers to LARC placement, confirms the significance of training, and suggests that even providers who are trained to place LARCs may face considerable barriers to placement that result in referrals and nonplacement.

Overall, this study and existing research^{10,22,24} point to the importance of context in addressing LARC

Table 5.
Mean Differences Between Trained Providers Who Do or Do Not Refer and Place LARC by Knowledge and Concern (N=185)

Variables	Subdermal Implants, Mean (SD)				IUD, Mean (SD)			
	Refer (n=16)	Do not refer (n=63)	Place (n=66)	Do not place (n=15)	Refer (n=26)	Do not refer (n=70)	Place (n=69)	Do not place (n=27)
Knowledge	7.25 (2.18) ^b	9.16 (2.16)	9.27 (2.04)	6.60 (2.03) ^a	7.84 (1.78) ^a	9.41 (1.84)	9.59 (1.49)	7.44 (2.14) ^a
Concerns								
Patient	3.02 (0.92)	2.77 (0.79)	2.75 (0.82)	3.17 (0.70) ^d	3.26 (1.01)	3.11 (1.02)	3.10 (1.02)	3.29 (1.00)
Provider	2.33 (0.97) ^c	1.83 (0.59)	1.78 (0.58)	2.56 (0.85) ^b	3.04 (0.81) ^b	2.53 (0.68)	2.53 (0.65)	3.02 (0.85) ^b
Procedure	1.88 (0.82) ^b	1.38 (0.61)	1.33 (0.54)	2.20 (0.84) ^b	2.66 (1.12) ^a	1.63 (0.76)	1.63 (0.77)	2.63 (1.11) ^a
Resource	2.23 (0.83) ^b	1.69 (0.66)	1.64 (0.59)	2.54 (0.87) ^b	2.88 (0.99) ^a	1.78 (0.76)	1.72 (0.73)	3.01 (.85) ^a

^a $P<.001$.

^b $P<.01$.

^c $P=.06$.

^d $P=.07$.

Abbreviations: IUD, intrauterine device; LARC, long-acting reversible contraception.

placement by recognizing not only providers' unique and interdependent barriers to LARC placement, but also the unique needs of the communities in which they practice, as different populations experience different LARC barriers. Medical education and training and continuing medical education need to address the barriers to LARC placement in different settings and populations in order to reduce them. For example, future research can consider how providers' LARC placement and referral may differ based on population, including urban vs rural, elderly vs nonelderly, as well as patient race/ethnicity, provider specialty, and insurance type.^{13,14,22}

Conclusion

Long-acting reversible contraception knowledge, training, and provider concerns about barriers to LARC placement were interdependent. Even when providers were trained to place LARC, a significant portion referred patients to other providers or did not place them. Efforts to increase LARC placement need to address multifaceted barriers.

Author Contributions

All authors provided substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; all authors drafted the article or revised it critically for important intellectual content; all authors gave final approval of the version of the article to be published; and all authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

References

- Finer LB, Zolna MR. Declines in unintended pregnancy in the United States, 2008-2011. *N Engl J Med*. 2016;374(9):843-852.
- Unintended Pregnancies in the United States*. New York, NY: Guttmacher Institute; 2016. <https://www.guttmacher.org/fact-sheet/unintended-pregnancy-united-states>. Accessed Oct 1, 2018.
- Committee on Practice Bulletins-Gynecology, Long-Acting Reversible Contraception Work Group. Practice bulletin no. 186: long-acting reversible contraception: implants and intrauterine devices. *Obstet Gynecol*. 2017;130(5):e251-e269.
- American College of Obstetricians and Gynecologists' Committee on Obstetric Practice. Committee opinion no. 670: immediate postpartum long-acting reversible contraception. *Obstet Gynecol*. 2016;128(2):e32-e37. doi:10.1097/AOG.0000000000001587
- American College of Obstetricians and Gynecologists. Committee opinion no. 735: adolescents and long-acting reversible contraception: implants and intrauterine devices. *Obstet Gynecol*. 2018;131(5):e130-e139. doi:10.1097/AOG.0000000000002632

6. American College of Obstetricians and Gynecologists. Committee opinion no 672: clinical challenges of long-acting reversible contraceptive methods. *Obstet Gynecol.* 2016;128(3):e69-e77.
7. American Academy of Pediatrics Committee on Adolescence. Contraception for adolescents. *Pediatrics.* 2014;134(4):e1244-e1256.
8. Stoddard A, McNicholas C, Peipert JF. Efficacy and safety of long-acting reversible contraception. *Drugs.* 2011;71(8):969-980.
9. Kavanaugh ML, Jerman J. Contraceptive method use in the United States: trends and characteristics between 2008, 2012 and 2014. *Contraception.* 2018;97(1):14-21.
10. Gilmore K, Hoopes AJ, Cady J, Amies Oelschlagel AM, Prager S, Vander Stoep A. Providing long-acting reversible contraception services in Seattle school-based health centers: key themes for facilitating implementation. *J Adolesc Health.* 2015;56(6):658-665.
11. Murphy MK, Stoffel C, Nolan M, Haider S. Interdependent barriers to providing adolescents with long-acting reversible contraception: qualitative insights from providers. *J Pediatr Adolesc Gynecol.* 2016;29(5):436-442. doi:10.1016/j.jpag.2016.01.125
12. Pritt NM, Norris AH, Berlan ED. Barriers and facilitators to adolescents' use of long-acting reversible contraceptives. *J Pediatr Adolesc Gynecol.* 2017;30(1):18-22. doi:10.1016/j.jpag.2016.07.002
13. Hopkins B. Barriers to health care providers' provision of long-acting reversible contraception to adolescent and nulliparous young women. *Nurs Womens Health.* 2017;21(2):122-128.
14. Phillips J, Sandhu P. Barriers to implementation of long-acting reversible contraception: a systematic review. *J Am Assoc Nurse Pract.* 2018;30(4):236-243. doi:10.1097/jxn.0000000000000019
15. Biggs MA, Harper CC, Malvin J, Brindis CD. Factors influencing the provision of long-acting reversible contraception in California. *Obstet Gynecol.* 2014;123(3):593-602.
16. Luchowski AT, Anderson BL, Power ML, Raglan GB, Espey E, Schulkin J. Obstetrician-gynecologists and contraception: practice and opinions about the use of IUDs in nulliparous women, adolescents and other patient populations. *Contraception.* 2014;89(6):572-577.
17. Berlan ED, Pritt NM, Norris AH. Pediatricians' attitudes and beliefs about long-acting reversible contraceptives influence counseling. *J Pediatr Adolesc Gynecol.* 2017;30(1):47-52.
18. Black KI, Lotke P, Lira J, Peers T, Zite NB. Global survey of healthcare practitioners' beliefs and practices around intrauterine contraceptive method use in nulliparous women. *Contraception.* 2013;88(5):650-656.
19. Buhling KJ, Hauck B, Dermout S, Ardaens K, Marions L. Understanding the barriers and myths limiting the use of intrauterine contraception in nulliparous women: results of a survey of European/Canadian healthcare providers. *Eur J Obstet Gynecol Reprod Biol.* 2014;183:146-154. doi:10.1016/j.ejogrb.2014.10.020
20. Goldstein RL, Carlson JL, Halpern-Felsher B. Contraception for adolescents and young adults in the inpatient setting: the providers' perspective. *Hosp Pediatr.* 2018;8(4):194-199.
21. Harper CC, Blum M, De Bocanegra HT, et al. Challenges in translating evidence to practice: the provision of intrauterine contraception. *Obstet Gynecol.* 2008;111(6):1359-1369.
22. Janiak E, Clark J, Bartz D, Langer A, Gottlieb B. Barriers and pathways to providing long-acting reversible contraceptives in Massachusetts community health centers: a qualitative exploration. *Int Perspect Sex Reprod Health.* 2018;50(3):111-118.
23. Kumar N, Brown JD. Access barriers to long-acting reversible contraceptives for adolescents. *J Adolesc Health.* 2016;59(3):248-253.
24. Rubin SE, Davis K, McKee MD. New York City physicians' views of providing long-acting reversible contraception to adolescents. *Ann Fam Med.* 2013;11(2):130-136. doi:10.1370/afm.1450
25. Schafer SL. *Providers' Knowledge, Perceptions and Views of Prescribing Long-Acting Reversible Contraception to Adolescents in a Southwest Community Health Center* [dissertation]. Tucson: University of Arizona; 2017.
26. Russo JA, Miller E, Gold MA. Myths and misconceptions about long-acting reversible contraception (LARC). *J Adolesc Health.* 2013;52(4 suppl):S14-S21. doi:10.1016/j.jadohealth.2013.02.003
27. Amico JR, Bennett AH, Karasz A, Gold M. "I wish they could hold on a little longer": physicians' experiences with requests for early IUD removal. *Contraception.* 2017;96(2):106-110.
28. Kavanaugh ML, Frohwirth L, Jerman J, Popkin R, Ethier K. Long-acting reversible contraception for adolescents and young adults: patient and provider perspectives. *J Pediatr Adolesc Gynecol.* 2013;26(2):86-95. doi:10.1016/j.jpag.2012.10.006
29. Thompson CM, Broecker J, Dade M, Nottingham K. Influences on intentions to place long-acting reversible contraceptives: a pilot study comparing according to provider specialty in Ohio. *J Pediatr Adolesc Gynecol.* 2018;31(5):509-515.
30. Faul F, Erdfelder E, Buchner A, Lang AG. Statistical power analyses using G* Power 3.1: tests for correlation and regression analyses. *Behav Res Methods.* 2009;41(4):1149-1160.
31. Gibbs SE, Rocca CH, Bednarek P, Thompson KM, Darney PD, Harper CC. Long-acting reversible contraception counseling and use for older adolescents and nulliparous women. *J Adolesc Health.* 2016;59(6):703-709.
32. Thompson KM, Rocca CH, Stern L, et al. Training contraceptive providers to offer intrauterine devices and implants in contraceptive care: a cluster randomized trial. *Am J Obstet Gynecol.* 2018;218(6):597. doi:10.1016/j.ajog.2018.03.016
33. Rubin SE, Maldonado L, Fox K, Rosenberg R, Wall J, Prine L. Establishing and conducting a regional, hands-on long-acting reversible contraception training center in primary care. *Women's Health Issues.* 2018 Sep 1;28(5):375-8.
34. Langston AM, Joslin-Roher SL, Westhoff CL. Immediate postabortion access to IUDs, implants and DMPA reduces repeat pregnancy within 1 year in a New York City practice. *Contracept.* 2014;89(2):103-108.
35. Secura GM, Allsworth JE, Madden T, Mullersman JL, Peipert JF. The Contraceptive CHOICE Project: reducing barriers to long-acting reversible contraception. *Am J Obstet Gynecol.* 2010;203(2):115.e1-e7. doi:10.1016/j.ajog.2010.04.017

© 2019 American Osteopathic Association