Challenges in Translating Evidence to Practice

The Provision of Intrauterine Contraception

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OBJECTIVE: Intrauterine contraception is used by many women worldwide, however, it is rarely used in the United States. Although available at no cost from the state family planning program for low-income women in California, only 1.3% of female patients obtain intrauterine contraceptives annually. This study assessed knowledge and practice patterns of practitioners regarding intrauterine contraception.

METHODS: We conducted a survey among physicians, nurse practitioners, and physician assistants (n=1,246) serving more than 100 contraceptive patients per year in the California State family planning program. The response rate was 65% (N=816). We used multiple logistic regression to measure the association of knowledge with clinical practice among different provider types.

RESULTS: Forty percent of providers did not offer intrauterine contraception to contraceptive patients, and 36% infrequently provided counseling, although 92% thought their patients were receptive to learning about the method. Regression analyses showed younger physicians and those trained in residency were more likely to offer insertions. Fewer than half of clinicians considered nulliparous women (46%) and postabortion women (39%) to be appropriate candidates. Evidence-based views of the types of patients who could be safely provided with intrauterine contraception were associated with more counseling and method provision, as well as with knowledge of bleeding patterns for the levonorgestrel-releasing intrauterine system and copper devices.

CONCLUSION: Prescribing practices reflected the erroneous belief that intrauterine contraceptives are appropriate only for a restricted set of women. The scientific literature shows intrauterine contraceptives can be used safely by many women, including postabortion patients. Results revealed a need for training on updated insertion guidelines and method-specific side effects, including differences between hormonal and nonhormonal devices.

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Of the 6 million pregnancies among U.S. women each year, nearly half are unintended, and the rate is increasing among low-income women.[1] Intrauterine contraception is safe and highly effective, with a failure rate of less than 1%.[2,3] However, it is infrequently prescribed by health care providers in the United States. Intrauterine contraception does not depend on individual compliance to be highly effective, but it does depend on health care providers for insertion and removal, and provider practices vary widely. In Europe, intrauterine contraception use ranges from 20–26% in certain countries (France 20%, Norway 24%, Finland 26%). In other parts of the world, use is even higher, for example, Israel (30%), China (34%), Egypt (37%), Korea (49%), and Uzbekistan (52%). In the United States, by contrast, intrauterine contraception use is negligible at about 1%.[4]

Specific–and unfounded–concerns related to intrauterine contraception safety include a correlation

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between intrauterine contraception and ectopic pregnancy,[3] which was disproved in the 1980s,[5] and a heightened risk of pelvic inflammatory disease (PID) and future infertility.[6,7] The Dalkon Shield, a poorly designed and tested device, was associated with an eightfold increase in PID risk and was removed from the market in the 1970s.[7,8] Although these events occurred three decades ago, they continue to influence providers' perceptions of intrauterine contraception, and the fear of litigation has been found to be associated with low intrauterine contraception provision in practice.[9] However, the forms of intrauterine contraception currently on the market do not pose similar risks.[6,8,10,11] In addition, concern that copper intrauterine contraceptives increase the risk of infertility in nulliparous women also has been refuted.[12]

Newly improved devices have been developed and widely used throughout the world; two methods currently on the market in the United States are the levonorgestrel-releasing intrauterine system (Mirena, Bayer HealthCare Pharmaceuticals, Wayne, NJ) and the Copper T 380A (ParaGard, Barr Pharmaceuticals, Montvale, NJ). A limited number of studies have examined barriers that health care providers face in the United States in offering newer devices to women. Barriers to provision generally are related to lack of clinical training and limited knowledge. A national survey of fellows of the American College of Obstetricians and Gynecologists (ACOG) found that 95% of respondents considered the Copper T 380A to be safe. However, nearly one third felt that there was a causal relationship between intrauterine contraception use and PID, and having this belief was significantly associated with lower provision. Although only 16% agreed that intrauterine contraception use leads to litigation, there was also an association with fewer insertions.[9] This study was not able to collect specific data on the levonorgestrel-releasing system, as it had just become available. A more recent training and educational intervention in a Northern California HMO including physicians and nurse practitioners (N=212) showed an increase in positive attitudes about the newer levonorgestrel-releasing intrauterine contraceptive and a greater comfort in recommending it to patients.[13] This intervention is promising and leads to the research question of what knowledge and content is most important for providers to gain to be proficient in intrauterine contraception provision.

This study builds on the new and growing literature in this area by examining the specific method characteristics of each of the available devices, including benefits and side effects. We used multivariable modeling to assess knowledge and practice patterns of physicians and advance practice clinicians.

MATERIALS AND METHODS

As part of an evaluation program of the California State family planning program for low-income populations, Family PACT, we conducted a study on intrauterine contraception practices among health care providers. In this program, 2,834 clinician providers served more than 1.5 million clients in 2003–2004.[14] Women eligible for Family PACT can obtain contraception at no cost, but only 1.3% of female patients received an intrauterine contraceptive in 2003, a level that has not varied since program inception. Claims data showed that fewer than half of providers received reimbursement for any intrauterine contraception-related procedure in 2003.

We collected data in 2006 through a small set of in-depth interviews and then a large-scale self-administered written survey of 1,246 clinicians, including physicians, nurse practitioners and physician assistants. Responses to the in-depth interviews generated questions for the survey, and we also included survey items from published provider surveys on intrauterine contraception.[9,13] The survey was pretested among clinician researchers. Two weeks before the initial survey mailing, a letter was sent to prospective participants to inform them of the survey. The survey was mailed with a cover letter and instructions that the survey was to be completed by a physician, nurse practitioner, or physician assistant who offers contraceptive services. Providers then were mailed a reminder postcard later that week, and a second survey was mailed to nonrespondents 4 weeks later. Providers were telephoned a maximum of four times, and data collection ended 12 weeks after the initial mailing. The survey was conducted on the entire population of Family PACT providers, serving more than 100 female contraceptive patients per year. A Family PACT provider refers to a public or private health care facility where contraceptive services are provided by clinicians.

The survey had 816 respondents, including 399 physicians and 402 nonphysicians, for a response rate of 65%. The number of respondents was more than sufficient to show a difference in proportion of physician and nonphysician intrauterine contraception insertions of .65 and .55, respectively, with alpha equal to 0.05 and power of 80% with a two-tailed test. The regression models adjusting for covariates require a slightly larger size to account for correlation between covariates, although we still have 80% power

for a one-tailed test with a squared multiple correlation coefficient of the predictor provider type compared with other covariates to be up to 0.2. The study was approved by the University of California, San Francisco Committee on Human Research.

The survey included items on demographic (age, gender, race/ethnicity), professional (physician, nurse practitioner, or physician assistant, specialty), and practice characteristics (number of female contraceptive patients per year, urban or rural location, public or private practice). Claims data were used for the practice characteristic variables. For items directly related to intrauterine contraception, the survey included training during residency or core training (number of insertions), counseling (frequency of counseling and content), provider views of the safety and risks of the intrauterine contraceptive, provider perceptions about which women make suitable intrauterine contraception candidates, requirements and protocols for insertions, knowledge of appropriate practices for intrauterine contraception in general and specifically by intrauterine contraceptive type–the Copper T 380A or the levonorgestrel-releasing system–and availability of intrauterine contraception in each clinician's practice.

To assess providers' knowledge of correct practices and basic method characteristics, including benefits and side effects, we used a series of scale variables. These variables measure knowledge of bleeding patterns, knowledge of hormonal side effects, and general knowledge. All scales were created using Cronbach's alpha to assess scale reliability and with tests for validity with associations with professional and practice variables as well as outcome variables. The knowledge of bleeding patterns scale was created from 10 survey items that asked about the levonorgestrel-releasing intrauterine system and the Copper T 380A separately. The items in the bleeding scale on the levonorgestrel-releasing intrauterine system included appropriate counseling about the system for patients with dysmenorrhea, patients with menorrhagia, and patients with iron-deficiency anemia, with an emphasis in counseling on spotting, amenorrhea, and irregular bleeding. The items for Copper T 380A were emphasis in counseling for copper intrauterine contraception on menorrhagia, dysmenorrhea, irregular bleeding, and anemia. The scale reliability coefficient for the provider practices for bleeding was 0.80.

The scale of hormonal implications included nine items on the accuracy of the counseling providers give to their patients on the effect of the levonorgestrel-releasing intrauterine system on breast tenderness, headaches, mood changes, acne, and smoking. The scale also captures the accuracy of what providers tell their patients about Copper T 380A for headaches, mood changes, acne, and breast tenderness. Cronbach's alpha gave a scale reliability coefficient of 0.87. For the general knowledge variable, we included 12 items that contributed to a cohesive scale: accurate counseling information on the levonorgestrel-releasing intrauterine system on spotting, amenorrhea, irregular bleeding, pain with intercourse, headaches, mood changes, and acne; and accurate Copper T 380A counseling on menorrhagia, dysmenorrhea, irregular bleeding, anemia, and pain with intercourse. The scale reliability coefficient is 0.86.

For provider views on which women are suitable intrauterine contraception candidates, we asked about consideration of the following nine items: nulliparity, immediate postpartum usage, immediate postabortion usage, teenager, history of ectopic pregnancy, STD in the past 2 years, PID in the past 5 years, current bacterial vaginosis, and human immunodeficiency virus (HIV) positivity. The scale reliability coefficient, measured by Cronbach's alpha, for potential intrauterine contraception candidates was 0.77.

We created a scale variable with provider concerns about risks that affect their willingness to recommend intrauterine contraception with these seven items: sexually transmitted diseases, PID, infertility, ectopic pregnancy, expulsion, uterine perforation at insertions, and other risks Cronbach's alpha gave a scale reliability coefficient of 0.88 for provider concern of risks.

The two outcome variables we assessed on intrauterine contraception provision were counseling contraceptive patients and availability of method at the provider's practice (n=812). Of the 816 survey respondents, we limited analyses to the 812 respondents with data on whether intrauterine contraception was provided at their practices. For analysis, the counseling variable was coded dichotomously to measure a general practice of usually counseling (always/mostly) or not (sometimes/rarely). We performed multiple logistic regression analysis to measure the association of demographic, professional, and practice factors with the outcome variables of provision of counseling and insertions. The models included demographic (age, gender), professional (clinician type, specialty, level of intrauterine contraception training), and practice (private/public, patient volume, urban/rural) characteristics. Additional models included provider perceptions of safety and risk, perceptions about which women make suitable intrauterine contraception candidates, and provider knowledge of the method. The variables that were significant in univariable analyses for either the counseling or provision outcome were included in the multivariable models, as

well as variables shown in the literature to be associated with intrauterine contraception counseling and provision. Data were analyzed with Stata 8.2 (StataCorp LP, College Station, TX) and significance levels reported at $P \leq .05$.

RESULTS

Table 1 presents demographic, professional, and practice characteristics of respondents. Almost half of respondents were physicians (49%), 36% were nurse practitioners, and 15% were physician assistants. By specialty, they were largely family practice (37%) and ob-gyn (35%), although there were also women's health specialists (12%) and general practice (8%). Within the ob-gyn specialty, 54% were physicians and 46% advance practice clinicians. Within the family practice specialty, 46% were physicians and 54% advance practice clinicians. However, in the women's health specialty, almost all (98%) were advance practice clinicians. More than half of providers were in private practice (56%), and the rest were in public/nonprofit. Patient volume for practice ranged from 100 to more than 10,000 female contraceptive patients per year, with a mean number of female contraceptive patients of 1,113 per year. The mean age of the providers was 49 years (standard deviation 10.5), and the sample was diverse, with 47% white, 21% Asian, 20% Latino, 6% African American. In comparing claims data on the respondents and nonrespondents, we found no differences between respondents and nonrespondents by provider type, urban area, contraceptive patients, or intrauterine contraception patients served. The respondents are similar to the full population surveyed: 56% of respondents were in private practice compared with 57% in the population surveyed; 80% in urban areas compared with 82%; 1.5% intrauterine contraception clients compared with 1.5% intrauterine contraception clients; 1,113 mean female contraceptive clients per year compared with 1,027 mean clients.

Sixty-nine percent of these contraceptive providers had received training in intrauterine contraceptive insertions during residency or their core training, although 44% reported inserting fewer than 20 intrauterine contraceptives in training. Among ob-gyn physicians, only 4% were not trained; but among other physicians, 32% were not trained, and among the mid-level practitioners, 41% were not trained. Younger age is significantly associated with a higher level of training (t test; $P=.006$). Although most ob-gyn physicians had received training, only 74% of them provided intrauterine contraception at their practices, as did 43% of other physicians. Clinicians reported substantial intrauterine contraception provision by mid-level practitioners in practices where the method was available (nurse practitioner 59%, physician assistant 32%), although the greatest proportion was by physicians (81%). Thirty-six percent of contraceptive

Table 1. Respondent Characteristics and Intrauterine Contraception Practices

Demographic		
Age, mean y (SD)	48.6	10.5
Race/ethnicity, n (%)		
White	373	46.8
Latino	161	20.2
Asian/Pacific Islander	166	20.8
African American	48	6.0
Multi-racial/other	49	6.1
Professional		
Professional title, n (%)		
Physician	389	49.4
Nurse practitioner	118	15.0
Physician assistant	281	35.7
Specialty, n (%)		
Obstetrician-gynecologist	285	35.1
Family practice	302	37.2
Internal medicine, pediatrics, adolescent medicine	47	5.8
Women's health	101	12.4
General practice/other	77	9.5
Trained in IUC insertions n (%)	548	69.0
Practice		
Private practice (vs public), n (%)	450	55.6
Urban, n (%)	644	79.6
Number female contraceptive patients per year, n (%)		
100–500 patients	389	47.8
501–1,000 patients	185	22.8
More than 1,000 patients	239	29.4
IUC counseling		
Frequently discuss IUC with patients seeking contraception	515	64.1
Sufficient time to counsel patients on contraceptive options	680	85.3
Patients receptive to learning about IUC	730	91.9
Enough experience to counsel patients on Copper T 380A	657	82.0
Enough experience to counsel patients on LNG system	590	74.0
IUC provision		
IUCs available at practice	495	61.0
Practitioners inserting IUC at your practice		
Physicians	342	67
Nurse-practitioners	291	59
Physician assistants	158	32
Very comfortable in inserting Copper T 380A	476	59.8
Very comfortable in inserting LNG system	310	39.5
Offered IUC in past 5 years but stopped (n=305)	106	34.7

SD, standard deviation; IUC, intrauterine contraception; LNG, levonorgestrel-releasing intrauterine system.
Not all numbers add up to 812 due to missing data on individual items.

providers counseled their patients infrequently on the method, although 85% reported that they had sufficient time to counsel patients on contraceptive options, and a full 92% considered their patients to be receptive to learning about intrauterine contraception. The majority of providers (55%) considered fewer than one quarter of their contraceptive patients to be intrauterine contraception candidates.

Of the providers offering intrauterine contraception at their practices, most (72%) had both the Copper T 380A and the levonorgestrel-releasing system available. Twenty-three percent of providers with intrauterine contraception offered just the Copper T 380, and 5% offered just the levonorgestrel system. Of the practices not offering intrauterine contraception to contraceptive patients, the main reasons cited included inadequate reimbursement (47%), lack of training (40%), low patient interest (32%), and concerns about procedure risks (28%). Twenty-three percent cited litigation concerns, and only 10% of providers cited few intrauterine contraception candidates as a reason for ceasing to offer services. Thirty-five percent of practices not offering intrauterine contraception had offered it in the previous 5 years but then stopped.

Provider knowledge as well as providers' perceptions of the safety and specific risks involved in intrauterine contraception are presented in Table 2. Almost all clinicians agreed that intrauterine contraception is safe (94%). However, they had many concerns that kept them from recommending intrauterine contraception to their patients. Sexually transmitted diseases and PID were top concerns affecting the willingness of providers to recommend intrauterine contraception, followed by ectopic pregnancy. Providers also showed extremely restrictive views of the women they were willing to consider intrauterine contraception candidates. Fewer than half of providers considered nulliparous, postpartum (immediate), postabortion (immediate), teenagers, history of ectopic pregnancy, PID, or HIV-positive women as candidates for intrauterine contraception, contrary to the World Health Organization Medical Eligibility Criteria.[15]

Basic knowledge about intrauterine contraception was inadequate. Roughly 20% of providers emphasized hormonal side effects, such as mood change, headache, acne, and breast tenderness, when counseling patients about ParaGard®–a copper T device that contains no hormones. Providers also were confused about the hormone content in the levonorgestrel-releasing system; the proportion who would insert a levonorgestrel-releasing intrauterine system for a patient who smoked was only 34%, but levonorgestrel is not contraindicated for smokers.[15] Contraceptive pro-

Table 2. Provider Attitudes and Knowledge

	n	%
Provider perceptions of IUC safety		
Agrees IUC is safe	759	94.2
Concerns affecting IUC recommendation scale (scale reliability coefficient 0.88)		
Sexually transmitted diseases	219	27.8
Pelvic inflammatory disease	227	28.7
Ectopic pregnancy	144	18.2
Infertility	75	9.5
Expulsion	86	10.9
Uterine perforation at insertion	81	10.3
IUC candidate scale (scale reliability coefficient 0.76)		
Nulliparous	362	45.9
Immediately postpartum	263	33.1
Immediately postabortion	313	39.4
Teenager	311	39.1
History of ectopic pregnancy	247	31.1
Sexually transmitted disease in past 2 years	486	61.1
PID in past 5 years	383	48.4
Current bacterial vaginosis	337	42.2
HIV positive	340	42.9
Knowledge of hormonal side effects scale (scale reliability coefficient 0.87)		
LNG system		
Willing to insert for menorrhagic patients who smoke	264	33.7
Breast tenderness	362	48.5
Headache	381	50.8
Mood changes	396	53.0
Acne	324	43.4
Copper T 380A		
Headaches	561	72.0
Mood changes	599	77.1
Acne	639	82.1
Breast tenderness	604	77.6
General IUC knowledge scale (scale reliability coefficient 0.86)		
LNG system		
Appropriate emphasis in counseling on		
Spotting	533	70.4
Amenorrhea	595	79.2
Irregular bleeding	629	83.4
Pain with intercourse	407	54.3
Headache	381	50.8
Mood change	396	53.0
Acne	324	43.4
Copper T 380A		
Appropriate emphasis in counseling on		
Anemia	555	71.0
Irregular bleeding	400	51.5
Dysmenorrhea	551	70.6
Menorrhagia	612	78.5
Pain with intercourse	461	59.3

IUC, intrauterine contraception; PID, pelvic inflammatory disease; HIV, human immunodeficiency virus; LNG, levonorgestrel-releasing intrauterine system.

viders in general are not yet fully informed about the benefits of the levonorgestrel-releasing system, nor of all of the important implications on bleeding patterns of both devices. Only 33% of providers had ever recommended the levonorgestrel-releasing intrauterine system for noncontraceptive benefits. Only 39% reported they would insert a levonorgestrel-releasing intrauterine system for a patient with dysmenorrhea if she were interested, and half (51%) for a woman with menorrhagia. Only 45% of providers responded they would insert a levonorgestrel-releasing intrauterine system in an iron-deficient anemic patient if she were interested. Just as bleeding patterns were often forgotten as a potential benefit of the levonorgestrel-releasing intrauterine system, they were also omitted in counseling on the Copper T 380, but in this case as a possible drawback: when discussing the Copper T 380 with patients, more than 25% of providers did not emphasize dysmenorrhea or menorrhagia, which can occur.

In other areas of general knowledge, 25% of the contraceptive providers responded erroneously that antibiotics should be given routinely at the time of intrauterine contraceptive insertion to prevent infection. A similar proportion (24%) responded that a woman with diabetes should not have an intrauterine contraceptive, although it is an appropriate method for this population.[15] Providers were unlikely to mention the Copper T 380A for use as emergency contraception; 85% had never mentioned it to patients.

Multivariable analyses of the factors associated with counseling contraceptive patients about intrauterine contraception are presented in Table 3 . The first model, with socio-demographic, professional, and practice characteristics, shows that there is no difference between physicians and advance practice clinicians (ie, nurse practitioners and physicians assistants) in the frequency of intrauterine contraception counseling. However, practitioners in ob-gyn prac-

Table 3. Counseling on Intrauterine Contraceptives to Female Contraceptive Patients: Multivariable Logistic Regression Results

	Model 1		Model 2		Model 3	
Frequently Counsel Patients on IUC	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Demographic						
Age (y)	0.96	0.98–1.01	1.00	0.98–1.02	1.00	0.98–1.02
Gender						
Male (reference)						
Female	1.50*	1.01–2.21	1.28	0.84–1.95	1.26	0.83–1.92
Professional and practice						
Title						
Mid-level NP/PA (reference)						
Physician	1.15	0.76–1.72	1.22	0.79–1.89	1.18	0.76–1.81
Specialty						
Family practice (reference)						
Ob-gyn	1.66†	1.13–2.46	1.51*	1.00–2.28	1.45	0.95–2.21
Women's health	0.96	0.56–1.63	0.83	0.48–1.44	0.81	0.46–1.41
Other (pediatrics/adolescent, GP, internist)	0.64	0.40–1.01	0.83	0.50–1.39	0.84	0.50–1.39
Trained in IUC insertions	1.60†	1.13–2.25	1.52*	1.05–2.20	1.51*	1.05–2.17
Female contraceptive patients (#/y)	0.98*	0.97–1.00	0.98‡	0.96–0.99	0.98‡	0.96–0.99
Provider type						
Public (reference)						
Private	0.70	0.47–1.04	0.84	0.55–1.29	0.87*	0.56–1.33
Urban location	1.24	0.82–1.87	1.05	0.67–1.65	1.08	0.69–1.69
Perceptions and knowledge of IUC						
Consider IUC to be safe	–	–	6.19‡	2.68–14.3	5.68‡	2.56–12.6
Low perception of risks	–	–	1.21	0.96–1.54	1.17	0.93–1.48
Expansive view of IUC candidates	–	–	1.89‡	1.36–2.64	1.85‡	1.32–2.59
High-level knowledge	–	–	1.59†	1.21–2.08	–	–
Knowledge of bleeding patterns	–	–	–	–	1.45*	1.06–1.98
Knowledge of hormonal side effects	–	–	–	–	0.84	0.66–1.08
Number of observations	801		783		792	
Likelihood ratio χ^2 (degrees of freedom)	46.5 (14)		112 (19)		111 (20)	

IUC, intrauterine contraception; CI, confidence interval; NP, nurse practitioner; PA, physician assistant; GP, general practitioner.
* $P \leq .050$.
† $P \leq .010$.
‡ $P \leq .001$.

tices, whether physicians or advance practice clinicians, are significantly more likely to counsel contraceptive patients on the intrauterine contraception than clinicians in other specialties (odds ratio [OR]=1.7). Likewise, healthcare providers who have received training in intrauterine contraception insertion are 1.6 times as likely to counsel patients, but as the number of female contraceptive patients increases, the frequency of intrauterine contraception counseling declines, perhaps due to time constraints. We assessed the contribution of providers' perceptions and knowledge of intrauterine contraception to their likelihood of counseling in Model 2, and we found that those who consider intrauterine contraception to be a safe method have far higher odds (OR=6.2) of counseling their patients frequently about the method than those who do not consider it to be safe. Providers who consider many different types of women eligible for intrauterine contraception and those with high knowledge levels of basic method characteristics and contraindications are also more likely to counsel frequently on the method. However, providers' reports of how concerned they are about the potential risks of insertion (eg, expulsions, perforation) were not associated with counseling. In the final model tested (Model 3), we included specific knowledge scales for whether providers were familiar with bleeding patterns of each device and with the hormonal side effects, and we found better knowledge of bleeding patterns to be associated with frequent counseling.

The multivariable logistic results of provision of the method in the practice showed associations with somewhat different factors than with counseling (Table 4). Model 1, with the socio-demographic, professional, and practice characteristics, showed that younger providers are significantly more likely to offer the method than

Table 4. Provision of Intrauterine Contraceptives to Female Contraceptive Patients: Multivariable Logistic Regression Results

	Model 1		Model 2		Model 3	
Provide IUC in Practice	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Demographic						
Age (y)	0.96*	0.94–0.98	0.97†	0.95–0.99	0.97†	0.95–0.99
Gender						
Male (reference)						
Female	1.29	0.82–2.03	1.09	0.68–1.76	0.90	0.55–1.47
Professional and practice						
Title						
Mid-level NP/PA (reference)						
Physician	2.26*	1.40–3.64	2.45*	1.48–4.05	2.53*	1.51–4.23
Specialty						
Family practice (reference)						
Ob-gyn	4.67*	2.98–7.32	4.52*	2.82–7.24	3.31	2.03–5.39
Women's health	3.85*	1.90–7.82	3.79*	1.81–7.97	2.64‡	1.25–5.56
Other (pediatrics/adolescent, GP, internist)	0.36*	0.20–0.62	0.45†	0.25–0.83	0.45‡	0.24–0.83
Trained in IUC insertions	1.82†	1.21–2.74	1.66‡	1.08–2.56	1.44	0.93–2.25
Female contraceptive patients (#/y)	1.05*	1.02–1.07	1.03†	1.01–1.06	1.04*	1.01–1.05
Provider type						
Public (reference)						
Private	0.18*	0.11–0.28	0.16*	0.10–0.27	0.20*	0.12–0.33
Urban location	1.43	0.43–1.13	0.58	0.34–0.99	0.56	0.32–0.97
Perceptions and knowledge of IUC						
Consider IUC to be safe	–	–	5.57*	2.10–14.8	3.36‡	1.29–8.74
Low perception of risks	–	–	1.08	0.82–1.41	0.96	0.73–1.27
Expansive view of IUC candidates	–	–	1.63†	1.13–2.35	1.40	0.96–2.05
High-level knowledge	–	–	1.68†	1.23–2.31		
Knowledge of bleeding patterns	–	–	–	–	3.24*	2.23–4.70
Knowledge of hormonal side effects	–	–	–	–	1.53†	1.15–2.03
Number of observations	809		785		794	
Likelihood ratio χ^2 (degree of freedom)	298.2 (14)		324 (19)		360 (20)	

IUC, intrauterine contraception; CI, confidence interval; NP, nurse practitioner; PA, physician assistant; GP, general practitioner.
* $P \leq .001$.
† $P \leq .010$.
‡ $P \leq .050$.

older providers and that physicians have elevated odds (OR=2.3) of offering intrauterine contraception compared with advance practice clinicians. Ob-gyn specialists, whether physicians or advance practice clinicians, are 4.6 times as likely as family practice clinicians to offer intrauterine contraception, and women's health specialists are 3.8 times as likely. Because these multivariable models are additive, the elevated odds for both physicians and ob-gyn specialists show that ob-gyn physicians have the greatest odds of providing intrauterine contraception. Providers in private practice had greatly reduced odds for offering intrauterine contraception to their patients (OR=0.18). Whereas clinicians in practices with greater numbers of contraceptive patients were less likely to counsel on intrauterine contraception, they were significantly more likely to offer the method to their patients at their practices. As with counseling, training is also significantly associated with increased odds of intrauterine contraception provision (OR=1.8).

In Model 2, we assessed how much of the elevated odds of ob-gyns and other physicians providing intrauterine contraception resulted from their more favorable perceptions or more informed practices. Results showed that the differences in age as well as the differences in professional and practice characteristics remain important, as do intrauterine contraception-specific attitudes and knowledge. As with the counseling results, the intrauterine contraception provision results show that considering the method to be safe was a key factor in its availability at the practice (OR=5.6), and that expansive views of who might be considered as an intrauterine contraception candidate as well as knowledge about each method were also significantly associated with method provision. We assessed the different aspects of knowledge in Model 3 and found that knowledge of bleeding patterns, as well as of hormonal side effects, were strongly associated with provision of the method. We also found that the impact of training was reduced, showing that much of the significant effect of training (seen in Models 1 and 2) lies in the ability to provide patients with accurate information and care about the bleeding they might experience with each method.

Because the physicians differed significantly from the nonphysicians in provision of intrauterine contraception, we also estimated the models separately for both groups and found that the results for physicians were the same as the results for all respondents. For the mid-level practitioners, the estimated coefficients were in the same direction, but a few variables lost strength and did not reach significance level, namely age and training. The specialty of the practice for mid-level practitioners retained a robust association with intrauterine contraception provision and is perhaps more important than core training for nurse practitioners and physician assistants.

DISCUSSION

Prescribing practices of providers in the United States reflect erroneous beliefs that intrauterine contraception is appropriate for an extremely limited segment of women seeking contraception. Our results showed that contraceptive providers who are open to the possibility that the method can be used by many different types of women are more likely to counsel their patients on intrauterine contraception and to have it available in their practices. Recent research has shown that the levonorgestrel-releasing intrauterine system can be used for nulliparous women, although clinicians do not generally provide it and the patient information on the product recommends that the woman have a child.[9,16,17] This study showed that fewer than half of providers would offer intrauterine contraception to nulliparous women, although ACOG has concluded that the method is appropriate for this population as long as the patient is at low risk for sexually transmitted diseases.[3] Likewise, nearly 70% believed that women with previous ectopic pregnancies were not eligible for intrauterine contraception, also contrary to ACOG and WHO recommendations.[3,15]

Only one third viewed immediate postpartum patients as potential intrauterine contraception candidates. Immediate postpartum insertions are done within 48 hours of delivery but usually directly after the placenta is out. Providers have been reluctant to insert intrauterine contraception in postpartum women for fears of increased risk of perforation or expulsion. However, women are often highly motivated for contraception at the time of birth, and the discomfort of insertion is diminished postpartum. Research has documented unintended pregnancies during the waiting period for interim insertions, showing that up to 40% of women requesting intrauterine contraception are lost in this period, sometimes because providers discourage them from intrauterine contraceptive use.[18,19] Postplacental insertion, that is within 10 minutes of placental expulsion, has been shown to be safe and acceptable to women and is a promising area for future research and practice.[20] In this study, only 39% of providers considered postabortion patients to be intrauterine contraception candidates, although the demonstrated need for contraception at that time is clear; half of the women in the United States having abortions are having repeat abortions.[21] A large World Health Organization study of

immediate post first trimester abortion intrauterine contraception insertions showed no increased risk of infection and low expulsion rates, and a Cochrane review of postabortion insertions found them to be safe and practical.[22,23]

Research also has indicated that even women at risk of infections and those who are already HIV positive may be able to benefit from intrauterine contraception, although most providers would not consider them as candidates. A small body of research has begun to inquire about the use of intrauterine contraception in HIV-positive women, even in developing country settings, and has found promising results.[24–27] One study found that providers in Africa (Zimbabwe) might be open to the use of intrauterine contraception for women at high risk of HIV,[28] although training efforts and other interventions to increase insertions have not yet been launched. Further intrauterine contraception research is needed to better understand client eligibility, particularly among immediate postcesarean or vaginal delivery and post second trimester abortion patients, and use by HIV-infected women.

A limitation with these results is that they may not apply to all contraceptive clinicians in the publicly funded program, because survey respondents could have different approaches to intrauterine contraception provision than nonrespondents (although they did have similar numbers of intrauterine contraception clients). Another limitation of this study is that the data were collected from a survey administered at one point in time, so that we cannot measure causality, only association. It is likely that causality does not only go in one direction; that is, the providers who are able to offer accurate counseling and evidence-based services are those who have more experience. However, the one survey item that does point to a temporal effect is training in insertions during residency and subsequently increased provision in practice. Whereas this study showed ob-gyn physicians were likely to be trained, family practice physicians and advance practice clinicians had far less training. A promising note was that younger physicians were more likely to be trained and to offer intrauterine contraception at their practices.

Training, not only in insertions but in basic method characteristics, is necessary to improve intrauterine contraception services. Incorrect knowledge about method benefits, contraindications, side effects, and appropriate candidates may deter providers from recommending the method to patients or may cause them to give faulty information. Although more than 90% of these providers thought their patients were receptive to learning about intrauterine contraception, far fewer had integrated it into their contraceptive services. As with providers, misconceptions about intrauterine contraception limit acceptance by patients.[29,30] Results show that even among these high-volume contraceptive providers, many were not familiar with the overall decrease in blood loss and improved dysmenorrhea associated with the levonorgestrel-releasing intrauterine system. Similarly, a significant minority did not emphasize the increased bleeding that can occur with the Copper T 380A. Among U.S. women who do choose intrauterine contraception, a main reason for discontinuation is increased menstrual bleeding.[29] Accurate information about the bleeding patterns associated with the different intrauterine contraceptives would help providers improve their recommendations and would also help women in their selections.

Improved intrauterine contraception provision requires medical education as well as training.[13,31] Specifically, provider education should involve evidence-based guidelines that emphasize safety and insertion techniques and should include not only ob-gyns and women's health care providers, but all providers offering family planning counseling and services.[32–34] In addition, less restrictive, evidence-based criteria for intrauterine contraception candidate selection should be developed and promoted.[9] Patient counseling should ensure proper knowledge and expectations of the method to increase adherence.[35] Clinical training is also necessary, especially to alleviate concerns about perforations from postpartum insertions or expulsions from incorrect placement in postabortion insertions.[19,22] Results from an intervention to use a checklist with the new medical eligibility criteria of the World Health Organization showed that a checklist was not sufficient to change providers' reliance on outdated knowledge about the intrauterine contraception.[36] A randomized trial likewise showed that provider education, without hands-on training, was insufficient to change practice.[37]

Finally, the issue of insurance coverage and reimbursements is a large obstacle for those health care providers who were actually trained and had experience offering intrauterine contraception but then stopped. Coverage of all contraceptive methods is a health policy need in the United States, but particularly for those methods that are expensive to pay out-of-pocket but confer many years of protection. The abortion rate in the United States is approximately three times higher than that of Western European countries. To prevent unintended pregnancy,

improved use of effective contraception is needed. Intrauterine contraception is an extremely effective and safe method that is far underutilized. It is also the most cost-effective method of reversible contraception.[38] Unfortunately, our study showed health care provider knowledge and practices continue to reflect erroneous views and unrealistic risk perceptions; current practice does not reflect the body of scientific evidence. By addressing these deficiencies in provider perceptions and practices, we can offer women in the United States greater protection against unintended pregnancy, similar to that of women in other industrialized countries where intrauterine contraception use is more frequent.

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