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Three-year Continuation of Reversible Contraception

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Abstract

OBJECTIVE—The objective of this analysis was to estimate the 3-year continuation rates of long-acting reversible contraceptive (LARC) methods, and compare these rates to non-LARC methods.

STUDY DESIGN—The Contraceptive CHOICE Project (CHOICE) was a prospective cohort study that followed 9,256 participants with telephone surveys at 3 and 6 months, then every 6 months for 2–3 years. We estimated 3-year continuation rates of baseline methods chosen for CHOICE including three LARC methods (52mg levonorgestrel intrauterine device, LNG-IUD; the copper intrauterine device, Cu-IUD; and the subdermal implant) and compared these rates to non-LARC hormonal methods (depot medroxyprogesterone acetate, oral contraceptive pills, contraceptive patch, or vaginal ring). Eligibility criteria for this analysis included participants who started their baseline chosen method by the 3-month survey. Participants who discontinued their method to attempt conception were censored. We used a Cox proportional hazard model to adjust for confounding and to estimate the hazard ratio (HR) for risk of discontinuation.

RESULTS—Our analytic sample consisted of 4,708 CHOICE participants who met inclusion criteria. Three-year continuation rates were 69.8% for users of the LNG-IUD, 69.7% for Cu-IUD users, and 56.2% for implant users. At 3 years, continuation was 67.2% among LARC users and 31.0% among non-LARC users ($p < 0.001$). After adjustment for age, race, education, socioeconomic status, parity, and history of sexually transmitted infection, the hazard ratio for risk of discontinuation was three-fold higher among non-LARC method users than LARC users ($HR_{adj} = 3.08$, 95% CI 2.80 – 3.39).

CONCLUSION—Three-year continuation of the two IUDs approached 70%. Continuation of LARC methods was significantly higher than non-LARC methods.

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Keywords

contraception; continuation; intrauterine device; subdermal implant; long-acting reversible contraception

INTRODUCTION

Long-acting reversible contraceptive (LARC) methods are highly effective and have high user satisfaction [1]. Their use has increased in the United States over the past two decades with approximately 8.5% of contraceptive women reporting current use of a LARC method [2]. In fact, a recent report demonstrated a nearly 5-fold increase in LARC methods over the last decade [3]. LARC users are likely to be highly satisfied with their method at 12 and 24 months [4,5]. However, data are lacking regarding continuation of LARC methods at three years in the United States. Some of the prior studies that assessed longer-term continuation randomized women to their contraceptive method and included women from many different countries [6,7]. The largest study was performed by Sivin and colleagues. This multinational study randomized women to the LNG-20 (the predecessor to the current levonorgestrel-containing intrauterine device (LNG-IUD) and the TCU380Ag (the predecessor to the current copper-IUD, Cu-IUD). Cumulative continuation at 3 years was 49% among LNG-20 users and 59% among TCU380Ag users [8]. Other prospective studies found 3-year continuation rates of 67–78% among users of copper IUDs [9,10]. Continuation of LNG-IUD has been reported at 73–80% at 3 years [11,12]. Subdermal implants have international continuation rates of 30–53% [12–15].

This analysis was performed to estimate rates of 36-month continuation of the baseline contraceptive method chosen and compare continuation rates of LARC and non-LARC methods. In addition, we explored baseline characteristics associated with discontinuation of contraceptive methods. We hypothesized that 36-month continuation rates for the LARC methods would exceed 60% and that continuation would be significantly higher for LARC methods than non-LARC methods.

MATERIALS AND METHODS

In 2007, the Contraceptive CHOICE Project (CHOICE) began recruiting women for a prospective observational cohort study. The goal of the study was to reduce the unintended pregnancy rate in the St. Louis area by promoting the most effective methods of contraception and eliminating the cost barrier to all forms of contraception. The methods have been reported in detail [16], but are described briefly below. The Human Research Protection Office at Washington University in St. Louis approved the study protocol prior to study recruitment.

Participants were referred to CHOICE through their health care providers, posted flyers, and by word of mouth. Recruitment sites included local health care centers, two abortion care providers, and a university-associated clinical research center. Inclusion criteria included women : 1) 14–45 years of age; 2) desiring reversible contraception and willing to start a new method; 3) sexually active with a male partner or intending to be within 6 months; 4)

living or receiving reproductive care in the St. Louis area; and 5) able to consent in English or Spanish. Women were excluded if they desired pregnancy in the next 12 months or were status-post hysterectomy or permanent sterilization. Recruitment of the 9,256 participants began in 2007 and was completed in 2011. All participants provided written informed consent prior to study enrollment.

All potential participants heard a standardized introduction to LARC methods, and upon enrollment they received additional contraceptive counseling [17]. LARC methods included the LNG-IUD, the Cu-IUD, and the 3-year subdermal implant. The contraceptive counseling reviewed all reversible methods in order of effectiveness from most to least effective. After a baseline interview, participants completed screening for sexually transmitted infections (STIs), received their contraceptive of choice at no cost and were followed for 2 or 3 years, depending on the timing of enrollment. Follow-up telephone interviews were performed at 3 and 6 months, then every 6 months thereafter for the duration of study participation. At the enrollment visit each participant chose her baseline method. When possible, they would start that method immediately. In certain cases (such as when pregnancy could not be reasonably ruled out), the patient received a bridge method until they returned for initiation of their chosen method. Bridge methods included depot medroxyprogesterone acetate (DMPA), oral contraceptive pills (OCPs), combined contraceptive patch, vaginal ring, or condoms. Participants were able to switch methods at any time during their follow-up. For the purposes of this analysis, if a participant switched her method, we considered this a discontinuation of the baseline method. Women who received the implant were told it was approved for up to 3 years of use. If a participant had the device removed and reinserted within the same month it was not considered a discontinuation. Follow-up interviews focused on method use, complaints, complications, side effects, method troubleshooting, reasons for method discontinuation and pregnancies. CHOICE Project participants have unrestricted access to device removal even after CHOICE ended.

This analysis included women who chose a LARC or a non-LARC method (DMPA, OCPs, contraceptive patch, or vaginal ring), started using their method by their 3-month survey, and completed their 36-month follow-up survey or had another data source which verified continuation or discontinuation at 3 years. Continuation rates at 3 years were estimated for each method. LARC methods were compared to non-LARC methods, and were stratified by age (14–19 and 20–45 years of age). Descriptive analyses were performed to describe demographic characteristics of participants using chi-square test or t-test, where appropriate. Normality was assessed for continuous variables. The time to event for this survival analysis was calculated from method initiation to the time point when the participant discontinued her contraceptive method. If she was lost to follow-up, she was censored at her last time of contact with CHOICE. Participants were censored if they discontinued a contraceptive method to attempt pregnancy. Kaplan-Meier survival functions were used to estimate continuation rates among different methods. We used Cox proportional hazard models to estimate hazard ratios (HR) for risk of contraceptive method discontinuation for characteristics associated with discontinuation. We defined confounders as variables that changed the estimate of hazard ratio for a contraceptive method by 10% or more when they were included in the model. Confounding variables and significant factors from univariable analysis or variables set *a priori* were included in the final multivariable model to evaluate

their effect size. The alpha level was set at 0.05. Stata software (version 11, StataCorp, College station, Texas) was used for all analyses.

RESULTS

Of 9,256 CHOICE participants, the first 5,090 were followed for 3 years. In this cohort, 382 were excluded because they did not start their chosen baseline method by the 3-month survey. There were a total of 4,708 participants (92%) who were followed for 3 years and included in this analysis. A flow diagram of included participants is shown in Figure 1. There were 185 women (4%) who were censored due to discontinuation for desire to conceive or pregnancy.

Demographic and reproductive characteristics are shown in Table 1. Mean age of participants in this analysis was 25 years; 48% were black; 35% had a high school education or less; 34% received public assistance; 44% had no health insurance; and 12% reported public insurance. Overall, 47% were nulliparous and 66% reported at least 1 unintended pregnancy at baseline. There were 644 adolescents in our cohort, 405 using LARC methods and 239 using non-LARC methods. In our stratified analysis by LARC versus non-LARC methods, we noted that LARC users were older, had higher parity, were more likely to have public insurance, and more likely to have a history of an unintended pregnancy.

Continuation at 1, 2, and 3 years for each contraceptive method is listed in Table 2. We stratified continuation by LARC and non-LARC methods. At 3 years, continuation was 67.2% among LARC users and 31.0% among non-LARC users ($p < 0.001$). The highest continuation was among IUD users with 69.8% continuation among LNG-IUD users and 69.7% among Cu-IUD users. Non-LARC methods had lower rates of continuation, ranging between 28% – 32% at 3 years. Among adolescents 14–19 years, 3-year continuation was lower for all methods compared to women 20–45 years, and lowest among non-LARC methods (52.6% for adolescents using LARC and 23.1% for non-LARC methods). By 3 years, 54.6% of adolescents continued the LNG-IUD, 49.5% continued the Cu-IUD, and 50.8% continued the subdermal implant.

Univariable analysis of risk factors for discontinuation is shown in Table 3. The multivariable model is shown in Table 4. After adjustment for age, race, education, low socioeconomic status (SES), parity, and history of STI, the hazard ratio for discontinuation was more than 3-times higher among non-LARC method users ($HR_{adj} = 3.08$, 95% CI 2.80 – 3.39) than LARC users. Participants 14–19 years of age at baseline were more likely to discontinue at 3 years compared to women 20 years and older ($HR_{adj} = 1.37$, 95% CI 1.19 – 1.56). Compared to those with a high school education or less, college graduates reported a lower risk of discontinuation ($HR_{adj} = 0.85$, 95% CI 0.74 – 0.98).

Participants discontinued their baseline methods for a variety of reasons (Table 5). Of LNG-IUD users that discontinued this method, approximately 19% did so due to bleeding changes, while 25% reported “I did not like how it made me feel.” The most common reasons for Cu-IUD users to stop their method was bleeding changes (35%) and cramping (17%). Forty-five percent of implant discontinuers reported bleeding changes, and 28%

reported that they did not like how they felt. Among non-LARC methods, 33% of DMPA users that stopped this method reported general “side effects” as the most common reason for discontinuing. Forty-two percent of OCP users that discontinued reported logistical reasons, such as the pill being hard to remember to get or to take. Of patch discontinuers, 41% reported “side effects.” Twenty-seven percent of women discontinuing the ring reported “side effects,” and 24% reported logistical issues.

COMMENT

Continuation rates for LARC methods at 1, 2, and 3 years are significantly higher than non-LARC methods. After adjusting for confounding variables, choice of a shorter-acting method and younger age were associated with increased discontinuation [1,4,18,19]. Teens aged 14–19 in our cohort were more likely to discontinue than women of 20 years of age and older. However, of those adolescents who chose LARC methods, over half were still using their method at 3 years compared to one-fifth of adolescents who were using their non-LARC methods at 3 years. Even among women using short-acting methods, 3-year continuation was relatively high. Those using OCPs, DMPA, patch, and ring had continuation rates between 28 and 33%.

Relatively few prior studies have estimated continuation beyond 1 year among U.S. women who chose their contraceptive method rather than being randomized to a method. Furthermore, this analysis was conducted using the data from the CHOICE cohort with a high follow-up rate where only 19% of participants were lost to follow-up at 3 years. Our cohort had continuation rates consistent with other prospective trials. The 70% continuation of both LNG- and Cu-IUDs was consistent with those reported previously of 67–80% [9–12]. The 56% continuation of implants was higher than previously reported of 30–53% [12–15].

It is very plausible that women who are interested in long-term (> 2 years) protection from pregnancy are more likely to select IUDs and the implant, while women who are less certain about their need or desire for long-term contraception would select non-LARC methods. However, we still believe our estimates of 3-year continuation are important as for contraceptive counseling. High continuation rates reflect high satisfaction with LARC methods [5].

The major limitation of CHOICE is that it is a convenience sample within one geographic region. Participants were required to start or switch to a different contraceptive method at enrollment, which may also limit generalizability. An important consideration in this analysis is our assessment of 3-year continuation of the subdermal implant. This may be an inappropriate cut-off to measure continuation and satisfaction if women undergo implant removal due to the approaching “expiration” of the device at 3 years (the FDA-approved duration of use) [20]. Another limitation is that data on side effects, continuation, and expulsion were self-reported through phone follow-up instead of at clinic visits.

Regardless of age, sociodemographic markers, and education, women using LARC methods report high continuation rates at 3 years. OCPs and condoms continue to be the most commonly-used reversible contraceptive methods used by U.S. women [3]. It is time for a

paradigm shift: LARC methods should be considered first-line contraceptives for women of all ages given that satisfaction, continuation, and effectiveness of LARC methods have been shown to be superior to non-LARC methods [1,4,5,21].

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CLINICAL IMPLICATIONS

- Regardless of age, race, and socioeconomic status, women using LARC methods report high continuation at 3 years.
- IUDs and the contraceptive implant should be considered first-line contraceptives for all women given their effectiveness and high continuation rates.

Figure 1.
Flow diagram of women included in the analysis

Figure 2.
Kaplan-Meier Survival Curve of contraceptive continuation by long acting reversible contraceptive (LARC) methods and non-LARC methods.

Table 1

Baseline characteristics of analytic sample stratified by contraceptive method and age

	Overall (n=4708)			non-LARC (n=1505)			LARC (n=3203)			p-value
	Mean	SD	N	Mean	SD	N	Mean	SD	N	
Age	25.2	5.7		24.0	5.0		25.7	5.9		<0.001
Race	N	%		N	%		N	%		0.668
Black	2243	47.7		723	48.1		1520	47.5		
White	2100	44.6		659	43.8		1441	45.0		
Others	364	7.7		122	8.1		242	7.6		
Education										<0.001
High School	1661	35.3		472	31.4		1189	37.1		
Some College	1987	42.2		666	44.3		1321	41.3		
College graduate	1058	22.5		366	24.3		692	21.6		
BMI										<0.001
Underweight	144	3.1		72	4.9		72	2.3		
Normal	1895	41.2		718	49.2		1177	37.4		
Overweight	1206	26.2		333	22.8		873	27.8		
Obese	1357	29.5		336	23.0		1021	32.5		
Low socioeconomic status										<0.001
No	2088	44.4		776	51.6		1312	41.0		
Yes	2618	55.6		728	48.4		1890	59.0		
Insurance										<0.001
None	2031	43.5		683	46.0		1348	42.4		
Private	2081	44.6		711	47.9		1370	43.0		
Public	556	11.9		91	6.1		465	14.6		
Parity										<0.001
0	2225	47.3		988	65.6		1237	38.7		
1	1150	24.4		290	19.3		860	26.8		

	Overall (n=4708)	non-LARC (n=1505)	LARC (n=3203)	p-value		
2	819	17.4	149	9.9	670	20.9
3+	514	10.9	78	5.2	436	13.6
<hr/>						
Unintended Pregnancies				<0.001		
0	1599	34.0	704	46.9	895	28.0
1	1292	27.5	423	28.2	869	27.2
2	780	16.6	188	12.5	592	18.5
3+	1027	21.9	187	12.5	840	26.3
<hr/>						
History of Abortion at Baseline?				<0.001		
No	2870	61.0	969	64.4	1901	59.4
Yes	1838	39.0	536	35.6	1302	40.6
<hr/>						
History of STI at Baseline				0.011		
No	2869	61.0	957	63.6	1912	59.7
Yes	1836	39.0	547	36.4	1289	40.3

^aLARC: long acting reversible contraceptive

^bStandard deviation

^cLow socioeconomic status includes trouble paying for basic necessities or receiving government subsidies in the form of food stamps or welfare

^dSTI: sexually transmitted infection

Table 2
Kaplan-Meier estimates of 1-, 2-, and 3-year continuation of baseline method chosen

	1 Year			2 Year			3 Year		
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	
Overall	76.7	75.4 – 77.9	64.2	62.6 – 65.5	56.2	54.5 – 57.5			
LNG-IUD	87.3	85.8 – 88.6	76.7	74.8 – 78.5	69.8	67.6 – 71.7			
Cu-IUD	84.5	80.7 – 87.3	76.3	72.1 – 79.8	69.7	65.1 – 73.7			
Implant	81.9	78.3 – 84.7	68.7	64.7 – 72.3	56.4	51.8 – 60.3			
DMPA	57.4	51.5 – 62.2	40.5	33.8 – 44.7	33.2	26.9 – 37.7			
OCP	58.1	56.3 – 64.6	40.1	37.9 – 46.5	29.5	27.3 – 35.8			
Ring	53.6	49.7 – 58.6	36.7	33.1 – 41.9	29.1	25.8 – 34.4			
Patch	46.1	38.3 – 57.4	35.0	25.7 – 44.5	28.1	19.5 – 37.9			
LARC	85.9	84.5 – 87.0	75.2	73.6 – 76.7	67.3	65.4 – 68.9			
Non-LARC	55.6	54.2 – 59.4	38.7	36.9 – 42.1	30.2	28.5 – 33.5			
Adolescents 14–19 years									
LARC	82.1	77.9 – 85.6	68	63.0 – 72.5	52.6	47.2 – 57.7			
Non-LARC	46.9	42.1 – 54.6	32.9	28.4 – 40.6	21.2	17.6 – 29.0			
Adults 20–45 years									
LARC	86.4	85.0 – 87.6	76.2	74.5 – 77.7	69.3	67.4 – 71.0			
Non-LARC	57.4	55.7 – 61.3	39.9	37.6 – 43.4	31.9	29.8 – 35.4			

^aLNG, levonorgestrel

^bIUD, intrauterine device

^cCu, copper

^dDMPA, depotmedroxyprogesterone acetate

^eOral contraceptive pill

^fLARC, long-acting reversible contraceptive

^gCI, confidence Interval

Table 3

Univariable analysis of risk factors for discontinuation of baseline contraceptive method at 3 years

Univariable model				
	HR	95% CI		
Contraceptive method				
OCP	Reference			
LNG-IUD	0.30	0.27	0.35	
Cu-IUD	0.31	0.26	0.38	
Implant	0.48	0.40	0.56	
DMPA	1.01	0.85	1.20	
Patch	1.21	0.94	1.56	
Ring	1.12	0.96	1.30	
Age				
14–19	1.55	1.38	1.74	
20+	Reference			
Race				
Black	1.20	1.09	1.32	
White	Reference			
Others	1.30	1.10	1.54	
Education				
High School	Reference			
Some college	0.93	0.84	1.03	
College grad	0.82	0.73	0.93	
Body Mass Index				
Underweight	1.18	0.92	1.51	
Normal	Reference			
Overweight	0.91	0.82	1.02	
Obese	0.78	0.70	0.87	
Low Socioeconomic Status				
No	Reference			
Yes	0.95	0.87	1.04	
Insurance				
None	1.07	0.97	1.18	
Commercial	Ref			
Public	1.04	0.90	1.20	
Parity				
0	1.38	1.27	1.51	
1+	Reference			

Univariable model			
	HR	95% CI	
Prior Unintended Pregnancies			
0		Reference	
1+	0.79	0.72	0.87
History of STI			
No		Reference	
Yes	1.13	1.03	1.24

^aHR, hazard ratio

^bCI, confidence interval

^cOCP, oral contraceptive pill

^dLNG, levonorgestrel

^eIUD, intrauterine device

^fCu, copper

^gDMPA, depot medroxyprogesterone acetate

^hLow socioeconomic status is defined as trouble paying for basic needs (food, housing, medical care, transportation) or receiving government aid (food stamps, welfare)

ⁱSTI, sexually transmitted infection

Table 4

Multivariable analysis of risk factors for discontinuation of baseline contraceptive method at 3 years

Multivariable model			
	HR	95% CI	
Contraceptive method			
OCPs	Reference		
LNG-IUD	0.31	0.27	0.36
Cu-IUD	0.33	0.27	0.40
Implant	0.44	0.37	0.52
DMPA	0.93	0.78	1.11
Patch	1.17	0.91	1.52
Ring	1.16	1.00	1.35
Contraceptive duration			
LARC	Reference		
Non-LARC	3.08	2.80	3.39
Age			
14–19	1.33	1.16	1.53
20+	Reference		
Race			
Black	1.12	1.01	1.25
White	Reference		
Others	1.26	1.07	1.50
Education			
High School	Reference		
Some College	0.93	0.84	1.04
College/Grad	0.85	0.74	0.98
Low Socioeconomic Status			
No	Reference		
Yes	1.05	0.95	1.17
Parity			
0	1.10	0.98	1.23
1+	Reference		
History of STI			
No	Reference		
Yes	1.21	1.10	1.34

^aHR, hazard ratio^bCI, confidence interval

^cOCP, oral contraceptive pill

^dLNG, levonorgestrel

^eIUD, intrauterine device

^fCu, copper

^gDMPA, depot medroxyprogesterone acetate

^hLow socioeconomic status is defined as trouble paying for basic needs (food, housing, medical care, transportation) or receiving government aid (food stamps, welfare)

ⁱSTI, sexually transmitted infection

Reasons for discontinuation of baseline contraceptive method in Contraceptive CHOICE Project

Table 5

	LARC				Non-LARC							
	LNG-IUD		Cu-IUD		Implant		DMPA		OCP		Patch	
	N	%	N	%	N	%	N	%	N	%	N	%
Bleeding changes	136	19.1	75	35.2	133	45.5	58	25.6	49	12.3	4	4.8
Pain	82	11.5	37	17.4	8	2.7	4	1.8	3	0.8	2	2.4
Did not like "side effects"	181	25.4	20	9.4	81	27.7	76	33.5	62	15.6	34	41.0
Desired pregnancy	67	9.4	22	10.3	17	5.8	4	1.8	8	2.0	3	3.6
Method failed	9	1.3	3	1.4	0	0	2	0.9	25	6.3	4	4.8
Expulsion/came off /fell out	96	13.5	26	12.2	--	--	--	--	--	--	5	6.0
Difficult to use	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Logistics [*]	0	0.0	0	0.0	0	0.0	22	9.7	169	42.5	14	16.9
All others	142	19.8	30	14.1	53	18.2	61	26.7	82	20.6	17	20.5
TOTAL	713		213		292		227		398		83	

^aLARC, long-acting reversible contraception^bLNG, levonorgestrel^cIUD, intrauterine device^dCu, copper^eDMPA, depo medroxyprogesterone acetate^fOCP, oral contraceptive pill^{*}Time, hard to get, remember