

vitamin D level on BV (HR, 1.02; 95% confidence interval, 0.99–1.04).

#### COMMENT

In this randomized trial of STD clinic patients with symptomatic BV, supplementation with high-dose vitamin D in addition to standard metronidazole therapy did not reduce BV recurrence. Adjustment for adherence and sensitivity analyses to test the robustness of the

primary finding reinforced the lack of association between vitamin D supplementation and BV recurrence.

Our findings suggest that short-term, high-dose vitamin D supplementation does not reduce BV recurrence in non-pregnant women. Given the established associations between BV and negative health outcomes, effective interventions to reduce BV's impact continue to be urgently needed.

#### CLINICAL IMPLICATIONS

- Supplementation with high-dose vitamin D in addition to standard metronidazole therapy did not reduce bacterial vaginosis recurrence in this trial.
- Vitamin D supplementation is unlikely to provide meaningful clinical benefit in the treatment of recurrent bacterial vaginosis. ■

## Development and testing of an iOS waiting room “app” for contraceptive counseling in a Title X family planning clinic

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**OBJECTIVE:** Long-acting reversible contraceptive (LARC) methods, such as the intrauterine device and implant, are highly effective but used by less than 10% of US women. The objective of our study was to improve LARC interest by enhancing clinic counseling.

**STUDY DESIGN:** A quality improvement methodology was used to evaluate intrauterine device service delivery in 3 Chicago Title X clinics. To address identified barriers, we developed a theory-based iOS application (app) for patients to use in the clinic waiting room using human-centered design. The final prototype was tested in a randomized controlled trial in a Title X clinic with sexually active females (79% African American) under age 30 years. Our sample of 60 was chosen to detect an increase from 10% (baseline) to 45% (app intervention) in the proportion of patients expressing interest in discussing a LARC method during their clinic visit with 80% power and two-sided  $\alpha = 0.05$ . After completing demographic and baseline knowledge questionnaires, participants were randomized 1:1 to

intervention (app) or standard care arms. App users also completed a posttest. Our primary outcome was expressed interest in discussing a LARC method during the clinic visit. Secondary outcomes were contraceptive knowledge and LARC selection.

**RESULTS:** App testers ( $n = 17$ ) preferred interactive, visually appealing design and video testimonials. In the pilot randomized controlled trial ( $n = 52$ ), app users had a significantly higher knowledge of contraceptive effectiveness ( $P = .0001$ ) and increased interest in the implant (7.1–32.1%,  $P = .02$ ) after the intervention. Users were highly satisfied with the app. Staff reported no problems using the app in the clinic.

**CONCLUSION:** Use of a theory-based counseling app offers a novel method to optimize wait time while minimizing clinic flow disruption. Preliminary data demonstrate that app use was associated with improvements in patients' contraceptive knowledge and interest in the implant.

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## BACKGROUND AND OBJECTIVE

Long-acting reversible contraceptive (LARC) methods (ie, the intrauterine device [IUD] and contraceptive implant) require few use behaviors and are therefore highly effective. Lack of awareness of and misinformation about LARC may contribute to low rates of use.

Recent reports have called for focused application of behavioral theory to interventions for contraceptive use. The transtheoretical model and its stages of change paradigm posit that in changing behaviors, individuals progress through sequential stages of precontemplation, contemplation, preparation, action, and maintenance and that transition between steps requires a core set of change processes.

Patients presenting for contraception will most likely be in the precontemplation or contemplation stages for adopting LARC. For precontemplation, the key change process is enhancing awareness. The transtheoretical model is

## EDITORS' ★ CHOICE

often coupled with the theory of planned behavior, which postulates that behavioral intention is informed by the following: (1) attitude toward the behavior and beliefs about outcomes associated with performing the behavior (behavioral beliefs); (2) subjective norms and beliefs about those norms; and (3) perceived behavioral control or the perception that one has the requisite skills and resources to perform the behavior. Thus, addressing common behavioral, normative, and control beliefs can help women advance from precontemplation or contemplation stages to action in adopting LARC.

Interactive, multimedia, computer-based programs provide a novel platform for delivering information. This paper describes the development and evaluation of an iOS application (app) for use in the clinic waiting room to increase LARC awareness and interest prior to the clinic visit.

## MATERIALS AND METHODS

During 13 meetings with clinicians, staff, and patients, 33 failures in the processes of care that could undermine IUD service delivery were identified and further substantiated by clinic administrative data. This revealed that contraceptive counseling was limited by the lack of time, nonuse of waiting room pamphlets, and failure to counsel all women on LARC. Waiting room down time was recognized as a missed opportunity for patient engagement. We therefore opted to create a counseling app to promote the interest in and awareness of LARC.

A randomized controlled trial was conducted to evaluate the app's impact on contraceptive knowledge, LARC interest, and selection of a LARC method. Eligible participants were sexually experienced, English-speaking women, aged 15-30 years, presenting for contraceptive services at a Chicago Title X clinic. Exclusion criteria were currently pregnant, desiring pregnancy within the next 12 months, currently using LARC, scheduled for a LARC-related visit, and relying on male partner sterilization for contraception. A sample size of 60 was chosen to detect an increase from 10% (baseline) to 45% (app intervention) in the proportion of patients expressing interest in discussing a LARC method during their clinic visit.

The baseline survey collected demographic information, mobile phone use, sexual and reproductive health history (sexual experience and pregnancy history), and contraception-related variables (awareness of methods, knowledge of effectiveness, past and current method use, self-efficacy, method interest). Contraceptive knowledge was measured by 3 questions in which participants were presented with a method pair (eg, oral contraceptives and condoms) and asked which method was more effective. Participants indicated all the contraceptive methods that they were interested in discussing during counseling. The postintervention survey reassessed contraceptive knowledge and the indicated methods that they wanted to discuss during counseling and gauged intervention satisfaction.

TABLE

## Pre/post outcomes: contraceptive knowledge and LARC interest

Variable	Intervention (n = 28)		Standard care (n = 24)		P value <sup>a</sup>	P value <sup>b</sup>
	Baseline	After intervention	Baseline			
Knowledge of contraceptive effectiveness						
Question 1: OCs vs condom (correct)	10 (35.7)	19 (67.9)	8 (33.3)		.86	.04
Question 2: IUD vs DMPA (correct)	4 (14.3)	18 (64.3)	1 (4.2)		.22	.0001
Question 3: IUD vs implant (correct)	2 (7.1)	8 (28.6)	6 (25.0)		.08	.11
Total score, median	1	1.5	1		.83	.0001
Interest in discussing LARC at visit						
IUD	8 (28.6)	8 (28.6)	4 (16.7)		.31	1.00
Implant	2 (7.1)	9 (32.1)	3 (12.5)		.51	.02
Any LARC	8 (28.6)	13 (46.4)	7 (29.2)		.96	.18

Data are listed as n (percentage) unless otherwise specified.

DMPA, depot medroxyprogesterone acetate; IUD, intrauterine device; LARC, long-acting reversible contraceptive; OC, oral contraceptive.

<sup>a</sup> Intervention vs standard care arms at baseline; <sup>b</sup> Baseline vs after intervention in intervention arm.

Gilliam. Waiting room app in Title X. *Am J Obstet Gynecol* 2014.

## RESULTS

The human-centered design process revealed a number of desired features. Testers preferred contraceptive effectiveness conveyed in absolute numbers (eg, <1 pregnancy per 100 women) rather than percentages (eg, >99% effective). They rated peer testimonials very highly and related well to the stories. Testers were presented with multiple options for the information categories to be included on all method-specific pages. The most popular categories (“How does it work,” “What can I expect,” and “What will he think?”) were incorporated into the final design.

Use of the app translated to improvements in knowledge of contraceptive effectiveness over baseline (Table). After the intervention, app participants had significantly higher scores on 2 of the 3 knowledge questions as well as higher total knowledge scores ( $P = .0001$ ).

Baseline interest in the IUD was higher than for the implant in both study arms. Among intervention participants, there were no pre-post differences in IUD interest (28.6% and 25.8% at both time points in per-protocol and intent-

to-treat analyses, respectively). However, there was a significant increase in the proportion of women interested in discussing the implant during contraceptive counseling (per protocol: 7.1-32.1%,  $P = .02$ ; intent to treat: 6.5-29.0%,  $P = .02$ ).

## COMMENT

This study presents an innovative process for developing and testing a contraceptive counseling tool. Principles of human-centered design were used to include patients and clinic staff throughout the design and development process. Iterative prototyping enabled immediate design modifications in response to comments. In addition, behavioral theory was incorporated to address factors that can hinder behavioral change. The final app complemented the clinical visit, took advantage of the clinic wait time, shifted some of the counseling burden, and did not interfere with clinic flow.

Brief (<15 minutes) app sessions significantly improved women’s knowledge scores on the relative effectiveness of LARC compared with other methods. Although app users reported increased

interest in the contraceptive implant, the app had no discernible impact on interest in the IUD.

This study demonstrates that an app can be highly acceptable, informative, and easily integrated into the Title X setting for use by low-income women. Women self-counseled by the app had increased knowledge, awareness, and interest in highly effective contraception before meeting with a health care provider. Although the study was clinic based, given high access to Smartphones with app capability in this community, the app can be downloaded by women onto their Smartphone in advance of the visit. Thus, apps could be a mechanism for implementing timely, evidenced-based educational information to a wide network of clinics and clients.

## CLINICAL IMPLICATIONS

- Theory-based contraceptive counseling applications may be an effective use of clinic waiting room time.
- Contraceptive counseling applications can increase contraceptive knowledge. ■

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