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# An Evaluation of Contraception Education and Health Promotion Applications for Patients

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A B S T R A C T

*Purpose:* Patients use mobile applications (apps) to obtain information about health, including contraception. Providers and health educators may also use apps designed for patients to aid in patient education during the clinical encounter or recommend apps for patient use. Individuals may have a difficult time remaining updated on the number and quality of available apps. The objective of this study is to identify and evaluate contraception apps for patient education and health promotion, so that providers and health educators may recommend accurate apps to patients.
*Methods:* We systematically searched the Apple iTunes Store using contraception search terms. A master list of apps was created and the apps were divided into categories and subcategories according to intended audience and purpose. Contraception apps for patient education and health promotion were selected and also checked for availability in the Google Play Store. We evaluated these identified apps using an adapted APPLICATIONS scoring system.
*Findings:* Forty-eight apps were identified from the original search. Nineteen of these were excluded because they did not open on an iPhone or iPad, were no longer available, or did not contain educational material on contraception. We excluded 11 additional apps that contained inaccurate information. We evaluated 18 apps. The mean score was 10.6 out of 17 possible points with a range of 7 to 15 points.
*Conclusions:* Many apps provide contraception information for patients, but some apps are inaccurate. Few apps provide comprehensive information on all available methods, including effectiveness, side effects, and contraindications.


Many patients use mobile applications (apps) to look for health information. A 2012 survey showed that 31% of cell phone owners used their phones to look for health information, and 19% of smartphone users had at least one health app on their phone (Pew Research Center, 2012). The majority of people in the United States have smart phones, primarily iPhones (30%) and Android phones (33%) (Pew Research Center, 2015). Health care providers also use apps for patient education in clinical settings (Sclafani et al., 2013). App overload is a major challenge for both providers and patients (Aungst, Clauson, Misra, Lewis, & Husain, 2014; Kuehn, 2015). The total number of health apps in the U.S. Apple iTunes and Google Play Stores now exceeds 165,000. There are 90,088 health apps in the Apple iTunes Store; 7% are apps for women's health and pregnancy (IMS Institute for Healthcare Informatics, 2015).

Given the many different contraceptive options available to patients, providers can find counseling on available methods, including side effects, risks, and benefits difficult to cover in a single office visit (Akers, Gold, Borrero, Santucci, & Schwarz, 2010). Providing adequate information has been shown to improve contraception uptake, satisfaction, and continuation (Dehlendorf, Krajewski, & Borrero, 2014). Patient education materials can help with this process, and new mobile technology can make education materials more interactive and accessible. To date, two contraceptive apps have been developed and studied for use in the clinical setting: one app increased knowledge of contraception and interest in the contraceptive implant when

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combined with in-person counseling compared with counseling alone (Gilliam, Martins, Bartlett, Mistretta, & Holl, 2014), and use of another app alone was shown to result in the same postuse knowledge and long-acting reversible contraception uptake as an in-person counseling session (Sridhar, Chen, Forbes, & Glik, 2015).

As more health-related apps are developed, multiple studies have been published to evaluate these apps. A systematic review of quality assessment methods for apps recommended key components of app assessment (BinDhim, Hawkey, & Trevena, 2015). In response to these recommendations and a review of published literature on apps, researchers in the field of obstetrics and gynecology developed the APPLICATIONS scoring system to create a systematic way to compare multiple components of apps including content, and accessibility issues such as cost, requirements for an active internet connection, searchability, and ease of navigation (Chyjek, Farag, & Chen, 2015). We have previously used the scoring system to evaluate contraception apps that providers may use for their own reference (Perry, Lunde, & Chen, 2016). This system has also been used to evaluate pregnancy wheels (Chyjek et al., 2015), menstrual cycle tracker apps (Moglia, Nguyen, Chyjek, Chen, & Castano, 2016), and apps for gynecologic oncologists (Farag, Fields, Pereira, Chyjek, & Chen, 2016). Our current study goal is to identify and evaluate apps about contraception designed for patient education and health promotion that providers and health educators may use during patient encounters or recommend to patients for further education. As classified by Aungst et al. (2014), patient education apps contain educational material targeted to patients rather than physicians, and health promotion apps are patient centered and provide information or support to promote health. For example, in the field of contraception, health promotion apps may provide encouragement to use contraception or practice abstinence. We chose to evaluate these two types of apps together because they both provide education and health information specifically for patients. Other types of patient-centered apps, such as medication reminder apps for contraception and health tracking apps for menstrual cycle tracking, have been evaluated previously (Gal, Zite, & Wallace, 2014; Moglia et al., 2016). We use an adapted APPLICATIONS scoring system to systematically evaluate patient education and health promotion apps related to contraception.

## Materials and Methods

### *App Search Strategy*

We generated a complete list of iOS apps relevant to contraception by searching the Apple iTunes Store between March 2 and March 27, 2015, using our previously described search strategy (Perry et al., 2016). To summarize the search strategy, we searched for all contraceptive terms included in the World Health Organization (WHO) Family Planning Handbook (WHO, 2011), a list of common brand names and slang terms generated by the research team, and the general terms "contraception," "contraceptive," and "birth control." We excluded apps that were identified by the search terms but were no longer available in the iTunes Store, were not in English, or were not relevant to contraception education as determined by the research team. We then assigned identified contraception apps to the following categories and subcategories developed by Aungst et al. (2014): clinician centered (electronic health record and electronic prescribing, productivity, communication, medical calculator), patient centered (health promotion, patient communication, health tracking, medication reminder), reference (disease reference, clinical reference, drug reference, medical literature), and educational (general medical education, specialist medical education, continuing medical education, patient education).

### *App Evaluation*

We then further evaluated apps in the patient education and health promotion subcategories. We downloaded apps June 14 and 15, 2015. We also searched the Google Play Store for availability of these apps. Identified apps were evaluated for accuracy in the areas of method effectiveness, side effects and risks, instructions for use, and method description and availability using the Contraceptive Technology textbook (Hatcher et al., 2011) and Centers for Disease Control and Prevention Medical Eligibility Criteria as references (Centers for Disease Control and Prevention, 2010). Three authors (B.L., R.P., and K.T.C.) evaluated the apps for accuracy and the decision for exclusion of inaccurate apps was reached by consensus. Apps were deemed inaccurate and excluded if they contained any incorrect information compared with the two references cited above.

We collected the following information for each app: developer and seller, sponsoring organization, version, device availability (iPhone, iPad, Android phone, and Android tablet) and price. Popularity index was calculated from the product of the average app rating and number of reviews of all versions of the app (Tripp et al., 2014). We adapted the APPLICATIONS scoring system (Chyjek et al., 2015), which includes 12 objective and subjective categories: app comprehensiveness, price, paid subscription, literature used, in-app purchases, connectivity, advertisements, text search field, inter-platform compatibility, other components, navigation ease, and subjective presentation (Table 1).

Scores for comprehensiveness included evaluation for inclusion of the following information: 1) all modern reversible contraception methods (defined as WHO tier 1 and tier 2 methods plus condoms; WHO, 2011), 2) typical effectiveness of each method, 3) contraindications and medical risks, and 4) method side effects. Apps received 1 point for each criterion met up to a total of 4 points. Because the contraceptive implant is not currently available in Canada, Canadian apps were given 1 point if they included all modern methods except the implant.

In the scoring system, apps that are not dependent on an Internet connection for function receive 1 point. For our evaluation, apps that required Internet for clinic location or provided links to videos but had core content that did not rely on Internet were given 1 point for this category. Apps received up to 3 points for "other components": images, videos, and special features. We defined special features as a clinic or service locater, sexually transmitted infection prevention information, recommendations for type of protection needed for specific sexual activities, or the ability to enter multiple characteristics of one patient to determine contraceptive eligibility (i.e., decision tree function). All authors independently scored each app and reconciled any discrepancies by discussion for an eventual 100% agreement.

Navigation ease and subjective presentation, including appearance such as text size and color, images, and illustrations (Zapata, Fernandez-Aleman, Idri, & Toval, 2015), were evaluated by each author independently on a Likert scale of 1 (poor), 2 (below average), 3 (average), 4 (above average), and 5 (excellent). The four authors' scores were averaged. An average rating