

Mobile Application Use Among Obstetrics and Gynecology Residents

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ABSTRACT

Background Mobile applications (apps) are increasingly used in clinical settings, particularly among resident physicians. Apps available to patients and physicians are rapidly expanding.

Objective We aimed to describe obstetrics and gynecology (ob-gyn) residents' use of and attitudes toward ob-gyn-related mobile apps.

Methods We conducted a cross-sectional survey of residents at all 19 California ob-gyn programs using a web-based questionnaire. Responses were analyzed using descriptive and chi-square statistics.

Results Of 386 residents contacted, 197 (51%) completed the survey. All respondents owned mobile devices (100% smartphone, 74% tablet), and 93% used apps in the clinical setting. Commonly used ob-gyn-related apps were pregnancy wheels (84%), cervical cancer screening algorithms (68%), and contraceptive eligibility guidelines (47%). Only 53% of respondents recommended apps to patients, with many reporting not being aware of appropriate apps. Sixty-two percent of respondents used apps for learning, but only 3 ob-gyn-specific apps were mentioned. Most chose apps based on recommendations from other residents. Residents viewed mobile technology as an important clinical tool (92%) that improves efficiency (89%). App use did not differ by gender, age, or postgraduate year.

Conclusions Mobile technology and ob-gyn-related app use are widely used among California ob-gyn residents, who feel that apps enhance their ability to care for patients. Context of app use varies, with most residents using apps during clinical care, but only half recommending apps to patients. Recommendations from other residents are the common resource for discovering new apps, suggesting a need for more formal guidance on finding and evaluating apps.

Introduction

In this age of advanced technologies, physicians increasingly use electronic tools for patient care, clinical reference, and education.¹ Mobile applications (apps) are tools that can be downloaded onto smartphones or computer tablets, and many are targeted at medical providers. These apps may aim to enhance patient care, increase efficiency, or provide individualized learning for clinicians.² Mobile apps targeted at obstetrician-gynecologists include pregnancy-dating apps, cervical cancer screening algorithm apps, and contraception eligibility apps, among others.

Authors of a 2014 study³ systematically searched the iTunes store (Apple Inc, Cupertino, CA) using a list of medical subject heading terms relevant to obstetrics and gynecology (ob-gyn) compiled by the National Institutes of Health US National Library of Medicine. This search identified 242 mobile apps potentially useful to obstetrician-gynecologists. A 2012 survey⁴ of resident physicians in Accreditation Council for Graduate Medical Education-accredited training programs found that more than half used

apps in their clinical work. This proportion is likely growing, as current residents have been introduced to mobile apps in their preclinical years. A Canadian study⁵ from 2014 found that nearly 100% of medical residents used mobile devices for medical resources, with 77% of them using apps more than once a day.

The prevalence and patterns of app use among ob-gyn residents have not been studied. We explored how ob-gyn residents in California use specialty-related mobile apps, the types of apps used, how residents choose among available options, and their attitudes toward this technology.

Methods

We contacted residency program directors or faculty involved in resident education at the 19 ob-gyn programs in California. A web-based survey was delivered via e-mail to residents by each program. A \$5 gift card was e-mailed to participants who completed the survey. Data collection occurred between October 2015 and March 2016. Residents were sent up to 2 reminder e-mails before being considered nonresponders.

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The 44-item web-based survey was developed by the authors and contained closed and open-ended questions regarding mobile app use and attitudes toward mobile technology in the clinical setting. The survey was piloted with 7 recent graduates and took approximately 15 minutes to complete; feedback did not result in changes. The only identifiers were e-mail addresses collected for the purposes of gift card distribution, which were removed prior to data analysis.

The primary outcome was prevalence of mobile app use in the clinical setting. Secondary outcomes were prevalence of recommending mobile apps to patients, prevalence of mobile app use for medical learning, and attitudes toward mobile app use in the clinical setting. Mobile app types and specific app names in each use category were collected. Attitudes were assessed with Likert scales. Demographic information collected included age, year in residency, and gender.

The study was approved by the University of California, Irvine, Institutional Review Board and was declared exempt from written informed consent. Assent was obtained from all participants via the landing page of the online survey.

Data on demographics, prevalence of mobile app use, and resident attitudes were analyzed using descriptive statistics; chi-square statistics were used to examine associations between app use and gender, age, and year of training. SAS version 9.4 (SAS Institute Inc, Cary, NC) was used to conduct analyses, and $P < .05$ was considered significant. No special processes for handling missing data were employed in the analysis.

Results

Residents from all 19 California ob-gyn programs completed the survey. The response rate was 51%, with 197 of 386 residents completing the survey. The median age of respondents was 29 years. There was approximately equal distribution across postgraduate years (PGYs) 1 through 4. All 197 respondents used smartphones, and the majority also owned tablet computers (146 of 197, 74%).

Prevalence of mobile app use in the clinical setting was 93% (184 of 197). TABLE 1 shows the types of apps most frequently used in clinical encounters, with pregnancy wheels being the most common. Residents used 23 distinct pregnancy wheel apps, with no app used by more than 30% of respondents who used them. Among cervical cancer screening algorithms, almost all respondents who used an app used the American Society for Colposcopy and Cervical Pathology app (125 of 132, 95%). Half of residents

What was known and gap

Mobile application use is expanding, but little is known about the use of specialty-specific applications by residents.

What is new

A study of California obstetrics and gynecology residents found widespread use of mobile apps for clinical care and learning, with some residents recommending apps to patients.

Limitations

Survey instrument lacks validity evidence; potential for response bias.

Bottom line

Residents use apps for clinical care and learning and may benefit from added guidance on selecting the most accurate appropriate apps.

used a contraception eligibility guideline, and among these apps, the Centers for Disease Control and Prevention app was the most popular (86 of 89, 97%). The American Congress of Obstetricians and Gynecologists (ACOG) clinical reference app was used by 26% of residents (52 of 197). A minority of residents used a vaginal birth after cesarean success estimator, with 50% (18 of 36) using the Perinatal Calculators app. Overall use of clinical mobile apps was not associated with gender, age, or year in residency.

Approximately half of respondents recommended mobile apps to patients (99 of 188, 53%). TABLE 2 shows the types of apps recommended. Respondents who did not recommend apps to patients (89 of 188, 47%) most frequently cited not being aware of patient-focused apps (58 of 89, 65%), not having time to research the best ones (40 of 89, 45%), patients' lack of access to mobile devices (17 of 89, 19%), and not trusting the accuracy of patient-centered apps (10 of 89, 11%). While gender and age were not associated with recommending patient apps, residents in the second half of residency (PGY-3 and PGY-4) had higher odds of recommending apps

TABLE 1
Obstetrics and Gynecology Residents' Use of Mobile Applications (Apps) for Clinical Care

Types of Mobile Apps Used in Clinical Setting	No. (%) ^a
Pregnancy wheel	165 (84)
Cervical cancer screening algorithm	134 (68)
Contraception eligibility guideline	93 (47)
ACOG clinical reference app	52 (26)
VBAC success estimator	38 (19)

Abbreviations: ACOG, American Congress of Obstetricians and Gynecologists; VBAC, vaginal birth after cesarean.

^a N = 197; 4 respondents had missing data.

TABLE 2

Obstetrics and Gynecology Residents' Recommendations of Health-Related Mobile Applications (Apps) to Patients

Types of Mobile Apps Recommended to Patients	No. (%) ^a
Menstrual calendar	76 (39)
Fertility-tracking calendar	53 (27)
Contraceptive pill reminder	49 (25)
Blood glucose log for diabetes in pregnancy	28 (14)
Pregnancy tracker	26 (13)
Other	4 (2)

^a N = 197; 9 respondents had missing data.

to patients (odds ratio = 2.4; 95% confidence interval 1.3–4.3).

The majority of residents used mobile apps for learning (116 of 186, 62%). A total of 29 apps were mentioned by respondents, yet these included only 3 ob-gyn-specific apps (ACOG app; Obstetrics, Gynecology, and Infertility app; and Case Files Obstetrics and Gynecology). The ACOG app was the most commonly used for learning (53 of 116, 46%). Reported reasons for not using educational apps included not knowing any (44 of 70, 63%), preferring to use a laptop or desktop computer (27 of 70, 39%) or textbooks or journals (23 of 70, 33%), and not having time to identify the best ones (22 of 70, 31%). Use of mobile apps for learning was not associated with gender, age, or year in residency.

Across all types and uses of apps in this study, residents most often chose apps based on the recommendation of a resident colleague (TABLE 3). As shown in the FIGURE, most residents believed that mobile technology in the clinical setting is important and improves efficiency.

Discussion

Use of ob-gyn-related mobile apps is widespread among California ob-gyn residents. Residents reported that mobile apps improved clinical efficiency, and almost all used apps in the clinical setting.

Pregnancy wheel apps were the most popular clinical app category used by residents, suggesting that downloading a mobile app may have replaced acquiring the cardboard pregnancy wheel.

This study shows that residents are more likely to rely on colleagues than on attending physicians or professional organizations for app recommendations. While this may result in a “crowdsourcing” for the most useful apps to be disseminated, it does not provide for rigorous assessment of quality and can lead to the proliferation of use of inaccurate apps. Studies that evaluated ob-gyn app accuracy can provide guidance for accurate app choices for providers.^{6–9} One study⁶ that systematically evaluated pregnancy wheel apps found that only 47% of apps assessed were accurate. Given the fast pace of app development, these evaluations may become out-of-date quickly. Residency program leaders may consider teaching residents how to assess the credibility of app content or compiling lists of accurate apps recommended for use. Alternatively, it has been suggested that a professional group provide up-to-date app recommendations for use among obstetrician-gynecologists.³

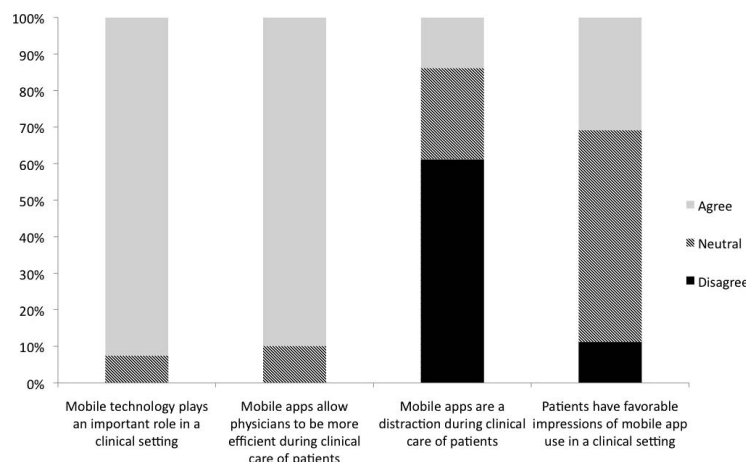
Our findings suggest that there may be a resource gap in ob-gyn-related mobile apps for resident education. Of the 3 specialty-specific apps used by residents as learning tools, only 1 (the ACOG app) is free to use. Use of educational apps is supported in the literature. A cross-sectional study¹⁰ of ob-gyn residents supported the use of a mobile app-based question bank to increase knowledge retention and identify low-proficiency topics. In addition to question-answer functionality, the mobile app interface provides the opportunity for development of unique features to enhance resident education, such as procedural videos, safety checklists, and self- or faculty evaluation.

Many respondents indicated they lacked the knowledge necessary to suggest apps to patients. An evaluation of consumer-based menstrual calendar and fertility tracker apps found that 81% of apps were

TABLE 3

How Obstetrics and Gynecology Residents Choose Mobile Applications (Apps)

Method	Clinical Care Apps, No. (%) (N = 184)	Patient-Centered Apps, No. (%) (N = 99)	Medical Learning Apps, No. (%) (N = 116)
Recommendation of another resident	129 (70)	54 (55)	88 (76)
Search of a mobile application store	24 (13)	8 (8)	10 (9)
Recommendation of an attending physician	12 (7)	16 (16)	5 (4)
Recommendation of professional organization, newsletter, or article	12 (7)	11 (11)	10 (9)
Other	1 (1)	4 (4)	2 (2)



FIGURE

Obstetrics and Gynecology Residents' Attitudes Toward Mobile Technology

inaccurate,⁸ and an evaluation of patient-centered contraception apps found that 38% were inaccurate.⁹ Patients searching app stores for information about reproductive health may encounter inaccurate apps, and residents should be equipped with the knowledge to point them toward accurate alternatives. Recommending mobile apps to patients was the only domain of app use that demonstrated a difference across year of training, with residents further along in training more likely to recommend apps. This may be due to greater exposure to patient interest in app recommendations, which increases residents' knowledge about available apps.

This study has limitations. While we piloted our questions, our survey lacks evidence of validity, and respondents may have interpreted the questions differently than we intended. We limited our survey to 1 state, so our findings may not generalize to all US ob-gyn residents. The characteristics of our sample are similar to those of US ob-gyn residents more broadly: there was an equal distribution across all 4 years of residency; 84% (166 of 197) of our respondents were female, similar to the national rate of 82%; and the mean PGY-1 respondent age of 28.9 years was equivalent to the mean national PGY-1 age of 28.8 years.¹¹ Our findings may be affected by nonresponse bias, because only slightly more than half of California ob-gyn residents completed the survey.

Future research should examine patient attitudes toward use of mobile apps in clinical encounters and continue to evaluate mobile apps as tools to improve residents' knowledge. Medical educators in other specialties may consider similar evaluations of specialty-specific apps to enhance guidance for their residents in incorporating technology into training.

Conclusion

Mobile technology use is widespread among California ob-gyn residents, with the majority using mobile apps in clinical and educational contexts. Residents have favorable impressions of mobile apps in the clinical encounter but are less likely to recommend apps to patients, particularly early in their training. Residents' colleagues are the most common resource for discovering new apps, suggesting that residents may benefit from added guidance on selecting the most accurate and appropriate apps.

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