How to Evaluate Mobile Health Applications: A Scoping Review

Pasquale Fiore a , 1

a School of Health Sciences, British Columbia Institute of Technology (BCIT, Vancouver, Canada)

Abstract. Evaluating mobile health applications requires specific criteria. Research suggests evaluation grids and online web sites are available to provide a quick sense of ease for the health care professional wanting to use a mobile application without worrying about the quality, efficacy, and safety of the mobile application. This article will present a scoping review and explore the available resources for health care professionals.

Keywords. Health information technology, smart devices, mobile health, evaluation, apps, evaluation web sites for apps

1. Introduction

The number of health-related applications available on iTunes© and Google® Play is overwhelming. This can create a sense of distress and frustration for health care providers who want to interact with accurate, reliable, timeless and up-to-date sources of information at the point of care. Professionals are cautious of downloading mobile applications for fear of liability issues in their practice, but are looking for user-friendly and current information. The question for this review is “Are there tools available that can allow clinicians to analyze effectively a new mobile application, provide a comprehensive evaluation of such and confirm which application to choose from amongst the many available?”.

The sheer volume of applications available online has made it a necessity for clinicians to evaluate health information technology tools. It is therefore important to appraise their potential to improve health care professional critical judgment. This paper discusses what are the evaluation tools available to evaluate mobile health applications.

1 Author: Pasquale Fiore - Email: pfiore1@bcit.ca
2. Methods

2.1. Search terms to find appraisal tools

The following databases were searched with the keywords: health care apps, evaluation and mobile health: CINAHL with full text (EBSCO), PubMed, Cochrane Database of Systematic Reviews (EBSCO), ScienceDirect (Elsevier), Medline with full text (EBSCO). A few articles were retrieved that discussed specifically how to evaluate health care mobile applications. The main criteria were to select only articles that discuss the evaluation of mobile health applications. The review process focused on the titles, abstracts and was limited to literature that was published between 2013 and 2016. Mobile health applications became more used the last three years by clinicians. This search identified 225 abstracts published between August, 2013 and September 2016, 10 were selected. The literature research only included studies in English - language publications.

3. Results

When one enters the world of health care applications, it feels like a jungle out there. In 2002, the Institute of Medicine stated: "it has vast amounts of unregulated territory and no one is in charge"[1]. The major issue for health care professionals and clients is how to determine which application to choose. This decision should be based on criteria that will allow one to evaluate the quality, efficacy, and safety of apps. Unfortunately, there is a lack of systematic evaluation of mobile applications, meaning that the accuracy and evidence base are difficult to evaluate [2]. In search of a solution and because of the lack of evaluation tools many users default by choosing applications that are most popular. Lower ranks in the app store doesn't always mean poor quality and should be considered to be appraised. One might ask, “What about free-app as opposed to an app that consumers will pay for?” A review of weight loss mobile applications demonstrates that there were no more evidence-based strategies included in the paid apps in comparison to the free apps [3].

Screening through the literature and reading specific articles that studied how to evaluate mobile health applications, most of them refer to the established criteria that are available to assess health care information on the internet. These guiding principles refer to the credibility, accuracy and intent of the web sites. These principles can be transferred to mobile applications. [4] The Health on the Net Foundation Code of Conduct (HONcode) states on their web page: "The problem is therefore no longer finding information but assessing the credibility of the publisher as well as the relevance and accuracy of a document retrieved from the Net" The HONcode identifies eight principles; (1) authoritative, (2) complementary, (3) privacy, (4) attribution, (5) justifiability, (6) transparency, (7) financial disclosure, (8) advertising policy. A review of these eight principles allows one to evaluate the objectivity and transparency of the information shared by the developer but this will not assure the accuracy of the medical information posted online, in this case on the application downloaded [5]. The Agency for Research and Quality (AHRQ) has organized a health summit working group which developed seven criteria to evaluate internet health information. These criteria are: (1) credibility, (2) content, (3) disclosure, (4) links, (5) design, (6) interactivity, and (7) caveats. [6] These criteria can also be transferred to evaluate a mobile health
Mnemonics tools are also available to evaluate health information on the internet. A review of the literature has identified two mnemonic devices: RADAR and the modified CRAAP test.

**RADAR:**
The author of the palindrome RADAR, cites that it is “easy to remember, and when evaluating the amount of information in the "internet sea" you need to be cautious of the numbers of "sharks" swimming around you that can be misleading information. Using the word RADAR, R for relevance, A for authority, D for date, A for appearance and R for reason for writing to evaluate information. The author cites: "I believe that this is significant because, while students may not always recall instantly each of the RADAR criteria, the term itself is memorable, as is its associated concept, that is, the need to be constantly alert to possible information dangers. My small study indicated that students react positively to both the term and the concept."[7]

**Modified CRAAP-O:**
A faculty group at the University of Wisconsin-Oshkosh decided to adapt the evaluation information test tool called CRAAP from the California State University Chico [8] to objectively evaluate the credibility of mobile health care applications for clinical practice as well as patient education. The CRAAP tool was modified to add the letter O at the end allowing students to assess if the app is easy to use, fun or interesting. The meaning of each letters are: C for currency, R for relevance, A for authority, A for accuracy, P for purpose and the O as stated previously. The CRAAP - O assessment of health promotion mobile applications test was then used as an activity by both undergraduate and graduate nursing students to enhance their skills to determine credibility of applications that mobile clients and health care professionals are using. This activity was an eye opener that allowed nursing students to highlight the inaccuracies and misinformation with current available mobile applications. [9]

The only mnemonic that was specifically developed to evaluate mobile application was found in the Journal for Nurse Practitioners. The authors Angela Golden and Patricia Krauskopf, are providing solutions by creating the - NPMEDAPP mnemonic. The breakdown for this mnemonic is:

N for novel: Is the application innovative and the best solution?
P for potential of benefit versus risk, risk for the client using the application or for care provider to the client.
M for medically sound, take the time to verify the accuracy of the information, is it relying on best evidence based practice?
E for the ease of use, is one able to navigate through the application easily, are there any screen shots that allows you to review the applications prior to downloaded.
D for developer, who is the author of this application, what are his/her credentials, who is it a reliable and credible organization.
A for audience, whom was the application target for.
P for price, is this worth the cost, do you need to subscribe to.
P the last letter in platform. Is the application available for both android and iOS users.

Health care professionals can also refer to online websites that will allow them to know if the application was reviewed by other peers, clients and apps consumers. Mobile
health consumers are invited to consult these specific online sources for information; iMedicalApps (http://www.imedicalapps.com) is a physician peer review mobile medical and health applications; MedicalApp Journal (http://medicalappjournal.com) utilize twitter and Facebook group to peer review and follow the latest trend; MobileHealthNews (http://mobilehealthnews.com) as a consumer and a provider section that provides commentary on mobile technology as well identifies mobile applications for clinicians. [2] & [11]

When analyzing the various mobile health applications, they can be divided into two major groups of apps. One group which is predominantly used by clinicians and the other, applications developed for consumers. Clinicians will download and seek medical applications for four main reasons: reference, education, patient centered care and clinician centered.[11] Consumers on the other hand, are downloading applications because it allows them to: inform, instruct, record, display, guide, remind by providing them with alert as well communicate with their health care provider and/or links to social networks.[12] In 2013, The U.S. Food and Drug Administration (FDA) established guidance that regulates high risk medical applications. Applications who are considered high risk level can control other medical device, transmit information to another device, transform a platform into a medical device to view sensitive information as well perform a client analysis and provide a diagnosis or treatment recommendation.[13]

The Fasken Martineau’s legal web site page provides information on the Canadian Medical Devices Regulations ((MDRs) [2]). The life science bulletin answers the question: is my mobile medical app a regulated medical device in Canada? They state: "The threshold question from a regulatory perspective is whether a mobile medical app qualifies as a medical device. In this regard, one must refer to the Act (section 2) and MDRs (section 1), which define a medical device as: [...] any article, instrument, apparatus or contrivance, including any component, part or accessory thereof, manufactured, sold or represented for use in the diagnosis, treatment, mitigation or prevention of a disease, disorder or abnormal physical state, or its symptoms, in human beings [...] If a mobile medical app falls within this broad definition, then it is a medical device which becomes subject to regulatory oversight. Moreover, it is up to the manufacturer to make this threshold determination." [14]

The complexity and subtlety of this regulation brings forward a need to request specific evaluation tools that are customized for the level of risks that health care professionals will undertake when working with medical applications. As stated by Vallespin, Cornet and Kotzeva: "The lack of clear rules or guidelines for mHealth [mobile health] regulation is producing uncertainty in the industry and also lack of confidence of healthcare professionals. We need therefore to look for creative and innovative ways to create mHealth evaluation" [12].

In 2014, an eReport on evaluating mobile medical applications was published by a group of pharmacists, with the recommendation to develop specific tools for such. A rubric was created to evaluate mobile drug information apps. Checklists was developed for: evaluating the mobile drug information and medical reference apps as well a checklist for evaluating mobile medical calculators. Taking in consideration the various criteria and guidelines for evaluating online websites information, these authors created a worksheet to evaluate mobile medical apps that determine the relevance, quality, functionality and security of the mobile medical applications. The relevance section imbeds if the app is cleared by the FDA. The quality section will cover the
information accuracy, authorship and objectivity this means no conflict of interest. The functionality section will assess the stability support as well the design and usability. The last section will address the security by questioning if the application is password protect and how the data is utilized. [4]

4. Discussion

This scoping review reveals that they are limited resources available to evaluate health and medical mobile applications. One specific mnemonic was developed for quickly check and evaluate mobile applications and until recently no specific rubric was available to provide a comprehensive evaluation. Fortunately a team of pharmacists has worked in collaboration to develop checklists and rubrics specific to drug mobile applications and a worksheet was made now available to appraise medical mobile applications. One might wonder how developers can create mobile applications without any guidelines or rules from the health care industry, without being peer reviewed prior to commercialize the application. Would this be allowed in other industries such as the aircraft industry? Opportunities to bring together interdisciplinary health care professionals to discuss and share health applications can be launched through an Apps club [15], the same idea as a scientific journal club. Deciding to embed a medical application in ones daily clinical practice should be thoughtfully explored and self-exploring one’s professional risks is a must.

5. Conclusion

It is highly recommended to explore, network and attend events in health information technology that showcase the latest mobile health and medical applications. I would recommend research groups to work on developing other evaluation tools for mobile health applications. Taking control of this jungle of apps by providing clear guidance from federal organizations will certainly help health care professionals and consumers to feel more safe. In the meantime, consulting with peer review web sites, blogs, Twitter and Facebook groups on mobile applications will keep ones emobile practice up to date. Ironically word to mouth is still the best solution to learn about the most current trends and the efficiency of health and medical applications.

References


