Author's response to reviews

Title: A Systematic Review of Healthcare Applications for Smartphones

Authors:

Abu SM Mosa (abu.mosa@mizzou.edu)
Illhoi Yoo (Yooil@health.missouri.edu)
Lincoln Sheets (sheetslr@health.missouri.edu)

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Author's response to reviews: see over
Response to Editor’s comment

“Please confirm in your covering letter that your study adheres to the PRISMA guidelines for systematic reviews (http://www.prisma-statement.org/), and add a statement to that effect in the revised manuscript”

We confirm that this study adheres to the PRISMA guidelines for systematic reviews. We added a statement to that effect in the manuscript.

Response to Reviewer 1

The reviewer requested to address the following issues.

Minor Essential Revisions

• Title: “Systematic review” should be “literature review”.

    This study provides a systematic review of the literature. This journal requires adhering to the PRISMA guidelines (http://www.prisma-statement.org/) for the systematic reviews, which require identifying the report as a “systematic review” in the title.

• “Well written and organized manuscript.”

    No action item was requested by the reviewer.

• “Introduction section should be more reduce.”

    The section was reduced from 1549 words to 931 words.

• “Methods were appropriate.”

    No action item was requested by the reviewer.

• “Results were displayed appropriately.”

    No action item was requested by the reviewer.

• “Discussion was appropriate.”

    No action item was requested by the reviewer.
Response to Reviewer 2

Two criticisms from the reviewer:

1. “This is only a review of published articles. Whilst this is all it sets out to do, the majority of medical applications are introduced without the need to publish in the medial literature. This means that this is a very select group of 'Apps' that have been reviewed. For instance, by reviewing the various online 'app' stores themselves there are many more and when we recently reviewed urological apps we found a total of 68 urological apps alone in the main 3 stores (Apple, Android, Blackberry). Thus this article is by no means a 'users guide' to available apps. However it was never intended to be.”

Many smartphone-based medical applications are available in the online application stores without the need to publish in the medical literature. These applications were not included in this study. We agree that our goal was not to provide a “user guide” for all available applications; instead, we systematically reviewed the articles that are published in the academic literature discussing the applications of smartphones in healthcare. This has been addressed in the “Limitations” section.

2. “The review includes articles on Medline in April 2011. In such a rapidly changing field this means that many apps won’t be included as it is nearly a year later. In our review we found a doubling of urological apps from 2010 to 2011.”

In a systematic literature review study, this is important to search the literature systematically before starting the study. We searched in MEDLINE for this study in April, 2011. We agree that the number of smartphone-based medical applications is growing rapidly in the online application stores and many applications won’t be included as it is nearly a year late. However, many of them have just released in the online application stores but not discussed in the academic literature yet. We believe that there are not a lot of eligible articles published while we have been conducting this systematic literature review based on our literature searches.

Major Revisions

1. “I feel a paragraph discussing the accuracy of information contained in Apps with any medico-legal consequences is important. This is especially true for the drug reference applications.”

Done; a paragraph discussing the accuracy of information contained in Apps with any medico-legal consequences has been included at the end of the Discussion section.

2. “A section is required on limitations of this study.”
Done; a section discussing the limitations of the study has been included before the conclusion section.

Minor Revisions

1. “Formatting of the references in the text needs adjustment e.g. [1-6]”

   Done; the references have been formatted throughout the manuscript according to the suggestions.

Response to Reviewer 3

“The article summarizes and discusses smartphone applications in the healthcare and medical sector. This summary was achieved by a quite thorough and systematic review/survey of articles potentially regarding the approached question. The articles were searched from the MEDLINE database.”

   No Action item was requested by the reviewer.

1. “Although the initial number is already quite large, I was wondering whether other databases, e.g. ACM digital library, would also have additional matches (DISCRETIONARY).”

   Our literature search was limited to MEDLINE only because our focus is on healthcare rather than the general applications of smartphones. However, PubMed/MEDLINE indexes most ACM and IEEE journals and even proceedings (e.g., Communications of the ACM, Computer graphics, ACM transactions on graphics, ACM queue: tomorrow's computing today, IEEE/ACM transactions on computational biology and bioinformatics, ACM transactions on applied perception, ACM transactions on knowledge discovery from data). Thus, we believe we missed very few articles discussing healthcare applications for smartphones.

   “The authors introduce a sound classification and discuss the found applications within this classification. Besides the third party information they retrieve from the reviewed articles they also back up with experiences of at least one of the authors, which increases the trust in the discussed information.

   The article provides a good overview and some insight in the available applications.”

   No action item was requested by the reviewer.

2. “There is no remark on what application / feature is missing or requested by healthcare professionals or students. (DISCRETIONARY)”
We agree that our study does not provide any information about the completeness of the applications. However, this was not the aim of this study. Only a single article included in this study discussed the completeness of some selected disease diagnosis applications [47]. Further studies are required to analyze the applications in each category in order to identify potential and novel features for medical practices.

3. “The conclusion does not really provide an outlook. What should this study help for? Will there be any attempts of standardizing existing applications? Can those applications be integrated in a system or conjointly used? Is it reasonable to have a loose collection of applications for different rather narrow application scopes? (MINOR)”

Done; we discussed it in the Conclusions section (the second paragraph)

4. “I am not familiar with this journal’s format, but I found it hard to read and get a brief overview of what I read in each paragraph without the referenced figure or table at hand. The tables and figures are moved into the appendix, which does not help the understanding while reading. It would be preferable to have those at the same or next page. Further the figure labels are not with the actual figure, but that might depend on the required submission format. (MINOR).”

We totally agree with the reviewer. We just followed the formatting guidelines. We don’t think the format is effective and efficient for both reviewers and authors. Even the authors have considerable difficulty writing and refining the manuscript based on the guidelines.

5. “The availability of the reviewed applications on different smartphone OSs is reflected in the tables only, which is ok to remain in the structure of the classification and to keep the sentences in reasonable lengths. On the other hand there is not even an exemplary summary, which set of applications on which platform, a healthcare professional may feasibly and reasonably have, use and need on one device. While reading there were various applications named, that are widely used in practice but no reflection if ever multiple applications were used or required. E.g., some applications exist only on iOS other only on Android. Is there a case where the concurrent usefulness is high enough to have multiple devices or better port the applications? (DISCRETIONARY)”

We agree that using multiple smartphone devices for concurrent use of different applications is not practical. The “Application Distribution” section has now been expanded to discuss the coverage of healthcare applications for different OS platforms (i.e. which set of applications on which platforms).
6. “Page 11 mentions EIGHT articles with focus on overview and uses of ... but has only SEVEN references [11]...[63] (MINOR)”

   Done; this has been corrected in the manuscript.

7. “Page 20: The description of table 8 mentions a HIT client application. This abbreviation is not introduced. I assume is shall be HIS. (MINOR)”

   Done; this has been corrected in the manuscript.

**Response to Reviewer 4**

“It seems interesting for ICT engineers or healthcare service developers not medical professionals. However, the paper can be enhanced by sticking with the following changes.”

   We believe that medical professionals are interested in the article since many of the authors of the reference articles (e.g. [12], [34], [40], [42], [57-58], [63-64], [66], [69], [72], [77], [82], [93-94], [98], [108], [120]) are medical professionals.

1. “Please, check the rules for reference numbers. Generally in a paper, we write multiple references as [1]-[3] for [1],[2],[3]. (Discretionary Revisions)”

   Done

2. “You have made efforts to analyze and group many applications. After this work, what will you do with this results? I think you need to add your next stage of this study.”

   The future work has been added at the end of the discussion section.

   “And you need to add your contribution points. Because this journal does not generally consider narrative review articles. (Minor Essential Revisions)”

   To the best of our knowledge, this study is the first study for classifying and summarizing healthcare applications for smartphones in a systematic literature review format. This is stated in the first paragraph of the Background section.

3. “More description of the discussion section from the perspective of medical fields. (Minor Essential Revisions)”

   We expanded the Discussion section to address this issue.
4. “Fig. 4, 5, and 6 are not required for this paper. They make this work to be seen as a report. (Minor Essential Revisions)”

From an academic perspective the figures could not be required. However, the article is more like “practical” in terms of topic. The figures are very important to understand the smartphone platforms discussed in the Appendix. We believe that those who want to develop healthcare applications for smartphones would be very interested in them because the figures provide information about the future trends of market share and because the figures could help them decide which platforms should be focused.

5. “Is there any your prospect to proliferate healthcare applications running on the smartphone in the point of collaborating healthcare devices, for example, Bluetooth Health Device Profile? Practically, the healthcare application (in mobile or home healthcare) for the general public not severe patients’ needs various data gathered by several devices made by different manufactures. If any, more description about the details will help to improve the quality. (Discretionary Revisions)”

A paragraph discussing the Bluetooth Health Device Profile has been added in the Discussion section.