Author's response to reviews

Title: Evidence-Based Medicine among Internal Medicine Residents in a Community Hospital Program Using Smart Phones.

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Title:

Evidence-Based Medicine among Internal Medicine Residents in a Community Hospital Program Using Smart Phones

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Author's response to reviews: see over

We want to thank the reviewers for their thoughtful review of our manuscript. We incorporated almost all the general comments into the manuscript. The suggested revisions are outlined below. We believe that in responding to the reviewers’ comments we now have a much improved manuscript, and we hope that the revised version will be acceptable for publication.
Reviewer #1. Saverio Maviglia

* Major Compulsory Revisions. (That the author must respond to before a decision on publication can be reached)

**Reviewer 1_1**
The authors should attempt to reconcile the discrepancy between reported use and actual use. For example, Table 7 indicates that there were a total of 546 accesses to the NLM server in 7 months. During this time, there were 3 PDAs available during business hours and days, a total of 420 PDA-days. This suggests that the average wireless-usage of the NLM resources was 1.3 times per unit per day. Yet 80% of users reporting accessing the Internet from the devices between 1 and 5 times a day, and 6% more than 10 times a day. The entire breakdown of responses to this question should be reported, and the possible discrepancy attributed to retrospective reporting bias, to use of other wireless resources, or to some other (even if unknown) reason.

**Authors Response 1_1**
Thank you for pointing out this issue. We should have stated in the initial manuscript that physicians used the smart phones to access not only NLM resources but also any other Websites they preferred or considered useful for their searches. They also accessed subscriptions to the New England Journal of Medicine, UpToDate and others. We quantified the access to NLM server only, but in the final survey we asked them to mention other Websites used during the study (Appendix #2, Question #6). In the methods section we clarified this point (last paragraph, page 4), and in the discussion section we addressed the “discrepancy” of results as well (Paragraph 2, page 7).

* Minor Essential Revisions. (Such as missing labels on figures or the wrong use of a term, which the author can be trusted to correct)

**Reviewer 1_1**
The authors should provide more details about the survey process, including a copy of the questions (even if just as an appendix, or available on request). For example, how were the surveys distributed (paper, phone, email, internet, etc), were there any incentives offered for survey completion, were non-responders contacted more than once, etc.

**Authors Response 1_1**
We addressed this issue by adding details on the survey process in the methods section (Paragraph 2, page 3) and added a copy of the questions of the Pre-study survey (Appendix #1) and the Final project evaluation survey (Appendix #2).

**Reviewer 1_2**
Prince George's County Hospital made significant contributions to implement the intervention, both financial (hardware costs, wireless service contracts) and human resources (workshops, training sessions, and special lectures). Can this be quantified?
How does this significant investment compare with how other institutions have supported PDAs in the hospital? How might this affect the generalizability of their findings?

Authors Response 1_2)
We specified in the methods section (Paragraph 3, page 3) the monthly cost of the phones for the hospital and provided more details on the activities of the Department of Internal Medicine directed to providing information and training to the residents and staff. We mention in the text that these activities were led by physicians involved in the research project and conducted as part of the monthly scheduled meetings of the Department, therefore no additional costs were incurred.

Reviewer 1_3)
The paragraph on limitations should also include that bias may be introduced by small sample sizes and by the retrospective post-intervention survey model - for example, users may tend to answer the questions with the last experience they had in mind, or the best, or the worst experience.

Authors Response 1_3)
We recognize the bias introduced by small sample size and retrospective post-intervention survey model by adding further comments into the manuscript on the limitations of the project (Last paragraph, page 8).

* Discretionary Revisions. (Which the author can choose to ignore)

Reviewer 1_1)
A question that was not addressed but which the authors may have some data that would be novel is a comparative evaluation of wireless and non-wireless access to medical literature at the point of care. What is the added-value of wireless connection, especially given the cost of dealing with the small form factor of the PDA? How ubiquitous were internet-connected desktop workstations? What was the non-wireless utilization during the same period of askMedicine, DiseaseAssociations, PICO, and Medline? Were there any questions in the survey about when they found the wireless-PDA access more useful than sitting in front of a desktop? Were there particular types of queries related to being mobile, or which a mobile-solution would be particularly convenient?

Authors Response 1_1)
In the description of the hospital settings we specified the average number of workstations available for physicians at the hospital’s nurse stations (Methods section, first paragraph, page 3). The benefit of mobility for immediate answers to clinical questions is supported by the Sackett reference (Reference #2). We were not able to find studies comparing wireless vs. non-wireless access. Our pilot project did not compare the mobile vs. the desktop access to the Internet and we clarified this in the limitations of our study (Paragraph 3, page 8). Data comparing wireless utilization is not available. This matter could be addressed by future comparative studies with bigger sample size and different settings.
Reviewer 1_2)
The list of Evidence-Based Medicine resources is not entirely accurate - notably UpToDate and MDConsult. Though articles in these resources often cite medical literature, they do not systematically evaluate/rank/grade all the evidence about a topic, and are primarily meta-syntheses or reviews.

Authors Response 1_2)
We agree with the reviewer. Question #9 in the pre-study survey (Appendix 1) asked the physicians to enumerate the Websites they considered as EBM sources in order to evaluate their level of knowledge of those resources. It does not imply that these Websites are indeed EBM resources. In table 7 we are reporting the Websites the study participants mentioned.

Reviewer 1_3)
Requesting teaching about medical use of the Internet is an extremely small part of "medical informatics" (last sentence in "Results: Pre-study Internet use survey" section).

Authors Response 1_3)
Question 10 in the Pre-study survey (Appendix #1) was directed only to the area of Web-based medical resources and not all Medical Informatics. What we tried to measure was their level of interest and obtain some idea of the participants’ areas of interest (Question 11-12 Appendix 1).

Reviewer 2_1)
Please state very clear what your research questions were. It is somewhat unclear to me whether you want e.g. to explore the general applicability of this kind of technology at the point of care, or the general usefulness of bedside information access, or the usability of mobile tools etc. So what are your original questions? Your result and discussion section should then answer those questions.

Authors Response 2_1)
We agree with the reviewer’s comment. We shortened the introduction section and made it clearer by directing attention towards the use of smart phones as an alternative way to access valuable medical information in real-time at the bedside. The last two sentences of the last paragraph in the background section state what the research questions were (Page 3). We are also using “smart phones” in the title instead of “wireless mobile devices” in order to be more specific and clear on what we did in the project.

Reviewer 2_2)
Please make very clear what the state of the art is with regard to your study questions. So, e.g.: If you want to explore this hybrid technology, has it ever been used before by others,
and with which results? If you want to assess the usability, then what is the state of research here?

Authors Response 2_2)
We wanted to evaluate the use of smart phones as an alternative way for internal medicine residents in a community hospital to access real-time medical information in the Internet because we were not able to find articles published on the topic. We have clarified this matter in the introduction section. (Last paragraph, page 3)

Reviewer 2_3)
It would be helpful to have more information on the functionality and layout of the software you used. You may decide to provide some screenshots and/or a more extensive description of the functionality.

Authors Response 2_3)
The “PubMed for Handhelds” Web page provided the main portal to MEDLINE through several interfaces developed at NLM for those devices and tested before. They are Websites and do not require any additional software. We clarified this in the methods section (Last paragraph, page 4) and we also added a screenshot of the index page of “PubMed for Handhelds” from a Palm Treo650 used in the project (Figure 1).

Reviewer 2_4)
You asked in your questionnaire about "clinical usefulness". A pity that you do not have any qualitative data (either from free-text comments or from interviews) what this clinical usefulness means. Respondents may judge "usefulness" very differently. You should assess this problem of questionnaire-based outcome assessment in your discussion.

Authors Response 2_4)
We agree that it is a challenge to quantify “clinical usefulness” and the impact of the information in the patient’s management and outcome. We recognize that this type of study may not provide the answer. What we have are the subjective evaluations from physicians and their comments. In the discussion section (Paragraph 4, page 7), we added a comment in reference to this and we also acknowledge that additional comparative studies are needed for this purpose.

Reviewer 2_5)
In Table 1 - 7, please provide also the absolute numbers, not just the percentages.

Authors Response 2_5)
All tables have been updated providing numbers and percentages for better analysis. Some tables (Table 1 and Table 4) do not have absolute numbers because in those questions we asked to estimate percentages of utilization of the Internet. (Appendix 1, Question #2, 3, 6)

Reviewer 2_6)
Please provide the absolute and relative numbers for all questions of your questionnaire, to allow the reader both reconstructions of your questionnaire as well as detailed investigation of the answers.

Authors Response 2_6)
Absolute numbers were added in the text of the manuscript as well as in all tables.
Reviewer 2_7)
Figure 1 - 3 are unclear to me: Which research question do they respond to? What is the message of those results?

Authors Response 2_7)
We added more information to the figures (absolute numbers) and a more detailed explanation of the figures in the NLM server log analysis section (page 6). These figures show the combined pattern of access to NLM resources by month (Figure 3), daily (Figure 4) and hourly (Figure 5). They correlate with the activities in the hospital. The information was also annotated in the results (Page 6) and discussion sections (Paragraph 1, Page 8).

* Minor Essential Revisions. (Such as missing labels on figures or the wrong use of a term, which the author can be trusted to correct)
None

* Discretionary Revisions. (Which the author can choose to ignore)
None

Reviewer #3. Pierre Pluye.

* Major Compulsory Revisions. (That the author must respond to before a decision on publication can be reached)

Reviewer 3_1)
The manuscript starts with a background section and the general problem is “information is not being used effectively in health care” (last sentence, first paragraph). Then, the manuscript summarizes some HARRIS surveys and empirical studies on the use of Internet, the use of wireless systems, the use of PDAs and doctors’ information needs. On the top of the third page the specific problem may be that wireless networks “are usually not available in many community hospitals,” and that information needs “are as much or even greater than those serving in the major teaching centers”. Smart phones may offer a solution to “this challenge.”
There are too many problems and an unclear problem. The notion “effective” information use is not defined, and the relationships with the absence of wireless networks and information needs are not explained. Authors will certainly agree that their interesting cohort study with 60 residents cannot certainly solve all these problems. There are no research questions and no objectives, thus the reader will think OK, but so what?
Therefore, this manuscript should be focused and clarified. (1) Why this study is important or what is the problem this study will contribute to solve? E.g. “there are no studies on the use and impact of smart phones” or “information needs are not met with desktop stations”. (2) What is the research question that this manuscript may answer or what is the objective that it may fulfill? E.g. “the present study aims to…”
The problem and the question or the general objective should be written up-front in the first paragraph (introduction) to answer basic readers’ questions: Why? What? Then, the background section will support the problem and may refine the objectives into specific objectives that may be fulfilled with the empirical study. There should be a strong coherence between the problem, the question/objective, and results. In sum, once this is clarified, I will be happy to re-review this manuscript. Other comments are merely superficial, and can be easily addressed.

**Authors Response 3_1**

In response of the reviewer’s helpful comments we have made multiple changes in the manuscript to address each of the points. Specifically, we agree that we enumerated too many problems and too much information that was not required. We amended and shortened the introduction to focus on the clinical information needs, how the Internet may provide this information and how the smart phones are an alternative to accessing real-time medical information at the bedside when wireless networks or desktop computers are not always available (paragraph 1 and 2, page 2). The references to the introduction section were also modified to make it more focused on the research questions (paragraph 3).

* Minor Essential Revisions. (Such as missing labels on figures or the wrong use of a term, which the author can be trusted to correct)

**Reviewer 3_1**

Page 3, “a recent study” refers to a 1995 paper.

**Authors Response 3_1**

The text was modified in the background section of the manuscript and some references were updated. This specific reference was changed. There are two basic references from 1998 (References 1 and 2), and all the others are from 2002 to 2006.

**Reviewer 3_2**

In the background section, a framework defining basic concepts of information retrieval may improve the coherence of the results that are mostly about the use, and self-reported usefulness and impact of information.

**Authors Response 3_2**

In the background section (Paragraph 1, page 2) we address the importance of information retrieval at the point of care (References 2-4)

**Reviewer 3_3**

Results: Terms like “effective” and “effectiveness” should be defined.

**Authors Response 3_3**

We have clarified in the discussion section (paragraph 4, page 7) that “clinical usefulness” is difficult to evaluate based on respondents’ judgment or self-reported impact of the information when answering a questionnaire. In the study we considered a search as "effective" when the information retrieved using smart phones resolved the specific clinical question and could be used in the team's discussion at the bedside regarding the
diagnosis or management of a patient. In academic activities, the "effectiveness" of the information was considered positive if it generated discussion or contributed new ideas during conferences or brought up new medical advances. These happened frequently in our study as described in the results section. (First paragraph, page 6)

**Reviewer 3_4)**
Discussion: The methodological limitation is not only the lack of randomization, but may also be seen as a lack of qualitative data analysis that may help better understand the use and impact of smart phones.

**Authors Response 3_4)**
In our study we introduced new technology that was not in use by the physicians in the hospital at that moment. We aimed to prove that it was feasible to use and we obtained subjective feedback on the use of the smart phones. To get qualitative data for analysis we consider the need of future prospective, comparative studies with bigger size samples and different settings. We clarified this concern in the discussion section (paragraph 4, page 7) and limitations section (page 8).

**Reviewer 3_5)**
References: Since my name will appear as Dr Pierre PLUYE on the present report, I suggest the typo error may be corrected in the list of references (“Pluyea”).

**Authors Response 3_5)**
We apologize for this error. It has been corrected in the manuscript.

**Reviewer 3_6)**
Tables: The numerical N should appear in tables 2, 3, 4 and 6 (not only %).

**Authors Response 3_6)**
Absolute numbers were added to tables and context of the manuscript. Tables 1 and 4 where we asked for percentage of distribution of usage will remain as percentage only.

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* Discretionary Revisions. (Which the author can choose to ignore)
None

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**Reviewer #4: Rajesh Aggarwal**

* Major Compulsory Revisions. (That the author must respond to before a decision on publication can be reached)

**Reviewer 4_1)**
Shorten introduction (detailed above)
Authors Response 4_1)
The Background section was shortened making it more focused in the research questions on information retrieval as suggested by the reviewers and in the objective of the project using smart phones. In the title we replaced “wireless mobile devices” for “smart phones” in order to make it more consistent with the project. Some references were changed as well.

Reviewer 4_2)
Comment upon extra time taken to use these resources on the hospital round.
Authors Response 4_2)
We agree time is a very important matter. During the project we tried to avoid interruptions to the work of the teams in the hospital since they were using a new technology, not well-known for most of them. We did not measure time but we have their subjective observation and positive comments of the teams’ work during the project. In the results section we added a comment about the time spent on the searches and that did not interfere with the team’s workflow during rounds. We added some free-text comments from the physicians in relation to this topic where they consider that they actually “saved time” with the utilization of smart phones (Paragraph 2, page 6).

* Minor Essential Revisions. (Such as missing labels on figures or the wrong use of a term, which the author can be trusted to correct)
None

* Discretionary Revisions. (Which the author can choose to ignore)
None