Author's response to reviews

Title: Adoption of computerized provider order entry systems: An organization-wide study based on diffusion of innovations theory

Authors:

Bahlol Rahimi (bahra@ida.liu.se)
Vivian Vimarlund (vivvi@ida.liu.se)
Toomas Timpka (tti@ida.liu.se)
Srinivas Uppugunduri (Srinivas.Uppugunduri@lio.se)
Mikael Svensson (Mikael.Svensson@lio.se)

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Author's response to reviews: see over

Dear Iratxe Puebla,

Thanks you very much for your and the reviewers comments. Enclose you will find our revised manuscript entitled “Organization-wide Adoption of Computerized Provider Order Entry Systems: A Study Based on Diffusion of Innovations Theory” (MS: 9976849252862673)

We appreciate the constructive comments provided by yourself and the expert reviewer.

We enclose a revised version of our manuscript. Below we outline the modifications we have made in response to reviewers’ comments. We also have added information in the method chapter about the ethical aspects of the study.

We are willing to contribute answers to any further questions if needed.

Again, thank you for giving us the opportunity to improve and re-submit our manuscript.

Sincerely,
Bahlol Rahimi

Following the reviewers' comments, we have carefully reviewed our contribution and done the following changes.

Reviewer: Habibollah Pirnejad
Reviewer's report:
Major compulsory revisions

1. Page 11, Data analysis: reading through the text it is not very clear what authors mean by “informal group-level index” and “personal agreement ratio”. Neither is it very clear that how these items were composed and calculated. Clarifying these items is necessary for the readers to interpret and understand the meaning of some findings. Authors are expected to clarify these items in recasting their paper. please also explain how did you transformed the likert scale into ratio in the graphs.
Authors’ reply: We have clarified in the Methods section the group-level index and agreement proportions as well as how we transformed the Likert scale.

2. Comparing the graphs presented in figures 2, 3, 4, and 5: There is compatibility between graph 2 and graph 4 and 5. This compatibility however does not exist between graph 2 and graph 3. Graph 2 shows that nurses have lower compatibility with the system, comparing to physicians. This is not compatible with the pattern presented in graph 3. In graph 3, most of the items have more weight on nurses’ side. Please explain why it is so and if necessary consider necessary corrections.
Authors’ reply: For the figures included in the manuscript we just used identical questions for physicians and nurses to avoid statistical bias when we composed the index. By this we have the same variables for both nurses and physicians groups.
3. The role of diffusion of innovation theory is clear in the study design and result analysis. However, its role in the Discussion and Conclusion sections, in interpretation of study findings and the lessons that one can learn, is not very well developed yet. The authors, for example, need to explain why the three attributes of diffusion of innovation theory were low in their study, what lessons can be learned to increase the adoption rate of CPOE system, and whether they found the theory appropriate for their purpose at the end of their study. Authors’ reply: The role of diffusion of innovation theory has been elaborated in discussion and conclusion section (e.g. in interpretation of study findings and the lessons that one can learn).

Minor essential revisions

1. The title of the paper: The study covered multiple organizations from different healthcare levels. Therefore, the term “an organizational-wide study” does not sound to be representative of the study scope. Maybe authors mean: Organizational-wide adoption of CPOE ...
Authors’ reply: We have changed the title of the manuscript to better reflect the study aim.

2. In the abstract, please consider refining the research question and being more specific in the conclusion.
Authors’ reply: We have refined the abstract according to the reviewer’s suggestions.

3. Page 5, paragraph 2, the study objective: The study followed more general objective than “examining factors associated with the adoption of a CPOE system for inter-and intra-organizational healthcare communication”. I think it is more about the factors that may influence CPOE adoption in inpatient and outpatient settings as it is also mentioned in the title of the paper. The authors should refine the objectives as well as the research question in recasting the paper.
Authors’ reply: We have refined the aim of study according to the reviewer’s suggestions.

4. Figure 1 was not referred in within the text.
Authors’ reply: Thank you. The change has been made.

5. As this study is about adoption and use of a CPOE system, providing more information about the system and its use context is necessary. For example, it is important to know whether using the system was mandatory for nurses and physicians or they could use paper-based system alongside the CPOE system. How nurses used the CPOE system; could they produce medication orders through the system or they were only working with system’s output? Was it possible for nurses to register administration data into the system?
Authors’ reply: We have added more information about the studied CPOE system in the study context section.

6. On page 16, line 7: “Nurses estimated a higher relative advantage from …”. I think the authors mean: nurses were estimated to receive a higher relative advantage from …
Authors’ reply: Thank you. The change has been made.
7. On page 17: please combine the second and the third paragraphs as they both are talking about the same issue.
Authors’ reply: Thank you. The change has been made.

8. On page 23, reference 11: please complete the reference with volume and page number or “doi number” of the reference.
Authors’ reply: Thank you. The change has been made.

Reviewer: Andrew Georgiou
Reviewer’s report:
Major comments:

1. The survey reported in this study appears broad ranging and comprehensive. There is distinct value in undertaking such surveys across a substantial health area. The use of the diffusion of innovation theory is important and potentially useful.
2. But unfortunately I do not believe the authors achieve their stated goal – “to examine factors associated with the adoption of a CPOE system for inter-organizational and intra-organizational care”. The analysis is quite shallow which the authors seem to concede in their Limitations section.
3. The authors acknowledge that they did not formally validate the questionnaire items with regard to diffusion of innovation theory. I also found that there was a lack of explanation in the Methods section of how they applied the theory to the drawing up of questions.
Authors’ reply: The role of diffusion of innovation theory has been explained in the Methods section of how we applied the theory to the drawing up of questions. And the role of diffusion of innovation theory has been elaborated in discussion and conclusion section (e.g. in interpretation of study findings and the lessons that one can learn).

4. The biggest problem with the lack of thorough statistical analysis is that it means that the findings are inadequately discussed, many questions or issues remain unanswered, and the reader is left with a vague and somewhat depressing picture of the state of CPOE in the study area. For instance, the workplace location of respondents involved primary care locations as well as hospital and home care locations. Surely, the findings from the different locations should have been examined. The same applies for the different County districts and other characteristics gathered from the survey. This information would have contributed to our understanding of the results.
Authors’ reply: We have extended the statistical analysis to understand the data. For instance, findings from different workplace locations, county districts, length of CPOE system use, or number of orders prescribed in a normal day have been examined.

5. The paper also lacks a description of the system and its components. Was the CPOE system identical across the whole area? What type of decision-support was available? Was it universally available? Surely, these factors should be taken into consideration to help us understand the results.
Authors’ reply: We have added more information about the studied CPOE system in the study context section.
6. The Discussion section needs to compare and assess the findings in the light of other survey findings. This would provide greater depth and content to their own results. **Authors’ reply:** We have compared and assessed the result of our study in light of other studies in the discussion section.

7. The Conclusion presents an unsatisfactory over-generalization. I agree that it is important to understand the concerns of health professionals but I would have liked some more detail about the implications (of which there are many) of the study’s findings. **Authors’ reply:** We have modified the conclusion section in order to show which lessons we have learned and to show more detail about the implications of the study’s findings.

Other comments:
There are a number of places where the meaning was not clear due to imprecise expression, eg,
- First paragraph on page 5: I am not sure what “more observable” means.
- The last paragraph of page 6 contains a non sequitur. It is not clear how Ford et al.’s point about user friendly systems explains or leads to “few studies of unintended consequences.”
- The citation for Ash et al. is missing from the same paragraph.
- Second paragraph on page 15 should be “the system led ...”
- First paragraph on page 16: it is not clear what “physicians were slightly more agreed...” means.
- Second paragraph on page 18: Better to use the words: “human-machine”.
**Authors’ reply:** We have improved the manuscript text by introducing all the reviewer’s minor comments.