Author's response to reviews

Title: Comparative evaluation of different medication safety measures for the emergency department: physicians' usage and acceptance of training, poster, checklist and computerized decision support

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Author's response to reviews: see over
Description of changes made for the manuscript titled with:

“Comparative evaluation of different medication safety measures for the emergency department: physicians’ usage and acceptance of training, poster, checklist and computerized decision support”

Comment 1330090229846744, Reviewer: Ping Yu

the wording for the second question may need to be improved, e.g. what do ‘they’ point to?
- The second research question was re-phrased to make clearer that it refers to the medication safety interventions.

some results appear to be generated from discussions with the clinicians, not just using the methods described; qualitative methods also need to be presented in the methods section
- No, we did not go into discussion with the physicians; we guess you refer to the results of the open-end questions of our questionnaire (see table 1, items U7-U9).
- We have clarified the methods section and introduced a questionnaire item number for all questionnaire results.

9 responses is too small for reliable results to be acquired for Cronbach’s alpha test; this points to the question about the validity of the measurement for the research model posed in this particular study; the quality of reporting needs to be improved
- We performed an internet search for “Cronbach’s alpha” AND “small sample size” respectively “minimal sample size”, but could not find any indications that a sample size of nine violates the assumptions of the calculation of alpha. Besides we tried to find indications in Medline and detected a study of Peleg et al., which is now cited in methods discussion and mentions a sample size of 8 being too small. We accept your argument and addressed it in discussion, but we do think that it doesn’t warrant to just discarding the validity checks we performed including pre-test and Cronbach.
- Quality of reporting: Do you refer to measurement validity? We addressed the topics construct validity and content validity now explicitly in the methods discussion. Construct validity of TAM2 has been proven previously. Content validity has been based on literature review for the items. For healthcare the TAM2 variables resistance to change and compatibility have been identified as important constructs of acceptance. We added these explanations in the “discussion of methods” section. Concerns e.g. sample size have been outlined under limitations.

some of the discussions appear to be based on data collected from discussion with clinicians; the discussion needs to be around the research questions, this logic connection needs to be explicit
- See above. All discussed results have been gained in field observation and the questionnaire.
- Discussion around the research questions: Thank you for the advice. We have restructured the discussion to address this valuable hint.

The discussion section may need to remind the reader about the research questions and how they are addressed. It is difficult to read given the information to be presented in the current version of the manuscript.
- Thank you, see above. The discussion has been restructured considering your advice.

Are limitations of the work clearly stated? Could be improved.
- Limitations in discussion have been refined to consider the various aspects mentioned above.

Do the title and abstract accurately convey what has been found? Some refinement is beneficial.
- The abstract has been rephrased and clarified, thank you.
- We decided not to alter the title of the work since we believe that it conveys the content of our paper.
Is the writing acceptable? It could be benefited from further proof read and fine tuning. For example, use of headings for the presentation of results can improve its readability.

- Thank you. The paper has been rephrased and hopefully improved in many places with help of a native speaker. Results have been partially rearranged under headings as proposed by you.

Minor Essential Revisions

Specific comments: p8 Line 4. The explanation about SN needs to add some more words to clarify the meaning adequately.

- Thank you, done.

P.13 Questionnaire “As far as possible a standardized and previously validated questionnaire should be used”. Please provide support for this assertion.

- This referred to proven validity of previously validated and standardized questionnaire instruments but may have been misleading. The statement was therefore eliminated.

P21. Para 1. Line 7. The explanation about insignificant relationship falls into subjective. The last sentence is not supported by the findings.

- The presented work is (to our knowledge) the first which applies TAM2 methods to explain (non) acceptance of medication safety interventions. It was our problem that only 12 physicians work directly for the ED, thus the return of 75% TAM2 questionnaires was still a comparatively small sample. We distinguish now very clearly between significant and (potentially also caused by the sample size) non-significant correlations and have rephrased the critical parts, but we do think it worth to convey all correlation results.

P22. The results presented in the first para. needs to be validated statistically, not just by the appears of slightly higher or lower in the diagram. Chi square test may help.

- Has been done, thank you. Friedman test for differences between all single measures showed no significant difference. In addition, we refined the figure by illustrating all measures in detail, not only the summarized values of the computer-based support.

Para 2. Line 5, unclear sentence.

- The sentence was rephrased.

P24 Para. 2. The argument is not quite supported by the findings.

- The sentence refers to the self-reported usage and the results of the questionnaire item U3. According to our findings the electronic medication check was the most used measure, followed by the checklist and the poster, that’s why we can’t understand your comment. However, by restructuring the discussion around the research question this sentence was modified.

The sentences that are difficult to understand and can be benefited from re-phrasing.

P11 Para.2. The first sentence.; P12. Para 2. The accuracy of expression in the first sentence can be improved.; P17. The sentence in the first para.; P18. The sentence that follows Figure 2; P19. The results presented appear to be generated from discussion with clinicians. If so, this source of information needs to be given in the methods section.; Line 11, unclear sentence.

- Has been done, thank you.

P20. The first sentence in Para. 2. When mean is under 4, the description ‘rather high’ is not accurate. ‘Rather high’ is a vague term, suggesting to avoid using it throughout the paper. It would improve accuracy to use the term in the actual instrument. The third line from bottom: mean = 2.57, this is a negative finding, say it so.

- Has been done, thank you.

Quality of written English: Not suitable for publication unless extensively edited

- Thank you. The paper has been rephrased and hopefully improved in many places with help of a native speaker.
make the publication more concise, e.g. by avoiding redundancies in the different sections (e.g. the location of the posters is mentioned several times throughout the paper (p. 13/line 1; p. 16/line 16; p. 19/line 5), as is the study period

- We have condensed the paper reducing it by 25% and eliminating redundancies where possible. The mentioned location of posters however is a.) a description of setting; b.) a result of the open-end questions of physicians (lack of availability) and c.) in scope of improvements.

The authors should check the general structure of the paper (e.g. no methods should be described in the "background" section (p. 6/line 7ff) or in the results section (p. 17/line 15ff), no “discussion” in the “results” section (p.16/line 12ff, etc.).

- Thank you, correct, background has been explicitly truncated and interpretative parts moved from results to discussion.

The authors are invited to refine the manuscript with regard to coherence. For instance, in the methods sections, training, paper-based- and computer-based interventions are described as three distinct interventions, while in the result sections training is only scarcely mentioned as single intervention but rather as part of paper-based and computer-based measures.

- See above and markup showing the massive alterations. We now distinguish clearly between repeated medication safety training (one of the interventions) which is essentially assessed in the questionnaire part, not in the field observation and “briefing” to apply the interventions, e.g. the computer based case sheet with its extensions.

Moreover, authors are invited to check whether the manuscript could be shortened, e.g. with regard to the introduction of TAM and TAM2.

- The paper has been shrunken by 25%.

Specific comments
(5) Page 6 (Line 5 ff) Please check whether you could finish the background with the objectives of the study. The following paragraph would suit very well in the methods section. The paragraph on the TAM2 as theoretical framework could potentially be shortened and included in the methods section in page 13, line 15 as well as a keyword in the background paragraph on page 5, line 19.

- Thank you, has been done and feels better now.
- TAM2 as keyword was included in the background description.

(6) Page 11 (Line 3ff) It might helpful for the reader to know what exactly was the computerized intervention. If I understood it right, the computerized system with the electronic documentation was introduced beforehand and within the context of this study only the CDSS functionalities, i.e. the i-button and the medicheck should be evaluated?

- The description has been rewritten more concisely. This retrospective part of the study was conducted after all (paper based and computer based) interventions were in place.
- The study was essentially additive in the sense that paper-based interventions were later complemented with computer-based interventions. For the work described here in this paper we looked at the final effect of all interventions and asked the participants retrospectively what they liked most.

(7) Page 15 (Line 11ff) Please indicate how you dealt with missing values.

- We excluded the missing values from tests by deletion; a statement was added under the methods section.

(8) Page 16 (Line 12ff) This paragraphs may be read as discussion sections rather than as result section. Please check whether it should be moved to the discussion section.

- Thank you, has been done.
(9) Page 19 (Line 17ff) Please clarify the allocation of the values in the brackets. Which value refers to paper based- and which to computerized measures? Are there any results of the training programs available? If so, please consider including them in this paragraph and in table 4.

- We have gone in detail through this paragraph to eliminate all ambiguity. All mean values should now be clearly assigned to the respective paper-based respectively computer-based interventions.
- The repeated medication safety training has not been assessed separately because our goal was to obtain an aggregated ranking of all paper-based interventions (included training, poster, checklist).

(10) Page 21 (Line 1-2) and Table 5 and 6. I was wondering whether there is enough statistical power to calculate a correlation, if you have only 9 questionnaire filled out?

- Spearman correlation is known as statistical procedure that enables to process data of "low quality," from small samples, on variables about which nothing is known (concerning their distribution). We searched for “Spearman correlation” and “small sample size”, but could not find that with 9 persons underlying test assumptions are violated. In addition, we rerun the correlation test with SPSS obtaining identical results.
- We are aware of difficulties associated using Spearman’s test with data from small samples. Our sample was a 75% return rate of only 12 available candidates for the questionnaire. But - as already mentioned in the limitations - the results should be used with caution, taking care not to over-interpret the outcomes.

(11) Page 24 (Line 1 and 2). The explanation “In consequence, the measures were only used for up to 10 percent of prescriptions” differs from the result section, where the statement of 10% was linked with the subgroup of “high risk” drugs. Moreover, also for this subgroup, 2 of 9 physicians used clinical support up to 50% respectively 100% and 1 of 9 participants did not use any support.

- The mentioned question refers to use of the medications safety interventions especially in high risk cases such as polypharmacy, multiple disease etc. Nevertheless, in a comprehensive restructuring of the discussion suggested by the other reviewer the problem should now be solved.

(12) Discussion in general. In my opinion there is a large difference in observed and reported usage and acceptance of all medication safety measures. During your observation you identified that safety measures where scarcely used (p. 16, table 2), however, at least 50% of physicians stated in the questionnaires that they would use one or more safety measures. Hence, I believe it would be worthwhile discussing this difference, because it might potentially impact the results we obtain from any questionnaire focussing on implementation of safety measures.

- Correct, we were astonished about that difference as well but unfortunately did not have the opportunity to carry on the field observation to solve this riddle. In another work we try to gain insight by an in depth analysis of log data at least for the computerized part, but results so far are non-conclusive although logs suggest more system use than found in the field observation period. We addressed the issue within a new section in the discussion.

(13) Page 4: Keywords. Please add “TAM2” as a keyword.

- Done.

(14) Page 5 (Line 11). “Improvements will occur only if clinicians use them methodically.” What does that adverb mean in this context?

- We meant “regularly” or “systematically”; the sentence has been re-phrased.

(15) Page 9 (Line 12 – 14). Since you have outlined the objectives in the background it is probably not necessary to repeat them here.

- Thank you, done.

(16) Page 9 (Line 20). Please specify that the study was conducted over a period of 5 weeks.

- Has been added in methods section.
(17) Page 10 (Line 8–9). It might helpful for the reader to include a heading for that paragraph, like “measures” or “evaluated interventions”.
   - The structure has been (hopefully) improved by clarifying the interventions and introducing new headers.

(18) Page 10 (Line 5,6,7,16). Please replace the footnotes by references
   - Done, replaced with references.

(19) Page 12 (Line 20) Was the observation really conducted anonymously? How could the authors allocate different cases to the same physician, if it was recorded anonymously? Isn’t it more likely that the observation was done pseudonymized and data were anonymized before analysis?
   - Primarily data was collected pseudonymized and later anonymized for analysis. Now explained in methods.

(20) Page 23 (Line 22) I thought that both the observation and the questionnaire would be employed to evaluate and compare the acceptance of different medication safety measure. This sentence, however, may be read as that the questionnaire was a logical consequence to a non-acceptance observed during observation? Wouldn't also the observation as such offer important information on why measures might not be used (e.g. that the poster were not placed next to every patient bed?)
   - Field observation was conducted to compare utilization of the interventions and served to obtain valuable hints for the questionnaire design. As we could observe that interventions were not used as expected we implemented some questionnaire items asking for reasons for non-usage and decided for TAM2 as framework. Of course, the observation offered valuable hints for non-utilization as well, that’s why we integrated these results for an overall picture. We tried now to clarify the procedure.

Quality of written English: Needs some language corrections
   - Thank you. The paper has been rephrased and hopefully improved in many places with help of a native speaker.