Author’s response to reviews

Title: Oncology nurses' beliefs and attitudes towards the double-check of chemotherapy medications: A cross-sectional survey study

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We thank the referees for their valuable comments and helpful suggestions. We revised the manuscript along the recommended lines and think that the manuscript has much improved. We hope that the changes made are satisfactory.

Editor:

Comment

This is a worthy topic regarding patient safety and is well written.

Please revise the manuscript:

Thank you!

Break out the aims of the study and expand on them. Consider numbering them. For example, put the factor analysis of the instrument first as a preliminary establishment of the instrument's characteristics (instrument development subhead). Then note the other research questions; for example, clarify the ANOVA on different levels of nursing experience. This is part of your aims.
Specify that you have 2 dependent variables: strong beliefs and effectiveness of DC for the multiple regression calculations.

We now clearly state aims and hypothesis and make the results more accessible.

However, after thoughtful consideration we decided not to present the instrument development as an aim of the study. The details of the instrument assessment, namely, the EFA, was mainly provided to justify the use of scale means in the regression analysis. We agree with the comments of reviewer 3 that the manuscript should be clear on the main focus. Thus, we place the necessary details of the survey in the methods section (as part of survey development) and focus in the results on the application of the survey. We hope that this decision is acceptable.

Move the results around. You did use subheads. Continue to address each aim of the study for clarification using subheads.

See above, results were slightly reorganized.

The demographic table shows an overlapping characteristic: See years of practice in oncology.

Yes, this has been corrected

Clarify if your review of the instrument wit 39 HCWs is a pilot (lines 148-150). If so, are there statistical results?

Yes, this was a pre-test. We now describe this in more detail, but do not present the statistics in the text.

Lines 125-129 is a long sentence: please consider breaking it into 2 sentences.

We reworded this section.

Reviewer #1

Comment
Overall, this was an interesting and informative piece of work that has clear relevance to those providing care to patients within the hospital setting, not limited to clinicians/healthcare workers. The findings add to the dearth of research in this area. There are some minor issues that require attention:

Thank you!

Background:

The UK NPSA no longer exists - suggest rephrase sentence.

In order to structure the introduction as straightforward as possible, we deleted this phrase.

Lines 83-85, 87-89, 96-97, 104-106 - authors to provide reference(s) to substantiate points made.

Statement in lines 83-85 is now clearly worded as our hypothesis.

Statement in line 96-97 rewritten to mark own and others’ thoughts more clearly.

Other lines: references added.

Lines 113-115 - sentence seems incomplete and the connection to the previous sentence is unclear

rewritten

Methods:

Lines 141-144 - authors stated they addressed several issues e.g. beliefs about safety production, limitations of DC, etc. in the survey. Not clear how a survey could address these issues. Suggest authors revisit this section. Did the authors mean assessed?

Thank you, yes, corrected to “assessed”

Line 155 - how did the participants receive the survey? How long did they have to return the survey?
Information added

Results:

Line 188 - how was 'overwhelming' and 'strong beliefs' defined.

rewritten

Line 215 - 'except' rather than 'expect'?

Yes, corrected. Thank you.

Conclusions:

Line 307 - first sentence is redundant.

Yes, deleted. Thank you.

Reviewer#2

Comment

Summary: The authors present part of the results from a survey on nurses’ perspectives of double-checking in oncology. I enjoyed reading this manuscript, and overall, the text was well written. The authors also appear to take an appropriate, systems-based view of patient safety. Comments below may further strengthen this work.

Thank you!

Title: Accurate and clear.

Abstract: Good, but the ‘conclusions’ (line 49/50) statements in the abstract and main text could be strengthened by adding information on the implications of this research.

We rewrote the conclusions and abstract paragraphs.
Introduction:

a. In Introduction and Methods, specify the anchors when referring to rating scales. For instance, line 68, what does 7 = ?.

In the methods this was already stated. In the introduction we added this information.

b. Line 88, the following statements need to be supported by references: “Health professionals often believe double-checking – if done properly – to be effective “best practice” in detecting and preventing drug administration errors but perceive the process as inconsistent. Others report negative attitudes towards double-checking due to time constraints and impracticability, e.g., in emergencies.”

Thank you. We actually described our own experiences and evaluations there. We decided to word it differently, as the study at hand is designed to shed light on the attitudes of nurses and physicians towards the double check.

c. I expected the Introduction would provide a rationale for why oncology was selected as the clinical setting for this research. Why was oncology chosen, rather than another clinical area? And in the discussion, what results may or may not generalize to other clinical settings?

We now elaborate on the relevance of oncology as a clinical field to study the double-check in the introduction and added statement in the discussion about the generalizability and other clinical areas.

Methods

a. From Line 136: “The survey consisted of two main sections: The first section (not reported herein) assessed practice patterns and experiences with DC procedures. The second survey section (reported herein) assessed attitudes and beliefs in double-checking medications.” It is unclear why only the second part of the survey is included in this manuscript. Also, have results from the first section been reported? If so, the text should include a reference along with a rationale on how this manuscript is distinct.
The survey was quite extensive and included sections on detailed clinical practice at the surveyed units. The complete set of results would be too extensive as to be covered in one manuscript. We added a reference to the other results.

b. Information is lacking on the study sites. What were the characteristics of each site? For example, at each site, how long had double-checking been implemented? Is it being used for all medications, or just certain medications in oncology? Do the sites have different policies in place? In the sample, how many nurses completed the survey from each individual site?

We now provide the requested details in the “sample section”.

Information on sample distribution is now included in the results.

Results, Line 223: “Nurses felt reassured by knowing that a co-worker will double check dangerous drugs and every second nurse agreed that with the DC responsibility…” What is meant by “every second nurse” here? Were nurses somehow surveyed in pairs? This comes up again in line 273: “Every second nurse already had experienced that two nurses make…”

This simply means “around 50%” of responders.

Discussion:

a. Include discussion of how survey results point to future research directions.

We now discuss the need for future research in other less high-risk clinical areas, the causes for non-compliance with checking policies, and on the emotional value of double-checking.

b. The last paragraph is very interesting, but presents new information and seems more like continued Discussion, rather than a conclusions/summary. The paragraph itself could be strengthened: “The strong belief in double checking suggests that any change to the current procedures may be difficult to implement in practice….In particular, the view that human actions are considered as most critical in safeguarding patient care, should be kept in mind when trying to implement technical solutions such as barcoded checking.”
What is intended here by “kept in mind”? What might be some ideas to move safety efforts forward?

We elaborated on the implications mentioned in the paragraph in order to strengthen it. The conclusion part is not intended to be a summary, rather a paragraph elaborating on the practical implications of the study. We hope the changes done to the paragraph made it stronger and more precise.

Minor comments:


Corrected throughout

b. The list in lines 74-76 was hard to interpret and appears to be 3, not 4 issues.

Rewritten

Reviewer#3

Studies that explore well established routines (too well established?) are valuable.

Thank you!

I have received for review a paper that in my opinion tells two stories. One is about the beliefs and attitudes as measured by a questionnaire in a sample of nurses and the other about the development of the said questionnaire. The title points to the first story, and some of the contents to the other. The mix does not serve the manuscript well.

We discussed whether we should drop details about survey development between authors extensively. Our focus in the paper is and should remain the results obtained by using the survey.
After careful consideration, we decided not to present the instrument development as an aim of the study. The details of the instrument assessment, namely, the EFA, was mainly provided to justify the use of scale means in the regression analysis. We agree with the comments of reviewer 3 that the manuscript should be clear on the main focus. Thus, we place the necessary details of the survey in the methods section (as part of survey development) and focus the results on the application of the survey. We hope that this decision is acceptable.

The literature indicates that

Line 96 Views about the effectiveness of double-checking procedures are connected to subjective

Line 97 theories, beliefs and experiences how errors occur and how safety is produced.

The study results seem to be consistent with previous findings.

The authors states that

Beliefs in effectiveness of the DC were mainly driven by

Line 244 beliefs in safety production (table 6). Stronger perceptions of the limitations of the DC in

Line 245 clinical practice negatively affected beliefs in its utility.

Line 250 variables. Self-efficacy, perceived norms and personal and work-related characteristics did

Line 251 not determine beliefs in effectiveness and utility of the DC.

Be careful in suggesting causality, in general and particularly with the subject matter represented by the scales. “Beliefs in safety production” and “Beliefs in benefits and effectiveness” are associated, but please explain the reason for thinking that the first causes the other, and not the other way around?
Thank you for pointing out this need for a more precise use of language. We actually cannot tell from our data and do not want to make a conceptual statement about the direction of influence. We adapted the wording of the cited phrases accordingly.

Lines 125–129: These seems like hypotheses to me. I would like to know what they are based on, and perhaps see them more explicitly stated, for example with numbering. This would ease making references to them in the results part.

We reworded this section along the recommendations of the editor and reorganized the results section accordingly.

Lines 132–150: This is a description of the survey development. As such, it is very superficial. For example, how were the items grouped? Were all items included in scales? Was the questionnaire on paper? Did the questions presented under specific headings? Could the questionnaire be presented as an attachment?

We now provide details on the survey, item grouping, headings, etc. in the methods section (survey development).

We provide the survey as attachment for review purposes (in German language original). At this stage, we do not want to make the survey freely available on the internet.

There are no references at all on the list about questionnaire development and assessment. Some items F11 (what about those who are in favour of introducing for other reasons than the stated), and F27 (would disagreement then be interpreted as no increased risk, or not considerable) look problematic.

We added survey development references.

Both cited items were designed purposively:

F11: This item intends to measure support for implementation independent of ones beliefs in effectiveness, e.g., due to social norms.
F27: we introduced the term “considerable” explicitly to reduce ceiling effects and increase variability (we mentioned this in the limitations).

Line 133, the literature review, is it the same as Ref nr 1?

Rewritten to “based on a review of the literature”. We did a quite comprehensive search of studies and materials.

Line 140: Would like to see more details about the iterative process: what was iterated, why and how, several rounds? I also would like to know who the research team was/professional background.

We now provide more detail on survey development.

Line 146: The steps of the response scale, were they all labelled (if yes, how?), or only the extreme points?

Only the anchors were labelled, we now report this.

Line 149: Why test the survey among health care workers, when the target group is nurses? It would be useful to know some more about the methods used in this testing. This is a very valuable step in questionnaire construction.

Yes, absolutely right. This was simply wrongly worded, it were only nurses involved in the pretest.

We now provide more details on the pre-test.

Line 163: How were item missing treated? (and how prevalent was it?)

This information is now added.

Line 165: Why the chosen and universal cut off point? I would like to know some about the distribution that was the rationale for the cut off point, and was the distribution the same for all items? Why the dichotomization at all? As far as I can see, the analyses are conducted with the scale scores in a continuous format? What is the point in the seven point scale when a lot of information is left out by dichotomization? Please elaborate on your choices.
We appreciate this comment. The reviewer is right in that we do not use the dichotomized variables for any further analyses. Exactly, because a lot of information is lost then. We decided to add the %-agreement information in the tables because many readers are used to this format from safety culture surveys. We also find that helps to put the results in words. It is easier to understand that X% agreed to a statement than the mean agreement was 6.1.

Line 168–170: I believe this has to do with lines 125–129, could be made clearer. a), b), c), and d) are all about comparing two group means. Why use ANOVA and post-hoc-testing?

We reworded this section. We now present all group means in new table 6. We are not sure what this reviewer would recommend instead of the chosen approach? As t-test and ANOVA are equivalent for two groups, we hope it is ok to stick with the ANOVA.

Line 175: In my opinion, exploratory factor analysis (EFA) is an element in questionnaire development and validation, and the mentioning of it seems a bit out of place here

Yes, we agree. As outlined above, we now include brief information on EFA in the methods section.

Lines 182–185: Most of it belongs to methods. If you choose to keep the survey development part in the manuscript, I would like to know if the EFA was run with all the items in, or scale by scale. Did you do other tests than Cronbach’s alpha in order to check/improve internal consistency? It would be interesting to see if there is any correlations between the scales.

See above comment

We did the EFA scale by scale because our main intention was the use of the scales for the further analyses. In addition, we did item-test and item-rest correlations.

The results part would be a lot more readable if the table numbers and item numbers were referred to in the text. The text duplicates information in the tables to a large extent.

We now include item and table numbers in the main text for easier reference.
Lines 202–205: Were subgroups tested only with regard to working hours? All comparisons should be reported. Was working hours dichotomized, or were several groups tested against the group working 40 hours per week?

We now report results of all subgroup tests in table 6. We had inspected associations of the original categorical variables with constructs but found no substantial differences to the analyses with the dichotomized variables.

Line 204: Why have this difference become irrelevant?

We dropped this statement. It is a matter of judgment whether this small difference in mean values is of any clinical meaning.

Line 209: Think you have to check again the recoding of negatively worded items. It is confusing when the reported agreement is 47.5% in the table and 52% in the text. The footnotes in the tables are unclear about whether the figures presented in the tables above are before or after recoding. Writing tips’ advice says to avoid starting a sentence with a numeral.

Yes, indeed, thank you. We carefully checked all results and now provide a clearer legend in the table.

The mean values are reverse-coded whereas the %agree values refer to the original values.

Lines 240–243: Results from EFA belongs to the assessment of the questionnaire/questionnaire development. And please rewrite, as the sentence seems to me at present to make no sense.

See comments above. Information on EFA is now presented in the “survey development” section in the methods.

Lines 244–245. See above re causality.

Yes, changed wording.

Lines 245–248: “This relation was less substantial than expected” How strong relation did you expect, and why? When this is brought to attention, one should have an idea about what to expect.
We changed this to “relation not very substantial”

Much of the discussion section is results repeated. Much of the contents lack references and to be connected to research literature in the field/introduction. Hence, some statements give the impression of being speculations, e.g. lines 289–292

We now added paragraphs about ideas for future research and about the implication for research on non-compliance with checking policies.

We also rewrote lines 289-292 to relate them more concisely to the results.

Lines 267–269: Please elaborate, in what way do your data support this?

There is one item saying that double-checking means sharing responsibility and another one saying that it feels reassuring to know that a co-worker will check. These results are the basis for the paragraph on the emotional value of double checking. We completely rewrote this paragraph and put it in another place.

Lines 297–300: This belongs to questionnaire development

We see the point but feel that this is rather an interpretation and thus should be reported in the limitations.

I cannot find the source for this statement: Line 311 checking or attributing a specific quiet room for DC. In particular, the view that human actions are considered as most critical in safeguarding patient care, should be kept in

This refers to results of items F15, F13 and F18. Answers to these items show little trust in technical solutions compared to checking by humans.

Lines 307–308: When the respondents seem to be reluctant to endorse possible alternatives to replace manual DC, could it be because no concrete, practical replacement routines have been presented?

In part this may be true but see e.g. attitudes towards barcode scanning. The majority of responders was not convinced by electronic alternatives to human double-checking.
Table 6. Have you considered simplifying the model? With 253 cases you may achieve a more robust model, and by leaving out the seemingly redundant variables you may have more cases with complete data. Are the coefficients standardised? R2 is very high. This may very well be partly a result of common methods bias. I suspect some of the explanatory variables (i.e. the scales) are correlated, but have no information to judge whether that is a problem or not.

Thank you for these suggestions. We followed the recommendation and reduced the model. Comparison of the initial and the new model show that the results are quite robust. We also did some regression diagnostics. For example, we found a variance inflation factor for our model with VIF=1.22 which is quite below the common rule of thumb (VIF > 10) indicating that multicollinearity is not a huge problem. There are correlations between the scales but their magnitude seems acceptable, please find the table attached below.

The coefficients are not standardized. We added this info in the table header. We agree that common methods bias may be present at least to some degree and added this to the limitations.

I hope you find my comments useful, and wish you the best of luck with the continued work.

Thank you!