Author’s response to reviews

Title: A Novel Design Process for Selection of Attributes for Inclusion in Discrete Choice Experiments: Case Study Exploring Variation in Clinical Decision-Making about Thrombolysis in the Treatment of Acute Ischaemic Stroke

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Author’s response to reviews:

Dear Editorial team,

We wish to thank the reviewer for their careful review of our manuscript. Based on their comments and suggestions, we have made a number of amendments to the manuscript. Please find below an account of these changes:
MAJOR GENERAL ISSUES

1. The first aim seems to largely duplicate that of a recent review (Vass (2017) Med Dec Mak) - not referenced. So it is unclear why a review is needed. Furthermore, the review is insufficiently executed as the authors state e.g. "...this was not intended to be a comprehensive or systematic review". The review findings are also not obviously connected with the second aim of designing a process for developing DCEs. There is some interesting information produced from the review but - given a recent review has been conducted and the review is not comprehensive - it might be better off as part of the general literature/background section at the beginning of the paper.

Thank you for directing us to this paper. The work presented in our paper was conducted prior the publication of the Vass et al paper. We agree that in light of this publication, it is important to update the Introduction to include this reference and to remove the findings of our own review. Therefore, the first aim of the paper and related findings have now been removed from the paper. We have included a summary of the findings of the Vass et al paper in the Introduction section (page 6, paragraph 2).

2. The second aim is to specify a development process for the optimal design of a DCE and presentation of choice sets. If this is a research objective, then the methods for the design process need to be specified i.e there ought to be (i) a method to explain how the five stage process was designed; (ii) and clear rationale for how it is 'optimal' for DCEs. At the moment the final 5-stage process is described but no evidence is provided as to how it was designed nor that it would be transferable (much less optimal) for other clinical settings.

3. In summary, I don't feel the paper follows through on two of the research aims and would be better specifically focusing on the third research aim of describing the discrete choice experiment design for specific case study and maybe drawing out some general lessons for researchers in designing DCEs in the discussion.

Thank you for these suggestions. We agree that the strength of the paper is in the transparent documentation of the steps involved in the DCE design process. The paper has been re-focused and streamlined to reflect this single aim. We have reflected on lessons for researchers in the discussion (pg 27-28).
BACKGROUND SECTION

4. The literature review does not clearly explain the various methods that have been used to develop attributes in other studies - e.g. the reader needs to know how DCEs/attributes are typically developed, beyond just saying literature, interviews etc. While some review studies are referred to, we as readers need to know more about the specifics in the background section (and thus it would help if the review for aim 1 was incorporated here, rather than later).

In light of this recommendation and those provided above, the literature review has been revised to provide more detail on some of the methods and approaches used to design DCEs using examples of qualitative and quantitative techniques from the literature (pg 6, paragraph 2).

METHODS

5. The paper focuses to a great degree on the selection of attributes. Other issues like the selection of levels and design of the task are not explored in detail. So for example, the paper is not clear on how the final set of levels were determined from the survey responses or whether alternatives for designing the DCE (e.g. pairwise choice sets, BWS etc were considered). While I can clearly see the rationale for an accept reject scenario in this case, this would not be appropriate in other contexts and there is no guidance for the reader as to how to decide this. Either the paper needs to cover issues to do with level selection and design of task in more detail or it needs to be very clear throughout that the focus is on describing a process for selecting attributes.

You are correct that the major focus of the design phase is on the section of attributes. However, the SPE and qualitative work also enabled us to explore attribute levels that were deemed important (i.e., questions around the ‘cut-offs’ and grey areas of attributes that caused uncertainty and where it was perceived there was inadequate research to guide effective decision-making). These results influenced the expert panel discussions on appropriate level selection for attributes. We have amended the Methods section to comment on the value of these stages for subsequent level section by the expert panel (pages 13-14).

6. A key issue is going from 22 to 9 attributes. I can see how the ranking process helps with this. And this is a nice idea that others may want to borrow. However, it is unclear how it was determined that an attribute was fixed or variable. If it is fixed across all scenarios (e.g. 6mmol) - how is it a factor that determines clinical decisions?

Factors were selected as fixed if they clearly suggested that thrombolytic treatment was an option. For instance, the level of 6mmol for blood glucose level and confirmation that the patient
was not receiving anticoagulants were selected as fixed to exclude the possibility that the presentation of symptoms would be something other than acute stroke or that the treatment option was contra-indicated. The inclusion of other fixed factors (e.g., time to prepare dose) ensured that we could standardised some attributes that were beyond the scope of the clinical decision and perhaps could have been more reflective of personal clinical experiences (e.g., delays in dose preparation). More generally, holding particular attributes constant at a given level was preferred to simply excluding them, thereby avoiding the case in which respondents make assumptions about excluded attributes which can be confounded with the attributes that do vary.

7. Why 9 interviews? Why telephone interviews? Who are experts in stroke research? Furthermore, stating that coding and analysis of data used framework does not convey information to the reader as to how the coding was done. How were codes generated? Were they combined? I appreciate that there are a number of stages in the research and limited space, but without more clarity on the application of the methods or justification of choices in this study it is hard to use this as guidance for another study.

These questions have now been addressed in the Methods section with additional detail provided on each aspect under the section ‘Stage 1. Exploratory work’ in the Methods section (pages 11-12). Telephone interviews were conducted due to the geographic spread of participants. Nine interviews were conducted with individuals identified as expert in the area through literature reviews and through identification by the members of the research team who had expertise in stroke medicine and research. We also targeted clinicians from hospitals in both the upper and lower quartiles of thrombolysis rates, based on figures from national audits. Data were imported into QSR International’s NVivo 9 to facilitate the coding and analysis of data using a framework approach, where the initial framework was guided by the interview guide (deductive approach) and additional codes were generated where required (inductive approach). Codes were themed where relevant and coding was discussed among the research team to reach consensus.

8. What is a structured prioritisation exercise? Is it a Delphi survey? Can you explain and reference methods?

A structured prioritisation exercise is a ranking exercise we developed for the purpose of prioritising the influence of certain attributes on clinical decision-making. It was not a Delphi survey as it did not seek consensus or feedback to participants but was a means for the research team to elucidate a broader range of views to inform the selection of the attributes. The exercise was performed by clinicians on a single occasion to prioritise attributes related to clinical decision-making for inclusion in the cases, to ensure that the DCE was relevant without being excessively long. Some questions were phrased to identify where uncertainty and ‘cut-offs’
existed on individual attributes regarding the suitability of the patient for thrombolysis. This step was important for the current study as it was widely recognised that individual clinicians had different thresholds or cut-offs for decision-making. The full SPE is included in the Appendix. An explanation of this is now included in ‘Stage 3’ in the Methods section (pages 13-14).

9. Figure 1 could do with more clarification on the numbers at each stage and detail on whether they are same or different groups of experts. Eg on page 15 it sounds like a separate expert panel considered factors not raised by the exploratory work or SPE. Is this right?

Thank you. We have updated the figure to reflect numbers at each stage. The Expert Panel were the same group at each phase. This is now clarified in text on page 18 (paragraph 2).

10. One of the objectives in reducing the factors down was to provide a DCE that could feasibly be delivered to a smallish (150 or so?) sample of clinicians. However, the final set of attributes is large (9) and the design so large it needed to be blocked - does this mean the strategy was not ultimately successful?

It would not have been feasible or clinically meaningful to further reduce the number of attributes included. The complex clinical decision of the offer of thrombolytic treatment for patients with acute stroke must consider multiple factors simultaneously. While we wanted to ensure the DCE design could be reliably tested in a relatively small population of clinicians, we recognised the importance of maintain face validity and ensuring the vignettes were meaningful and sufficiently detailed to enable a definitive response without the need for additional data. What is considered a large number of attributes is context specific. In their daily practice, it is a common task for clinicians to weigh multiple factors simultaneously and this is reflected in other DCEs exploring clinical decision-making, where a similar number of attributes are employed with physician samples.[1] Furthermore, while there is no agreed maximum number of attributes to explore in DCEs, using 6-10 attributes is common,[2] but the final number should be primarily informed by the specific context of the study. We believe the study was successful in reducing the number of attributes given that we started from a long list of 22 relevant influences on decision-making. The use of blocking in the design was a useful tool to allow for appropriate coverage of the attribute/level combinations while keeping the number of vignettes considered by any one respondent manageable.

11. Stage 5 - if this is part of the methods, more detail is needed
This section has been amended to confirm that Expert Panel discussions at this stages were specifically focused on the feedback and results from the pilot testing and discussions centred on finalising the DCE accordingly.

DISCUSSION

12. It would be helpful if this drew out more clearly the transferable lessons from the case study for other DCEs. How can researchers decide what sort of exploratory work to do and how many interviews etc to conduct? How should the SPE be run effectively? How much think aloud is needed and what sort of probing is need afterwards? In general I feel that quite a lot of work has into thinking about a process that works in this specific clinical context and constraints but much more needs to be done to think about transferability. In particular, as mentioned at the beginning few DCE studies will have the financial and time resources to conduct all 5 stages properly for a one-shot DCE so some guidance as to the most important elements (based on the stroke study) would help.

Thank you. We have considered your question and amended the discussion on pages 27 and 28 to include two additional paragraphs to reflect on these issues based on our experiences.

13. Linked to this point it would be helpful if the discussion could more clearly outline the perceived strengths and weaknesses of the approach and areas where further work would be useful.

We have now elaborated on the strengths and weaknesses of the approach in the discussion section (in relation to transferability and broader relevance of the approach) and we have identified areas for future research (pages 27-28).

MINOR ISSUES

1. Suggest 'factors' is replaced by 'attributes' as the latter is the more common term for DCEs 2. Careful proof read needed - e.g. a number of references appear more than once in bibliography

We have updated the text to replace ‘factor(s)’ with ‘attribute(s)’ and have ensured the manuscript has been carefully proofed for typos.

We believe the revised paper has been streamlined as a result of addressing the reviewer's comments and benefits from the focus on the single aim of demonstrating a rigorous design process using an exemplar case to outline the approach. We hope the revised manuscript
satisfactorily addresses the reviewer’s comments and look forward to hearing from you in due course.

Yours sincerely,

The authors.

References
