Author's response to reviews

Title: Development of a case-mix funding system for adults with vision and hearing loss

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Author's response to reviews: see over
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Please find attached a copy of our revised manuscript (#1642203967556828) entitled Development of a case-mix funding system for adults with vision and hearing loss. We appreciate the detailed feedback received from the reviewers and are including a response to each of their comments as well as a revised manuscript. We have highlighted the changes made in the manuscript in yellow to make them easier to find.

Please feel free to contact me should you require anything further. We look forward to your response.

Yours truly,

Dawn M. Guthrie, PhD  
Associate Professor

Encl.
Author’s response to reviews: see over

Reviewer 1
1. Why didn’t we use random selection to develop our two samples?
   a. At the time when we derived the CM model, we only had the one sample
      (n=182) and then later, during a second project, we collected data for the replication sample. There were a number of years in between the two projects so it was impossible for us to do this although we recognize that would have been a more rigorous method.
   b. We have added some additional wording on pg. 9 to specify that the CM model was derived in 2006.
2. Any pruning of the decision tree to remove predictors?
   a. Once the CM model was derived using the interactive decision tree tool, we did not remove any predictor variables. The pruning took place in “real time” as we derived the model. The choice of predictors and the various splits were guided by the software but we also examined various predictors and splits manually. We continued to create splits until we ran out of observations. In the case of the largest group (group 9 with 49 cases) we explored splitting this further but did not find an appropriate predictor to split this group further.
3. Clearer to show Bland-Altman plot vs. scatterplot?
   a. We have included a Bland-Altman plot in place of the original scatterplot and have updated the text on pg. 12 and 13.

Reviewer 2
1. Lack of detail re: costs, what is included/excluded
   a. Further detail has been included in the methods section on pg. 10 to highlight that formal service use included professional services from a variety of different providers.
2. Should replication sample be independent from derivation sample? Is there overlap and how much?
   a. The derivation of the CM model was based on a set of 182 unique individuals. Given the relatively low prevalence of DSL, this is a large sample of individuals with this dual impairment. We were unable to determine to what extent the two
samples had duplicate assessments as different identifiers were used during the
two projects (as mentioned in the manuscript). The replication sample was a
convenience sample meant to provide some information on how this CM model
would work in a group of individuals with DSL assessed after the original
derivation sample. We recognize that a convenience sample is a potential limitation. However, given the low prevalence of this impairment and the fact that
this was the first time the assessment was being field tested, we feel that this
was a reasonable approach.
3. There are no clear descriptions on survey design, outcome measures, and
statistical analysis
a. Additional text has been added to more clearly describe the main
dependent
variable which was the sum of both formal and informal service use (pg. 10). The
assessment has been described in some detail on pg. 7-8 and the
decision-tree
analysis on pg. 11. We are unsure what additional information should be added
but would be happy to respond to this reviewer if further detail is provided to us.
4. Have we tested log transformation of our main outcome
a. We have chosen not to conduct a log transformation of our main
outcome
measures, namely formal and informal costs in the interactive modeling
process. The dependent variable values are positively skewed as one might expect, but
one challenge in our small sample was values of zero (requiring a shift, then log
transform), and so we chose to leave them as measured for the derivation. It’s
not apparent that modeling a transformed variable would have yielded a
significantly different (or better) algorithm.
5. Unclear why there should be strong agreement between 2 samples
given that
they are not arbitrarily selected
a. The fact that we do not have two completely independent samples is a
limitation of this study. A good CM model should be able to classify clients into
homogeneous groups. It should sort out the most important predictors of service
use. As such, we would expect to see strong agreement on CMI values when the model is applied to two different samples. The fact that there was good agreement between these two samples supports the notion that the CM model is reliable. If we think of this exercise as a “test/re-test” of the model, then our results are positive and support the model.

6. Big difference between 2 samples in terms of explained variance...does this indicate method is not reliable? What are likely differences?
   a. We suspect that the likely differences are due to the fact that the original sample was used to derive the model and thus had the higher explained variances as would be expected (some natural ‘over-fitting’). It may also be that the higher CV values for formal and informal costs in the replication sample (table 4) could also have contributed to this. It is unlikely that the lower explained variance has anything to do with coding issues or the quality of the data since all the assessors in both projects had the same training. All in all, a 28% level of explained variance can be acceptable for a CM system so we don't see any evidence that the method is unreliable.

7. Acronyms need to be defined and used consistently.
   a. Thank you for pointing this out. We have reviewed the document and fixed this accordingly.

8. No need to underline text to define abbreviations.
   a. This has been changed.

9. Table 4 should be reformatted in line with others.
   a. We are not sure what type of formatting is being requested here. There is a lot of information in Table 4 and we have done our best to present it in a user-friendly way. We would be happy to entertain suggestions for improvements.

10. Figure 2 title: There is no indication which is formal and informal. This seems to be analysis by groups.
    a. This has been updated to reflect the changes to this plot.

Reviewer 3

1. Some unnecessary information about the instrument in the background and some suggestions for lines that could be deleted.
a. We have opted to keep the lines that describe the original development of the assessment and the interRAI organization (lines 26-29 in the original) since we feel this is crucial to report for readers who may have no familiarity with these instruments. We agree that lines 32-35 and line 37 can be removed and have done so.

2. Some unnecessary parts in the methods section and some further detail required regarding the cap for the informal hours.
a. We have removed the sections that detail the sub-scales that were not used in the CM model. We chose to place a maximum value on the total number of informal hours a client could report as having received in the previous 7 days.

We capped informal hours at 168 hours/week which represents 24 hours/day of informal support since this value would be appropriate for most clients receiving informal support from a primary caregiver. Some additional text has been added on pg. 10. This value was reported on the assessment for all clients. Clients who live alone could have an informal care provider but is someone who does not live with them.

3. Are data for the DRS missing from table 1? How many used adapted or manually code language, had communication difficulties, and transportation capacity?
a. We have fixed Table 1 so that all scales and items included in the CM model have been included.

4. In results line 20 is incorrect
a. This has been modified

5. Nothing to address

6. In discussion could address misunderstanding that might have occurred due to difficulties in communication or cognitive impairment; experience of tiredness from lengthy assessment and how that might have influenced results
a. Given that the assessors were all highly knowledgeable in the area of deafblindness, and in working with clients with varying level of cognitive impairment, we are confident that they were able to find an acceptable
communication method in working with these clients. Also, because of their vast experience, they would be very aware of the issue of assessment fatigue and could have completed the assessment in multiple visits. We have chosen not to raise these issues in the discussion since we don’t feel that they influenced our results.