Author’s response to reviews

Title: Development and Validation of an Algorithm to Assess Risk of First-Time Falling Among Home Care Clients

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Please find attached a revised version of our manuscript “Development and Validation of an Algorithm to Assess Risk of First-Time Falling Among Home Care Clients” (BGTC-D-18-00674). We would like to thank the editor and the reviewers for taking the time to carefully review our study. As will be seen, we have duly attended to all the comments and suggestions made by the reviewers and revised our manuscript accordingly. All changes have been highlighted in yellow.

Thank you for your time and consideration.

Sincerely,

Ayse Kuspinar

Adam L Gordon (Reviewer 1): This is a worthwhile study. It describes using a decision tree analysis on the interRAI-HC dataset from four Canadian provinces to develop and evaluate an algorithm to identify non-fallers who are at high risk of falls. The work is well described, the statistical analyses sound and the caveats well stated.

There is a limitation here which is not mentioned or discussed, which is that this uses the interRAI, a highly validated tool which has been extensively validated and comes with its own suite of training and implementation packages. Of course this could be rolled out tomorrow in countries which have the interRAI, whilst countries with similar widespread MDS-type indices (e.g. MDS 4.0) could develop and validate their own falls prediction algorithm. But, for countries that don't have a minimum dataset, the development work...
would be more difficult, as first they would have to develop a set of widely utilised resident level variables which were validated in terms of inter-rater and test-retest reliability, before they could even start to work on an algorithm like this.

I wonder if I can challenge the authors to address this in their discussion - they have the advantage of having already implemented the interRAI. Is the only way to develop a falls prediction algorithm like this to have interRAI, or an equivalent, embedded or can they see an alternative way to arrive at such a predictive algorithm in systems where interRAI is non-native. I think I can anticipate their response, which will be to trumpet the value of the interRAI. I would have no objection if this is what they felt was the correct thing to do.

Thank you for your feedback. We have acknowledged this point in the discussion (page 10 lines 192 to 198): “This paper highlights the advantages of having Minimum Data Sets such as those obtained through the interRAI suite of assessments, as they allow for the development of predictive algorithms that can inform decision making at the individual and population level. In countries that do not have the interRAI suite of assessments or similar datasets, the development of such algorithms may be a challenge. Alternative ways may be to perform secondary analysis of prospective cohort studies or existing medical records. However, a potential drawback of this approach is that the collected variables may not have undergone the same level of scrutiny or rigorous psychometric testing that is found with Minimum Data Sets.”

Minor things:

Our Canadian colleagues will know better what the convention is, but Province is a proper noun, shouldn’t it be capitalised throughout?

Province is capitalized when it refers to the government of the province (i.e. Province of Ontario), otherwise it is lower case. We kept this word as is, but made the following correction on page 7 line 131: “province of Ontario” was changed to “Province of Ontario”.

Line 26 - "Falls are," not, "falls is."

Corrected.

Line 120 - "each levels", should be, "each level."

Corrected.

Marilyn Rantz (Reviewer 2): this is an important contribution of new approaches to measure the risk for falls for people living at home. Authors should be commended for approaching this problem using relatively novel analytic approach and using an available large data set of actual assessment information of people receiving home care in Canada.

There are a few suggestions to improve the manuscript for readers:

Please explain that MDS-HC has known validity and reliability, and cite references for that.
The sentence “The reliability and validity of the RAI-HC instrument has been established,[14-16]” was already included in the paper, but we also added the following to elaborate further on its psychometric properties (page 5 lines 68 to 71):

“For example, in a large multi-national study, [15] the RAI-HC items met or surpassed standard cut-offs for acceptable reliability and a significant proportion demonstrated excellent reliability. A number of studies have also demonstrated construct validity of the items and the embedded scales. [16, 17]”


On page 7, the fall rates are summarized as 5% and 9% for group 1 (low risk) and 34% for group 6 (high risk), it would be helpful to add the summary information across the Provinces so the reader could follow your numbers in this paragraph to summary Figure 2.

Summary information across the provinces (for Figure 2) has been added to page 7 lines 127-129.

Page 9 in the discussion adds more interpretive results with population data, some of which would be better placed in results and then expounded upon in discussion about the implications for health care of the population at home, more implications for clinicians and policy makers would be helpful, too, to add to discussion thanks for the opportunity to review and comment on this manuscript.

Thank you for this feedback. We have moved the interpretative results from the Discussion to the Results (can now be found on page 7, lines 121-123).

We have also added the following to the discussion “For policy makers, the 1stFall algorithm may provide a standard assessment system to facilitate allocation of resources, improve efficiency of the health care system and reduce costs. For example, resources can be allocated to people who are at high risk of experiencing their first fall by providing physical and occupational therapy services, exercise classes, etc. Falls are very common causes of injury in older adults and are also very costly to the health care system. The direct medical costs attributable to falls in older adults over the age of 65 is estimated at $32 billion in the
United States[29] and $3.3 billion in Canada[30]. The 1stFall algorithm can help reduce these costs by providing a proactive (rather than a reactive) approach to fall prevention. Furthermore, this prediction algorithm provides clinicians and case managers with a powerful tool to assess their clients and target preventative strategies. It can facilitate earlier identification of individuals who are at risk for falls and help develop personalized care plans. For example,…” (page 9 lines 171 to 181).
