Author’s response to reviews

Title: Frailty index of deficit accumulation and falls: data from the Global Longitudinal Study of Osteoporosis in Women (GLOW) Hamilton cohort

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Version: 2 Date: 15 April 2014

Author’s response to reviews: see over
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**Version:** 1 Date: 28 March 2014

Author’s response to reviews: see over
Reviewer #1: Sarah ST Tom

Reviewer's report:
This paper takes an important step in linking the Frailty Index with health outcomes in older women, with falls as the primary outcome, and fractures, death, and overnight hospitalizations as secondary outcomes. This paper also helps us understand how to move towards an efficient Frailty Index, as no universally accepted model currently exists. While the paper has a strong foundation, I suggest the following points for consideration:

Major Compulsory Revisions
1. On line 50, please elaborate on why falls are an important public health issue.
   Response: Thanks for your suggestion. We have explained why falls are an important public health problem in the elderly in the revised manuscript (Page 4, Line 51-56).

2. In the background section, please state the hypotheses you are testing in terms of the direction of association you expect between the Frailty Index and the outcomes.
   Response: As suggested, we have added the direction of the association between the frailty index and the health adverse outcomes (Page 4, Line 68-70).

3. In Tables 3 and 4, it would be helpful to have a sense of the association between Frailty Index and the outcomes in a model that adjusts for fewer risk factors, for example a model that is only age-adjusted. Comparison of the minimally-adjusted and fully-adjusted models will help the reader understand whether the risk factors included in the model confound the associations between Frailty Index and the health outcomes.
   Response: Thanks so much for your helpful advice! We have included the age-adjusted models and compared them with the fully-adjusted models. The updated analyses were modified in the sections of ‘Methods’ (Page 8-9, Line 160-164; Page 9, Line 173-174), ‘Results’ (Page 12, Line 235-236; Page 12-13, Line 247-249; Page 15, Line 275-277), ‘Table 3’ (Page 29) and ‘Table 4’ (Page 30) accordingly.
4. Please clarify the data collected regarding fractures. If the respondents reported date of fracture, then the Cox model is appropriate. However, if the respondents only reported whether or not they had a fracture in the previous year, the analysis should use a discrete-time model, rather than a continuous-time model.

Response: Thanks for raising the issue. We asked the participants to document their specific dates of fractures on questionnaires. We have revised the manuscript to make the information on dates of fractures explicit (Page 7, Line 131-132).

5. I appreciate the sensitivity analysis of the falls variable. However, I wonder if it is sufficient to consider new incident falls versus recurring falls and to exclude the models using baseline falls. The measures of new incident versus recurrent falls implicitly account for baseline falls. By including models for baseline falls only, I start to think more about reverse causality, and whether the falls contribute to the Frailty Index. If you choose to retain the models with baseline falls, please provide justification.

Response: Thanks for your question.
In Table 4, we analyzed the relationship between baseline frailty index (FI) and baseline falls, to show the face validity of the FI. Then we continued to dichotomize participants into ‘new incident falls’ and ‘recurrent falls’ based on their baseline falls status, and assess their relationship with the FI. Because our FI did not include variable to indicate participants’ baseline falls status (Table 2), we wanted to test the predictive validity of the FI in the women with and without baseline falls respectively. While we agree that baseline falls may be associated with frailty, we also believe that those who continue to fall may become frailer and their risk of falls may be quantified by the FI. We also discussed these findings in the discussion (Page 15-16, Line 311-317).

Minor Essential Revisions
1. Please clarify the use of the cutpoint for imputations in lines 176 and 178. I have difficulty with the current wording in understanding which methodology was used for missing values of < 10% of observations versus # 10%.

Response: Thanks for your question. We have changed the sentence using a mathematical
sign to avoid confusion (Page10, Line 187-189).

2. In line 274, instead of stating “significant findings,” I suggest you state the direction of the relationships instead.
   **Response:** As suggested, we have modified the sentence (Page 14, Line 285-286).

3. Please ensure that the number matches for noun and adjective/adverb/verb pairs throughout the text.
   **Response:** Thank you so much for your advice and reminder. We have examined all the numbers and nouns throughout the text.

4. In Table 2, please confirm whether the term should be “limits” or “limitations” for the rows regarding Activities of Daily Living.
   **Response:** Thank you for your suggestion. We have changed the word ‘Limits’ into ‘Limitations’ in the Table 2 (Page 26-27, Table 2).

**Level of interest:** An article of importance in its field

**Quality of written English:** Needs some language corrections before being published

**Statistical review:** Yes, and I have assessed the statistics in my report.

**Declaration of competing interests:**
I declare that I have no competing interests.
Reviewer #2: Nguyen Huong

Reviewer's report:

Reviewer's report

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The authors nicely document Frailty index of deficit accumulation and falls, fracture, death, and overnight hospitalization using the data from Global Longitudinal Study of Osteoporosis in Women (GLOW) Hamilton cohort with well written and appropriate statistical analyses. However, the authors should address the following questions:

1. How well Frailty index predict fall in compared to Fall risk assessment tool (FRAT)

Response: Thanks for your questions and advice. The objective of this study was to construct a frailty index (FI) and examine its relationship with risk of falls, fractures, death and overnight hospitalizations, based on the available data. The next step will be to validate these findings eternally, and to compare the FI with other existed well-known assessment tools. We added the sentences related to comparison with other assessment tools in the discussion (Page 18, Line 361-365).

3. Should it be recommended to use Frailty index to predict Fall & Fracture risk?

Response: Thank you for raising the issue. We identified the significant relationship between our frailty index (FI) and risk of falls, fracture, death and overnight hospitalizations, based on the longitudinal study. These findings suggest that our FI could be a useful tool for predicting falls and fractures, however, as discussed in the manuscript (Page 18, Line 361-365), we need to perform external validation and comparison with other assessment tools before adopting our FI in practice.

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.
Declaration of competing interests:
'I declare that I have no competing interests'