**Reviewer’s report**

**Title:** Depressive Symptoms in Long Term Care Facilities in Western Canada: A Cross Sectional Study

**Version:** 0  **Date:** 17 Mar 2019  
**Reviewer:** Hao Luo

**Reviewer's report:**

This cross-sectional study used RAI-MDS 2.0 data from 11,334 residents to examine the prevalence of depressive symptoms in long-term care facilities (LTCF) residents with or without cognitive impairment across Western Canada. The manuscript is written in a scientific manner. The sample is sufficiently large. The statistical method adopted is appropriate. I agree with the authors that this study does fill the gap of how common depression is in the less frequently studied Western Canada. However, my general feeling is that the study in its current form is more a report than a scientific study driven by a clearly defined research question/hypothesis. Almost all possible aspects that are related to depressive symptoms have been touched. However, the depth of discussions can definitely be improved especially for the primary independent variable cognitive impairment. Below are my specific comments.
1. The primary objective - the relationship between depressive symptoms and cognitive impairment (actually the authors phrases as "other prevalent comorbidities") - is not reflected in the title.

2. In the introduction part, the authors stated that CIHI report on depression in LTC focused only on provinces in eastern Canada. Any explanation why? And why do you think western Canada should be different from eastern Canada? Anything special you would expect from this sample?

3. The authors very briefly mentioned that depression frequently co-occurs with dementia. And residents with dementia are more than two times more likely to develop depression. I think if the relationship between depression and cognitive impairment is the key focus of this study, it is helpful to further discuss the reason why. Are there any pathological reasons? Or is it caused by the practice/care model of LTCF? Physical restraints and inappropriate antipsychotic drugs may also be highly relevant. Although the study did mention antipsychotic medication, it is studied in a separate manner.

4. In the method part, the goal of "to see what medications those with depressive symptoms were prescribed" suddenly emerged. This goal is beyond the scope of the study objective and need to be clearly defined in the Introduction part first.

5. In the measures part, I find the cutoff value choice of DRS rather strange. I think DRS\(\geq 3\) is the widely studied and validated cutoff. And I think it is helpful to use the same cutoff to facilitate comparison with prevalence figures reported by CIHI and other international studies. The authors did mention some recent work has shown that a score of 1-2 can be predictive of depression. However, there is no reference. I personally think this argument is not strong enough.
6. In the primary independent variable section, it is mentioned that CPS is preferred over the diagnosis of dementia. I kind of feel that this argument is redundant as cognitive impairment is conceptually different from dementia and using CPS is a rather straightforward choice to me.

7. Different scores of CPS have different meaning. Choosing CPS ≥2 means that you selected residents with mild cognitive impairment or above. I think it needs to be clarified.

8. The statistical analyses part is very clearly written. I just have one question about whether it is a two-level or three-level mixed model. If individuals (Level 1) are nested within care units (Level 2) and then care units are nested within facilities (Level 3), should it be three levels?

9. The very last sentence is the analysis section "We also ran our final model…the resident had a diagnosis of dementia" is a bit confusing to me. Please consider revise it.

10. In the results, the prevalence of cognitive impairment - 81.6% - if independent of depression. Presenting this result as "comorbidity" may not be appropriate.

11. Statistics, e.g., between unit/facility variance, intraclass correlation coefficient, log likelihood, and AIC, related to random effects need to be reported and briefly discussed.

12. The discussion focused on discussing relationships between each comorbidity and depression, which is helpful. However, given that the one of the arguments is that this study is conducted in western Canada. It would be more interesting to compare findings with results generated from eastern Canada (I guess from the CIHI report). To conclude, I recommend the authors to ca
Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

Yes

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Yes

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Yes

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

Quality of written English
Please indicate the quality of language in the manuscript:
Acceptable
Declaration of competing interests

Please complete a declaration of competing interests, considering the following questions:

1. Have you in the past five years received reimbursements, fees, funding, or salary from an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

2. Do you hold any stocks or shares in an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

3. Do you hold or are you currently applying for any patents relating to the content of the manuscript?

4. Have you received reimbursements, fees, funding, or salary from an organization that holds or has applied for patents relating to the content of the manuscript?

5. Do you have any other financial competing interests?

6. Do you have any non-financial competing interests in relation to this paper?

If you can answer no to all of the above, write 'I declare that I have no competing interests' below.

If your reply is yes to any, please give details below.

I declare that I have no competing interests' below.

I agree to the open peer review policy of the journal. I understand that my name will be included on my report to the authors and, if the manuscript is accepted for publication, my named report
including any attachments I upload will be posted on the website along with the authors' responses. I agree for my report to be made available under an Open Access Creative Commons CC-BY license (http://creativecommons.org/licenses/by/4.0/). I understand that any comments which I do not wish to be included in my named report can be included as confidential comments to the editors, which will not be published.

I agree to the open peer review policy of the journal