Reviewer's report

Title: Impact of Medical and Psychiatric Multi-Morbidity on Mortality in Diabetes: Emerging Evidence

Version: 2 Date: 13 May 2014

Reviewer: Molly Tanenbaum

Reviewer's report:

This manuscript, which looks at multimorbidities (both medical and physical) in a population of veterans with treated type 2 diabetes, addresses an interesting and timely topic and uses an impressive dataset. It has the potential to be a valuable contribution to the literature that points to important clinical implications not only for managing type 2 diabetes but also for the larger picture of improving care for individuals with multiple medical or medical and psychiatric conditions.

Here are my comments and suggestions for further strengthening the manuscript as well as addressing some weaknesses.

Major Compulsory Revisions

1) Elderly, older adults, etc…: Is this paper about "older adults" or "veterans with type 2 diabetes" or "older veterans with type 2 diabetes"? While the introduction and discussion both focus on why this study is important particularly for older individuals, this emphasis was not reflected in the analyses performed. There could be multiple potential ways to address this problem, such as including additional analyses to focus on the elderly portion of the sample or revising the introduction and discussion to explain that this is about veterans with type 2 diabetes, who tend to be older.

The following comments relate to this point:

--Line 65: "the impact of multimorbidity is also likely to be stronger in older individuals." This statement seems obvious. Expand upon or remove.

--Line 68: "Older aged and elderly individuals" What do authors mean by this distinction? Remove or else define.

--Lines 242-246: "in the elderly, where our findings show that multi-morbidity is associated with significant increase in mortality". As separate analyses were not done looking at age specifically, this sample wasn’t all necessarily "elderly" so the findings do not support this statement.

2) Medication adherence: On Line 93, when reading that your study excluded individuals not on medications in order to assess medication adherence and account for differences in medication adherence, I expected some analyses to focus on adherence. Analyses on adherence are not reported in the manuscript. I suggest resolving this either by adding in analyses related to medication adherence consistent with what is stated in the Methods, or else by changing the
justification for the inclusion/exclusion criteria. Same comment applies to line 255
in the Discussion. Going back to the inclusion/exclusion criteria, a related
question is whether authors meant they were interested in diabetes medication
adherence specifically or any type of medication adherence, because they could
have still assessed hypertension medication adherence, for example. In other
words, why was it important for this sample to have a somewhat similar
self-management regimen for diabetes? Given that analyses don't address
adherence the best bet may be to omit references to it.

3) Psychiatric categories: Authors should provide justification and more definition
for dividing up these categories as they did. What does "psychoses" include? Is
depression only those diagnosed with Major Depressive Disorder? Or a single
depressive episode as well? What about bipolar disorder? Since this is a
population of veterans, what about PTSD? Why were these diagnostic categories
chosen and why were they grouped in this way? [This is a discretionary side
note, but some medications for psychiatric illnesses lead to weight gain, or other
side effects that could lead to medical comorbidity, and this issue is not
discussed]

Minor Essential Revisions

1) Specify type 2 diabetes throughout manuscript. Additionally, in the Methods
section the authors may want to specify that the sample has "treated type 2
diabetes" since those not taking medications for diabetes were excluded.

2) Remain consistent with not capitalizing the word "veteran"

3) Recommend specifying both in abstract and main manuscript that this data
was based on electronic medical record search

4) "HR" should be spelled out the first time and then abbreviated the rest of the
time

5) Lines 53-54, the comma in that sentence should come after the word
"increased" rather than the word "although." Also, recommend specifying in that
sentence that the authors are citing a review paper. Would also recommend
describing a bit more about how one might test interventions for patients with
multi-morbid disease (possibly give an example of one such intervention).

6) Line 72: "Veterans are an ideal population to tease apart the impact of medical
and psychiatric multimorbidity on mortality." More clarification needed here on
what exactly is being teased apart. It seems like the intent of the study is less
about teasing apart medical and psychiatric multimorbidity and more about
moving away from the individual disease focus to a more global perspective on
overall medical and psychiatric illness burden, and whether this burden increases
and negatively affects mortality as number of comorbidities increase.

7) Line 92: Please define "negative survival time"

8) Demographic Variables paragraph: Some terminology in this paragraph should
be defined more clearly or removed. For example, what are the "Medical SAS
data sets"? Spell out NHW on first use. In general, this paragraph on
demographic variables could be shortened significantly (e.g. eliminating variable
names, shortening how each variable was defined). Could probably state "gender, race/ethnicity, marital status" without saying which was the reference group and reflect this information in the table instead.

9) Results section, line 163 (and an overall comment on the Results): It would help readers for the Results section to spell out more clearly what the findings mean rather than putting the tables into words. For example, when reporting that congestive heart failure carried the greatest mortality risk, did that mean patients with congestive heart failure were nearly twice as likely to die as those without it? Also, should be consistent with providing or not providing confidence intervals in the text.

10) Line 173, please define "clear graded relationship." As in, as the # of X increases, ____ increases?

11) Lines 191-194: In the second clause of this sentence, starting with "...and decreased only slightly", it is not clear what decreased. Mortality risk?

12) Conclusions: In the first sentence, recommend clarifying that the graded response was only for medical comorbidities, not psychiatric – it currently implies that both are the case.

13) Line 214: what was the interaction and how was it demonstrated? Also, the discussion section should move away from the use of numbers to spelling out what these findings mean more clearly. (e.g. "Mortality risk for veterans with three or more medical comorbidities was consistently high regardless of number of psychiatric comorbidities. However, mortality risk for veterans with two or more psychiatric comorbidities decreased.....) Also, were any of these patterns surprising? The discussion could benefit from additional interpretation of the findings. This applies to the second paragraph of the discussion as well. Recommend that authors provide additional speculation as to why those with more psychiatric comorbidities had lower mortality risk. (One possible reason could be that if they have multiple psychiatric diagnoses they are being followed more closely by the VA, have more frequent appointments?)

14) Line 248: change "exist" to "exists"

15) Line 258: Authors state that the VA medical record does not include weight. Is this true?

Discretionary Revisions

1) One possible limitation that I would recommend addressing in the discussion section is using number of morbidities as the variable. This implies that each comorbidity is equal in its burden, but some may come with a greater burden than others.

2) Consider adding a mention of clinical implications in the abstract

3) In discussion, would recommend adding some additional statement about the fact that this study was done with a population of veterans who are accessing the VA medical system for their medical and psychiatric care. As the VA is a unique system, the implications of this study might be different in the VA vs. elsewhere. In lines 246-248, authors note that findings "highlight the need to integrate care
for medical and psychiatric conditions and address the fragmentation of health care that currently exist with separate coverage for medical and mental health conditions." Is this the case in the VA? Is this a need authors are pointing out within the VA system or outside of it?

4) Also in the discussion, would recommend adding more nuance and interpretation. Perhaps discussing which combinations of comorbidities come with greater risk? (or speculate about this since it was not a part of the analyses). Additionally, how can we "treat multimorbidity"? Since hypertension and depression were most common comorbidities, it could be helpful to cite efforts to treat multimorbidities and describe what is happening already in this area to provide context.

5) Since this is an EMR-based study, it seems logical that there should be some clinical implication that is also EMR-based, such as flagging patients with a certain # of multimorbidities so they are followed more closely in primary care. As authors astutely point out that a paradigm shift is needed, it may not make sense for this article to offer a magic solution to this problem but could provide a bit more speculation and recommendations based on the findings.

6) In my opinion, the authors could enhance the manuscript further for the readers of this journal by adding more about diabetes specifically in the introduction and discussion section. Why did they choose type 2 diabetes as the illness to focus on? Why not hypertension? Is there something particular about it? (for example, increasing #’s of patients with type 2 diabetes?) Otherwise it could be just a paper about multimorbidity in general, so it would help readers who are interested in endocrine disorders if it’s stressed more why we should be interested in multimorbidities for managing diabetes in particular.

7) Table 1: Change "Dead" to "Deceased"? Also relevant to earlier comment on whether this is an elderly sample, may want to provide range of age in addition to Mean and SD. Also may want to provide numbers for 0 comorbidities in the Total Comorbidities section.

8) Table 2: May want to specify in the heading that the comorbidities are listed in order of increased risk.

Level of interest: An article of importance in its field

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