Author’s response to reviews

Title: Psychotropic drug use among nursing home residents in Austria: a cross-sectional study

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Author’s response to reviews: see over
Point by point response to the points made by the reviewers

We greatly appreciate the opportunity to submit a revised version of our manuscript. We thank both reviewers for their careful review and the useful remarks.

Response to reviewer Daniel Collerton (referee 1)

2. Are the methods appropriate and well described?

Remark of the reviewer
Yes, though it is regrettable that data protection prevented cross-referencing medication prescription with diagnosis. The description of cluster adjustment might be difficult for a non statistician to follow. I would suggest rewriting this section to make it more directly relevant to the study. For example, "Since data is collected across a number of homes, the fact that each resident of a home has common influences means that the data from each individual must be adjusted for these common factors in order to make a reliable estimate of effect size and precision. Cluster adjustment allows these common factors to be taken into account..."

Comment
We tried to simplify the statistical section and partially rewrote it.

3. Are the data sound?

Remark of the reviewer
The study would have been strengthened by using two independent collectors and coders for a subsample of the data in order to check whether there were any errors in data collection, though this is unlikely to be a major or systematic bias.
The study did well in gaining such a large sample of homes.

Comment
Thank you for this valuable comment. In the methods section, we inserted an explanation that data entry and coding were double-checked by an independent research assistant.

8. Do the title and abstract accurately convey what has been found?

Remark of the reviewer
In general, yes. ACT could be spelled out, and the final conclusion could be strengthened by citing the rates of prescribing in other countries rather than just saying that they are higher in Austria.

Comment
We deleted the acronym ATC and now use the correct expression “Anatomical Therapeutic Chemical Classification”. Unfortunately there is not enough space to discuss studies from other countries within the abstract but we inserted “compared to recent published data from other countries.”

9. Is the writing acceptable?

Remark of the reviewer

The paper is clear. It would benefit from minor editing by a native English speaker in some places to increase its readability.

Comment

The manuscript was edited by a teacher for English language and reworded at several places throughout the manuscript.

Response to reviewer Arnim von Gunten (referee 2)

Major compulsory revisions

1. Is the question posed by the authors well defined?

Remark of the reviewer

The main question is straightforward, well defined and of great importance.

I feel, however, the secondary question on the variables associated with psychotropic medication deserves clarification. I wasn’t quite sure why the authors chose the variables they chose: are they convenience variables? It doesn’t seem they chose them according to specific hypotheses.

Comment

We thank the reviewer for the possibility to clarify the choice of the variables in our study. As residents’ diagnoses were not available due to data protection, the variables in our study were chosen to represent most important criteria for assessment of appropriateness of psychotropic drug prescription in nursing home residents: functional status, cognitive status, behavioural disturbances, and residents’ and nursing homes’ characteristics. Most of all recent publications about psychotropic drug use in nursing home residents refer to these variables although instruments chosen vary throughout countries and institutions. We hypothesised psychotropic drug prescriptions to be lower in residents with better functional status, without major cognitive impairment, and also in residents with dementia but without concomitant behavioural disturbances. We also assumed higher psychotropic prescription rates in nursing
homes with a low resident/staff ratio.
We inserted a sentence to clarify this issue at the end of the background section.

2. Are the methods appropriate and well described?

Remark of the reviewer
As the authors adjust psychotropic medication for clusters, I was a little surprised they did consider the variables chosen (à page 7) as being independent.
Although some of these variables can be considered a priori as independent others seem potentially dependent one from the other. Indeed, looking at Table 1, the figures regarding the different BPSD described suggest that they often co-occur and thus are not independent. Would it not have been more appropriate to do a data reduction analysis with regard to the patients’ clinical characteristics at least: 1) falls, 2) BPSD?

Comment
We presented unified models after variable selection for all 5 outcomes. We preferred to discuss models with the same sets of covariables, even if some of them were not significantly associated with all outcomes. Therefore, we did not perform a data reduction analysis excluding non-significantly associated covariables. On the other hand, each covariable is associated significantly with at least one outcome. We clarified this issue and inserted a corresponding sentence in the statistical methods.

This would also be appropriate due to the fact that differential predictors of BPSD are not at stake in this paper as only a few BPSD among the many possible have been selected. For instance, why was apathy not selected as one frequent BPSD? I think the authors should say a few words about how or why they selected their variables. I think it would make things clearer if they introduced a small sub-chapter regarding the different variables in “Methods” as parts of the description regarding the variables are now scattered in “Nursing homes and residents” and in “Statistical methods”. Structuring the method section differently with a sub-chapter regarding the different variables would probably help the reader. Giving this issue a little more attention is likely to result in changes regarding the presentation of the different tables.

Comment
Association analysis only included characteristics collected within the baseline assessment. Since we aimed to reduce the effort of proxy rating by nurses to a minimum we decided to assess only a limited number of residents’ characteristics displayed in table 1. These
characteristics included dementia related behavioural disturbances assessed by a shortened version of the Cohen Mansfield Agitation Inventory (CMAI). Apathy is not included in the CMAI which is the reason why it was not chosen. Since apathy might be positively associated with increased odds of psychotropic medication, we acknowledge that it might have been sensible to include this behavioural symptom.

As all variables explored within the multiple regression analysis have been listed in the statistical method section, we feel we should not insert a further sub-chapter.

3. Are the discussion and conclusions well balanced and adequately supported by the data?

Remark of the reviewer

I think it might be worthwhile discussing briefly the following points as they are potentially of clinical importance:
- What is the clinically relevant hypothesis prompting the authors to calculate the association between ‘legal guardian’ and antipsychotic drug prescription?
- Why was there no association between antipsychotic prescription and staff/resident ratio?

Comment

We decided to include the characteristic legal guardian into our association analysis since it is well known that residents with a legal guardian are more likely to be heavily affected by dementia and are more care dependent. Therefore, we assumed a positive association between legal guardianship and an increased odd of psychotropic medication prescription.

We could only hypothesise why staff/resident ratio is not associated to prescription of antipsychotic drugs. We inserted a corresponding sentence in the discussion section.

Minor essential revisions

Remark of the reviewer

1. References to tests not used in the study can be dropped: 27, 28. (page 5)

Comment

We deleted references 27 and 28.

Remark of the reviewer

2. Has the CDR been used (page 5)? The CDR is mentioned in the method section, but I couldn’t find it in the tables.

Comment
The reviewer is right. Since the CDR was not used and only discussed, we deleted the sentence referring to this instrument.

**Remark of the reviewer**

3. Although well known by experts, please define BPSD on page 5

**Comment**

We inserted “behavioural and psychological symptoms of dementia”.

**Remark of the reviewer**

4. In methods (page 6) please drop: “Cluster-adjustment of these data was avoided ...”

**Comment**

We suggest not deleting this sentence since these data were the only not adjusted for cluster design. We feel that this information should not be withheld. The rationale of our decision has been given in the following two sentences.

**Remark of the reviewer**

5. Although the authors go at great length explaining the statistical methods of which I am not particularly familiar, they omit explaining what the different clusters they refer to are (page 6). Similarly, this may not be altogether clear to the average reader. Please define them.

**Comment**

We inserted the following explanation: “A cluster was defined as a nursing home”.

**Remark of the reviewer**

6. Despite multiple analyses the authors do not use statistical correction and use the 0.05 level. This is fine with me, but they should state why they do this despite a large sample size of almost 2000 patients.

**Comment**

We did not test multiple hypotheses and therefore there is no need to adjust for multiple analyses defining a lower $\alpha$. Of course, there were many tests performed considering multiple regression models. However, the results are interpreted in an explorative manner as common in multiple regression analyses which is now mentioned in the statistical methods section.

**Remark of the reviewer**

7. Drop “… according to the Beers Criteria or other criteria (44,45,46)” as this is neither
done nor discussed.

Comment
We deleted the references 44, 45, 46.

Remark of the reviewer
8. Do the title and abstract accurately convey what has been found?
Abstract: In the results section the authors state that there is no association between institutional characteristics and drug prescription, but they say nothing about the associations with BPSD. This is a bit odd.
Otherwise, ok.

Comment
We inserted two sentences on the associations between psychotropic drugs and BPSD in the abstract and in the section “Associations of psychotropic medications with residents’ characteristics”.

Discretionary Revisions
Remark of the reviewer
1. Prothipendyl being the most frequently prescribed antipsychotic is a surprise.
This drug does not even exist in my country. Maybe the authors want to comment on this.

Comment
Thank you very much for this comment. We inserted an explanation on this issue.

Remark of the reviewer
2. In methods (page 6) I suggest the authors drop: “Cluster-adjustment of these data was avoided ...”

Comment
We refer to our comment above (point 4).

Remark of the reviewer
3. I always find it a bit odd to say the “the mean number of psychotropic drugs prescribed ... “Wouldn’t it be more appropriate to give the median value?

Comment
There was no important difference between the median and the mean value (mean number of psychotropic medications: 1.88, median: 2.00), and the confidence intervals can be calculated
more easily using cluster adjustment methods.

**Remark of the reviewer**

4. Are the data sound?

*I felt they are. Maybe the authors could state whether or not there is some quality assurance data in the literature regarding the different levels of a resident’s functional status (monthly amount of nursing care time) they define and use in the paper.*

**Comment**

We chose to use the levels of long-term care need as assessed by expert raters of the Austrian Federal Act on Nursing Care since we could not perform a personal assessment of residents’ functional status. The assessment instrument has been in use for many years. We inserted an explanation in the methods section.

**Remark of the reviewer**

5. Are the discussion and conclusions well balanced and adequately supported by the data?

*The last 2 paragraphs of the discussion are petering out and can be dropped leaving only the following sentence: “There clearly is an urgent need to reduce and optimise psychotropic drug prescription in Austrian nursing homes.”*

**Comment**

We deleted the last two paragraphs as suggested by the reviewer and now conclude our discussion stating the need to reduce and optimise psychotropic drug prescription in Austrian nursing homes.

**Remark of the reviewer**

6. Are limitations of the work clearly stated?

*I suggest the authors add a sentence, in the “limitation section”, stating that causality of associations could not be assessed (They discuss this point when they wonder whether some BPSD are the cause or the side effect of antipsychotic drug prescription, but don’t mention it together with the other limitations).*

**Comment**

We inserted a comment on the limitation that associations can not be interpreted as causality.