Reviewer’s report

Title: Excess costs of dementia disorders and the role of age and gender An analysis of German health and long-term care insurance claims data

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Reviewer: Hanna Leicht

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This study analyses excess costs of dementia in patients aged 65 and older on the basis of claims data, controlling for age and gender, and presents age- and gender-specific analyses. Thus adopting a payer perspective, the authors evaluate expenditures of statutory health insurance (SHI) and of long-term care insurance (LTCI). Excess costs of dementia amount to more than €8,000 annually, of which approximately two-thirds are expenditures for long-term care services.

To my knowledge this is the first German study to present excess costs of dementia from a payer perspective and to analyse costs in some detail with regard to effect of gender and age at the same time. It therefore adds relevant findings to the existing literature. The paper is very clearly structured and convincingly argued, and the methods are sound. However, I would suggest some minor revisions.

Minor essential revisions

1. Background:
While I arrive at the same 2006 figures for SHI and LTCI expenditures presented in the Hallauer et al. study, I have trouble relating the 2006 figures to the expenditures reported in the Schulenburg et al. paper. It would be helpful to present the original figures which the inflated 2006 values refer to in brackets.

2. Inclusion criteria:
It appears to me that the use of donepezil, galantamine, rivastigmine or memantine prescriptions as a stand-alone inclusion criterion may lead to the inclusion of patients with mild cognitive impairment in addition to dementia patients. Even though this might only concern a small fraction of the sample, the possibility should be discussed (or ruled out), as it presents a potential limitation with respect to sample homogeneity and might lead to the underestimation of costs for dementia patients.

3. Methods:
Recycled predictions should be briefly explained, as this method goes a little beyond standard statistical procedures. Also, the reference provided does not actually explain the method.
The fact that dementia is the principal predictor in the models might be explicitly mentioned at the beginning of section 2.3.

4. Presentation of methods and results:
Generally, I found that some deduction was required in places to understand the statistical background of the tables – readers might benefit from more detailed information in the table captions concerning the methods (such as type of model) and tests applied to produce the results.
In particular, the following points might be clarified:
- Tables 3 and 4: It is not made clear how the p-values are derived.
- Table 4 and corresponding text passage (p. 12): It is mentioned earlier in the text that significant differences are assumed for two-part models if a significant difference exists in at least the logistic or the gamma regression model and if the differences in both models point in the same direction. For the gender-based analysis, however, information on the direction of the differences in service use and costs per user is not made available, which should be remedied (since it appears to me that, in theory, two significant effects could point in opposite directions; see discretionary revisions below).
- Tables 3 and 4: I would suggest adding the coefficient of interest for the recycled predictions to the table captions. In particular, I’m not quite clear on whether for the data in Table 4 this coefficient is gender or the interaction term gender*dementia.
- Figure 2: I’m not sure that “adjusted costs” is the correct term here (adjusted for what?) – “predicted costs” seems the more likely candidate.
Also, I wonder if it might not be useful to provide measures or precision or dispersion, as appropriate, in tables 2 to 5. And finally, a small detail: the figure for total costs of formal care in patients (€ 12,343) appears to be erroneously repeated as the total cost for controls.

Discretionary revisions

5. Sensitivity analyses:
The analysis including comorbidity data are dealt with extremely briefly. Even though the inclusion of comorbidity covariates does not on the whole have a great impact on predictions, it would be interesting to see the model output (including coefficients) for SHI, LTCI and total costs in an additional table, to be able to assess the impact of these frequent comorbid conditions on costs. Also, I wonder if there might be interactions between this comorbidity complex and dementia.

6. For more clarity in the relation of text to tables it might be helpful to indicate explicitly in the text which data are not shown in detail (for instance, gender-specific costs, bottom of p. 11, or last paragraph of section 3.3 on p. 12).

7. Table 4: Results for the probability of service use and costs per user in male
vs. female patients might be interesting as such – the table might be split in two, comparable to Tables 2 and 3 for the analysis of patients vs. controls.

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

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

**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.