Reviewer's report

Title: A new approach for exploring comorbidity in dementia: A cross-sectional study of primary care patients

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Reviewer: christiane muth

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Summary: This manuscript reports different comorbidity patterns of dementia in a cross-sectional study of older primary care patients (claims data). The authors applied different epidemiological / statistical methods to explore frequent comorbidities (prevalences), but also to identify associated diseases which are not explained by coincidences of high prevalent diseases in older age alone. For this purpose they developed multiple logistic regression analyses and applied exploratory factor analysis. Apart from some overlap in diagnoses, all three methods resulted in differing comorbidity patterns.

Relevance / Originality: The research question targets at an issue of major importance in current multimorbidity research, as comorbidity patterns are urgently needed to develop further guidance in ‘real world’ patients, such as guidelines addressing not only a single disease but also the most relevant comorbidities (e.g., less frequent but relevant for clinical management due to interactions). The authors made use of statistical methods which have already been shown to be appropriate in identifying disease clusters, but are not yet used widely. Therefore, the paper is of outstanding interest for a broad medical readership.

Strength: A well defined research question, well described methods, balanced discussion and conclusions including a critical appraisal of limitations, and the clear style of speech are some of the major strengths of the paper. I am not an expert in statistics. For the appraisal of the appropriateness of the statistical methods, the interpretation of KMO measures etc., I refer to the statistical review.

Major compulsory revisions: none

Minor essential revisions:
1. The term “physiopathology” should be replaced by the term "pathophysiology".

Discretionary revisions:
1. I think that the described limitations related to claims data does not only apply to the dementia diagnosis, as it was clearly discussed by the authors. Moreover, there might be some imprecision, ambiguities or incompleteness in the comorbid diagnosis as well (due to under- and over-reporting, or misclassification). But the benefit (the non-selective character of the sample) may outweigh this disadvantage. Maybe, this point could be strengthening in discussion.
Level of interest: An article of importance in its field

Quality of written English: Acceptable

Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.

Declaration of competing interests:
I declare that I have no competing interests.