Reviewer’s report

Title: Vascular staging for diabetes: a useful instrument for severity adjustment in economic modeling

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Reviewer: Björn Stollenwerk

Reviewer’s report:

The authors simplified an existing vascular staging instrument and applied this modified version to data of an Australian indigenous population. The construct validity of this new staging instrument was tested by calculating in-patient hospital costs and mortality for each stage. However, the validity of the new instrument has not been compared to the old version. The results appear plausible and might be of interest, especially for the Australian audience. However, the authors believe this new staging instrument might be useful for modeling purposes. While it might be possible, that application examples exist, where this simplified vascular staging instrument might be used, the authors do not provide sufficient evidence for this conclusion.

Major Compulsory Revisions

Economic modeling

The authors mention the terminology ‘economic modeling’ in the title. However, the main focus of this article is not about modeling. It is true, that some results presented in this article might be used for modeling in future. But this is true for a wide range of articles that have themself nothing to do with economic modeling. Also the word ‘useful’ seems not to be appropriate to me, as the authors do not provide evidence that the presented results are really useful. This would require, to my point of view, incorporating the results into an economic model. However, doing so would be out of scope of this article. For this reason, I would recommend to choose a title that is closer to the study objective.

Similar, I would not mention ‘economic modeling’ within the conclusion. The conclusion should be drawn from the study results. It is correct, that the results might be used for modeling purposes, and it might be helpful to discuss this aspect in the discussion. However, a detailed discussion is missing.

Focus on Australia

The article seems to be very specific for Australia. The data is Australian, a main outcome is Australian hospital costs, and the population studied is an Australian indigenous population, which complicate transferability. Furthermore, most references refer to Australia. However, neither the title nor the abstract (i.e., within the objective) explicitly state this Australian focus clearly enough.
If the focus should remain an Australian, I suggest making this clearer (title and abstract). Taking a wider focus, however, seems to be difficult for given data. Independently from whether the focus should remain an Australian or not, I would expect a more detailed discussion, in how far the data are also valid for other countries/regions.

Study objective

The article appears not to have ONE clearly defined study objective. Instead the implied objective seems to alter within the manuscript. I strongly recommend choosing one single study objective to sharpen the manuscript.

The title implies the study objective would be to design an ‘instrument for severity adjustment in economic modeling’. The background of the abstract implies the objective to be ‘to derive a diabetes severity score for hospital cost and mortality prediction’. The background section of the manuscript states the ‘primary’ aim as ‘to evaluate the impact of primary health care resourcing on hospital use and mortality in a high risk population of Australian Indigenous adults with type 2 diabetes’. Another objective is ‘to make appropriate adjustments for diabetes clinical severity, in the absence of a reliable estimate of diabetes duration’ or ‘revising a classification system’.

I do understand, that these ‘objectives’ are overlapping, and somehow relate to each other. However, what I miss is ONE CLEAR OBJECTIVE. Details of what is done to address this objective can be moved from the background to the methods section (i.e., revising a classification system etc.)

Comparing the staging instruments

Results with respect to the ‘new vascular staging instrument’ are reported. However, information comparing the new instrument to the ‘old’ instrument is missing. It would be interesting for the reader to know, how much accuracy gets lost by applying the simpler version. If this comparison is not possible, the reasons for why it is not possible should be discussed explicitly.

Furthermore, the authors state within the discussion the ‘simplified instrument’ to be ‘more appropriate’ for the study population. Please discuss, why you think it is more appropriate.

Minor Essential Revisions

The authors mention ‘microvascular’ and ‘macrovascular’ disease stages. I would recommend explicitly stating the meaning of ‘microvascular’ and ‘macrovascular’ disease stages.

In the end of the results section the authors describe Figure 3. However, Figure 3 is not cited within the text. Please add this citation. Also Table 2 seemingly has not been quoted within the text. Please quote Table 2. Furthermore, in Table 2 it would be of interest to know the minimum and the maximum of the age, and to
know the minimum, maximum and standard deviation for the body mass index.

With respect to cost estimates, several standard errors (SE) should be reported in the results part. Within the corresponding Figure 2 confidence intervals should furthermore be displayed. These could be derived via bootstrapping.

In Figure 3 Stage 1 should be added. Furthermore the word ‘diseased’ in the headline should be replaced by ‘deceased’.

In the discussion section, the word ‘correlation’ has not been correctly used within a statistical sense (i.e., no correlation coefficient has been calculated). Instead, the authors could use the word ‘association’.

Background section: Change ‘Our primary study aims to evaluate’ to ‘Our primary study aim is to evaluate’

Citations in the discussion section: The formatting style has not been appropriately applied (Harris et al. (1992) vs. ‘[13]’)

Discretionary Revisions

Background: I would recommend inserting citations after the sentence ‘These complications are a great burden to patients and society, incur high health service use and contribute excessively to the cost of health care’.

Results: Some information is reported twice, once via figures and tables, and once via the text. Maybe the authors find a way, how the figures and tables can be described, without repeating all the information.

Discussion: After the sentence ‘Two existing diabetes severity indexes (...)’ I would prefer to have the corresponding citations inserted (however, the citations are given later on).

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: Yes, and I have assessed the statistics in my report.

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