Reviewer's report

Title: Impact of population ageing on the costs of hospitalisations for cardiovascular disease: A population-based data linkage study

Version: 2 Date: 24 July 2014

Reviewer: Nicholas Mitsakakis

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In this study the authors attempt to describe and estimate the effect of ageing in population of Western Australia to CVD related hospitalization expenditures. They use linked hospital data between two time points (1993/1994 and 2003/2004) and a quantitative method called “component decomposition method” to estimate the effect.

Although the research question of the article is of high importance and interest, there are serious methodological insufficiencies in the manuscript that need to be addressed before the manuscript is ready for publication. The involvement of a professional statistician in addressing these comments is required.

More details are provided below:

Major Compulsory Revisions

“Component decomposition method” is not a well-known and commonly used statistical or epidemiological method and therefore it needs to be clearly explained in the manuscript (despite the fact that a version of this method was used in the cited manuscripts).

“Average cost weight”: line 112. It is unclear what “weight” means in this context.

Lines 125-127: Is the average cost per episode the same for each diagnosis? I would not think so, in which case the description should be instead something along the lines of “total cost by sex, age group and diagnosis”.

Line 131 “using the age specific cost profile method”: it is not clear with this “method” is. It needs to be explained clearly.

Statistical analysis: While this section is describing a number of quantities and variables that play role in the analysis, it uses a narrative style that makes it hard for the reader to follow. A proper statistical notation of the variables and quantities described in the Statistical Analysis section needs to be used for the description of those quantities and how they are defined and calculated.

The formula for the total CVD hospitalization costs uses the variables of group populations, number of episodes per capita and cost per episode, for each group j. However the analysis method uses different quantities such as the Total population and the total number of hospitalizations. A more appropriate version
of the cost formula needs to contain those two variables in the expression, so that it is clear how changes of each one of those affect the result. This comment also concerns the equations and formulas used in the Appendix 1.

Other comments regarding the decompose component analysis described in Appendix 1:

The method implies that the actual change in total cost can be decomposed into a number of “changes” where some quantities change and some remain unchanged. Some explanation is needed as to why the sum of those individual changes is equal to the total cost actual change.

More importantly, it is not obvious how each one of those changes can be interpreted and whether the change in total cost attributable to the change of age structure or distribution assumes that both the total population and the number of hospitalizations have the 2003/2004 values while the cost per episode has the 1993/1994 values. This assumption, while fundamental for the calculations, is not described in the main text. It is not clear if this assumption is consistent with the interpretation of the attribution of the effect of aging to hospitalization costs. I believe that this needs to be clearly discussed in the main part of the paper.

Additionally, the subscript notations used for the equations in the Appendix are confusing. Clearer notation is needed.

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