Reviewer's report

Title: Direct risk standardisation: a new method for comparing casemix adjusted event rates using complex models

Version: 2 Date: 4 July 2013

Reviewer: Patricia Kipnis

Reviewer's report:

Each comment is preceded by a letter to qualify the comment/question as follows:

D: Discretionary
E: Essential
C: Compulsory

• Please add page numbers

1. Is the question posed by the authors well defined?
   • Yes, it is well defined.

2. Are the methods appropriate and well described?

   • (D) It might be easier for the reader if you changed the title of the “Proposed Solution” section to “Methods”

   • (E) In the section: “Calculating directly standardized rates” it is not clear how the categories are defined in practice. Are the categories with equal numbers of observed events chosen based on the overall population and then used for each center? How does this guarantee that there will not be missing categories for a center and thus still find the same problem described for the direct standardization method?

   • (E) The choice of number of categories seems arbitrary. It would be helpful to see a sensitivity analysis showing how the number of categories impacts the results. This is a limitation of the method and should be stated.

   • (C) Are they proposing to use the CMF or the DRS? Why would one be better than the other? The CMF is only mentioned in passing at the end of the methods section but shown in all the results.

   • (C) Clarify the definition of the weights in the Appendix. It is mentioned in the methods section in parenthesis but there is no definition of these in the Appendix.

   • (D) Define case mix – seems that the authors assume case mix is always discrete. Is that the case?
3. Are the data sound? (Results section)
   - The data shown are useful to illustrate the method and to show a comparison in real data
   - (C) What is the purpose of Figure 1? What is it showing? What does it mean to adjust the weights for zeros?
   - (C) Misspelled discrepancy in second paragraph of results section
   - (C) While examples are useful; they don’t establish the superiority of one method over the other. They authors might want to consider adding some simulation data to compare the performance of the methods in a controlled setting where truth is known.
   - (C) The authors state that there is considerable discrepancy between conventional direct standardization and CMF. What does considerable mean? The correlation between the two measures is still quite high. It would be useful to know the impact of using one method vs., the other when one is classifying hospitals as high or low mortality when comparing performance. Simulations can be used to study this question.

4. Does the manuscript adhere to the relevant standards for reporting and data deposition?
   - (C) The Figures are poorly labeled. Should specify the data set used for each figure.

5. Are the discussion and conclusions well balanced and adequately supported by the data?
   - (E) The authors argue that, compared to the SMR, the DRS(CMF) method can be used to compare population centers fairly. However, they also argue that the CMF and SMR are highly correlated. Why use the CMF then if it is similar to SMR? Is the argument that the non-comparability of the SMR is actually not as much of a problem?

6. Are limitations of the work clearly stated?
   - (C) No limitations section.

7. Do the authors clearly acknowledge any work upon which they are building, both published and unpublished?
   - (C) The introduction lacks the rigor of a scientific paper with little literature review and no description of the contribution or importance of this research relative to the existing literature on the topic.

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

9. Is the writing acceptable?
   - The writing is acceptable.
- Is casemix one word?

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

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

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

**Declaration of competing interests:**

I declare that I have no competing interests