Reviewer’s report

Title: The Predictability of Claim-Data-Based Comorbidity-Adjusted Models Could Be Improved by Using Medication Data

Version: 4 Date: 10 December 2012

Reviewer: James Bailey

Reviewer’s report:

This paper is extremely thorough, well thought out, and provides extensive important information regarding the performance of commonly used comorbidity assessment tools.

Major Compulsory Revisions

1. English grammar is poor in several places. The entire paper needs careful editing for clarity.

2. Methods -the procedure for selecting "subjects" is unclear. Why and how were malignant diseases excluded? Why and how did the authors limit the analysis to admissions with "the twelve most responsible diagnoses that caused high numbers of in-hospital deaths"? The inclusion criteria must be clearly spelled out and strong reasons given for excluding subject-visits at each of these levels. These selection criteria could introduce bias. Why not include those with all diagnoses? When the authors speak of "the twelve most responsible diagnoses are they using principal diagnosis? This must be made clear.

3. Subjects continued -"subject-visits" are the unit of analysis are they not, not "subjects"? There is no mention of eliminating duplicate subjects since presumably subjects could have more than one visit.

4. Define "most responsible diagnoses (MRDx)" more clearly? Reference literature if this term has been clearly defined there. Are these principal discharge diagnoses?

5. Why did you include pediatric subjects? To my knowledge, the Charlson and Elixhauser indices were largely developed and have almost exclusively been tested in adults. Limit your analysis to adults or provide strong rationale for including pediatric subjects.

6. Exclusion of "most responsible diagnoses that have a wide range of clinical spectrums (ex. sepsis, respiratory failure, intoxications, other lower respiratory diseases, cardiac arrest, ventricular fibrillation)" is hard to understand. To my knowledge other studies assessing the Charlson and Elixhauser indices did not make such exclusions. This is likely to change the performance of the indices and makes it difficult to compare your findings with previous studies and also to trust that performance really was improved with the addition of medication information. If this approach is taken stronger justification is needed.
Minor Essential Revisions

1. The supplementary tables are helpful but the lettering is not clear. Please provide clear copy.
2. Most literature refers to "claims data" or "administrative data" instead of "claim data". I recommend changing to "claims data" throughout.
3. MRDx Groupings - the purposes for grouping "MRDx according to the classifications established by the US Agency for Healthcare Research and Quality" and dividing "acute cerebrovascular diseases into intracranial hemorrhage and ischemic infarct because these two categories are quite different in pathophysiology and therapeutic approach [30]" are not entirely clear. Why was this method used? What was gained?
4. Footnote at bottom of Table 1 has some mistakes
5. Typos in footnote of Table 2

Discretionary Revisions

1. Strongly consider eliminating the duplicative "Framework of the Study" section. It is duplicative and raises questions that should be addressed at that point in the methods.
2. Exclusion of cancer patients concerns me because other studies looking at Charlson and Elixhauser have not done this. Are a high percentage of cancer patients in Korea admitted for cancer admitted for palliative care. Please address this concern in your methods or limitations.
3. Results - it is interesting that intracranial hemorrhage was the most common MRDx. This is not such a major cause of death in the UK and US. Is this the most common cause of mortality in Korean hospitals in general? What is the cause? Is it related to trauma? My memory is that some comorbidity indices exclude trauma. Did you do this?
4. Medication selection for inclusion in models - A very specific approach was taken whereby only very selected drugs were included. This process needs a little more justification.
5. I was confused a little by the focus solely on the individual Charlson and Elixhauser comorbidities rather than the summary indices. I believe that the authors focused on individual comorbidities because of their a priori focus on the 12 MRDx conditions in Korea - Is the overall purpose of the paper to see how well the individual comorbidity scores predict mortality from that specific comorbidity? I think this is what you are trying to do but the presentation was not completely clear on this. The Charlson comorbidities and the Elixhauser ones are most commonly used together as an overall comorbidity adjustment in studies looking at particular associations with mortality. Your purpose appears to be different and somehow you need to describe from the beginning of your paper that you are focused solely on the predictability of the individual comorbidities, what the applications of these individual comorbidity scores are, and why improving the individual comorbidity score predictability is important. This will
make your paper much clearer.

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

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

**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