Reviewer’s report

Title: Risk of Falling among Hospitalized Patients with High Modified Morse Scores Could be Further Stratified. A Retrospective Cohort Analysis.

Version: 1 Date: 30 Sep 2016

Reviewer: Jeremy Crenshaw

Reviewer's report:

The purpose of this study was to "identify patients' characteristics that could further stratify the risk of falls among hospitalized patients with MMFS." The strengths of this paper are that it addresses a significant clinical problem and takes a comprehensive approach to fall-risk assessments. The weaknesses of the paper include use of the highly-criticized modified Morse Scale, limited use of the literature to justify the work and compare it to previous results, as well as concerns and limitations as to the research design and analysis. The following comments and questions were made with the intention of improving the manuscript.

General Comments

The primary measure used in this study is a Modified Morse Scale. As stated by Dr. Morse herself (2006, Ref #5), there are numerous concerns as to the validity of a modified version. Furthermore, it is not clear if the modified version in the present study is that proposed by McFarlane (2004) or a custom version specific the Sheba Medical Center. McFarlane presented a model (Table 5 in her paper) that added "Major tranquilizer" and "Male gender" to the Morse Score. I do not see how McFarlane's model or the much simpler, original Morse Scale relate to the scale presented in Table 1. It needs to be clearly stated how the Morse Scale was modified, and the limitations of doing so need to be addressed.

A research hypothesis should be provided.

Previous studies have not been used to justify why improvement of the Morse Scale (or modified version) is needed. There are numerous reviews that detail the predictive ability of the Morse Scale in identifying fallers. It is implied in the third paragraph of page 3 that the modified scale has poor sensitivity, but no evidence of this has been provided.

It's not clear why only "at risk" patients were included in this study. If the long-term goal of this work is to develop an assessment tool that identifies fallers, why not also include those patients who were not identified as "at risk" by the Morse Scale? By limiting the cohort to "at-risk" patients, you are not truly representing the patient population intended for future applications.
Detailed Comments

The method by which falls were reported should be described.

Were reviewers of the medical charts blinded as to whether a person was a faller or non-faller?

It appears as if a single logistic regression equation was developed that selected a few independent variables (Table 3) from a long list of risk factors (Table 2). What were the selection criteria and methods (e.g. enter, forward selection, backward elimination, etc…) for including variables in the model? Also, what was the resulting regression equation (beta values and s.e.)?

Between the comparisons of Table 2 and the apparent stepwise regression method, there are numerous statistical tests. Please consider a more conservative alpha level.

Page 6, Line 35: It's stated that Morse Fall Scale scores "predict fairly well". However, an AUC of 0.6 is not typically described that positively.

The AUC of the Morse Scale is provided, but the AUC of the new model (Table 3) is not provided. Isn't the purpose of the paper to develop and evaluate a new model? Given that sensitivity and specificity seem to be of concern, it would be beneficial to determine the ideal cutoff score in the new model and its associated sensitivity and specificity.

Although limitations are listed on page 8, more detail needs to be provided as to why a single-center study and a retrospective design are threats to the validity of these results.

It is likely that your final model overestimates your regression coefficients due to a low number of fall events per independent variable. See: Steyerberg, Ewout W., Marinus JC Eijkemans, and J. Dik F. Habema. "Stepwise selection in small data sets: a simulation study of bias in logistic regression analysis." Journal of clinical epidemiology 52.10 (1999): 935-942.

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

No

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

No

**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.

No
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If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

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