Reviewer’s report

Title: Predicting 7-day, 30-day and 60-day all-cause unplanned readmission: A case study of a Sydney hospital

Version: 0 Date: 30 Jun 2017

Reviewer: Hadi Kharrazi

Reviewer's report:

Thanks for submitting your article to BMC MIDM. The manuscript focuses on predicting 7, 30, and 60 day all-cause unplanned hospital readmissions in Australia. I was pleased reading your manuscript. The manuscript is well written, conforms to most items recommended by the TRIPOD statement, presents a novel methodology and provides some interesting results by comparing the variables contributing to the different readmissions (7, 30 and 60 days); however, there are some comments to be addressed:

* Title: following TRIPOD recommendations, the title could be more specific (i.e. "Developing and validating a predictive model for 7-day, 30-day and 60-day all-cause unplanned readmission to Australian hospitals")

* Line 63: "where" instead of "were"

* Line 68: "It indicates that shorter-term..." - please clarify "it" with the "different predictors of 7-day versus 30 and 60-days"

* Line 65: "associated with" instead of "associated to"

* Line 108-111: What was the method for finding the past evidence? Literature review, systematic review, or expert feedback?

* Line 116-120: requires a citation

* Line 169: It is not clear how the list of 88 variables was determined? It doesn't look like that a univariate analysis with the variables (which is part of TRIPOD recommendations) has been performed - please describe the reason.

* Line 189: "Pre-processing" describe how lab value thresholds are determined? Only expert opinion? If yes, explain why didn't you use a regression tree to determine the most efficient thresholds?

* Line 189 + Appendix: Not clear which laboratory results were used (i.e. first ordered tests upon admission, last ordered tests before discharge, any abnormal result over admission)
* Line 193: The project uses a derivation set and a validation set; however, does not use a revalidation set (external to their underlying data)… please mention this and potential generalizability issues in the limitation of the manuscript.

* Line 199-205: should not repeat in the appendix anymore

* Line 199/320: stylistic, but inconsistent capitalization/italicizing of gradient tree boosting

* Line 217: t-test was used to compare distribution of the selected features - please cite a paper explaining why t-test is the best method to do this

* Line 268: "good predictor" - please provide numerical value

* Line 275: "two socio-economic" … please mention them


* Line 427: "Availability of data" - please explain if other researchers/analysts can access the data (and if not, why [e.g., protected health information])

* Line 491: Kansagara's review is outdated. Please double check and add/cite the new systematic review: https://www.ncbi.nlm.nih.gov/pubmed/27354072

* Line 326-329: "Outcome variables are very unequally represented" - the paragraph doesn't relate to the previous paragraph

* Line 338: explain "Medicare-Holder" public patients in the Australian context?

* Line 351: explain the "weekend effect"

* Table 1.2 - this table can be moved to appendix?

* Table 2: why "normal last lipase" has a positive effect?

* Table 2: "Overseas visitor" and "Referred by other practitioner" have a negative effect - please explain (could be simply because the data had an incomplete set of measures such as not showing the readmissions?)

* Table S6: indicate issues with using the higher scores given the low number of admissions (less than 10) in those ranges

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

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

Yes

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

Yes

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

Quality of written English
Please indicate the quality of language in the manuscript:

Needs some language corrections before being published

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