Reviewer’s report

Title: A retrospective analysis of determinants of involuntary psychiatric in-patient treatment

Version: 1 Date: 18 Jan 2019

Reviewer: Research Square

Reviewer’s report:

"STATISTICAL REVIEWER ASSESSMENT:

Is the study design appropriate for the research question (considering whether the analyzed population accurately reflects the design and whether you see any problems with control/comparison groups, e.g., likely confounders)?

No - there are minor issues

Are methodologies adequate and well implemented (considering whether assumptions are addressed and whether analyses are robust)?

No - there are major issues

Are the analyses adequately communicated (considering whether reporting details are adequate and whether figures and tables are well labeled and described)?

No - there are major issues

Does the interpretation accurately reflect the analyses without overstatement (considering whether limitations/bias are acknowledged and whether accurate descriptors, e.g., 'significant', are used)?

No - there are major issues

Could an appropriately REVISED version of this work represent a statistically sound contribution?

Maybe - with major revisions

STATISTICAL REVIEWER COMMENTS:
The article has several positive elements. It provides new and enlightening evidence to a well-established debate that could help understand the factors involved in involuntary psychiatric inpatient treatment. The manuscript is interesting. CHAID is a good choice for the analysis of categorical variables and their interactions. Yet I find major problems with some aspects and cannot recommend publication at this point. CHAID analyzes data and looks for rules and structures that are common in a target class. Rule-based classifiers such as CHAID identify rules (rather than subgroups of patients) that can become the basis for decision making. However, I am not sure that CHAID is the best choice to identify "specific patient groups at a high risk of involuntary psychiatric in-patient treatment." Cluster analysis and latent class analysis can better discover subgroups.

REQUESTED REVISIONS:

I believe that the aim of the model should be revised. The development of a comprehensive risk model is an objective has not yet been achieved and perhaps cannot be achieved. First, in the Discussion section, the interpretation of the results is focused on each factor rather on the development of a comprehensive risk model. Second, for the development of a comprehensive risk model, more variables (e.g., social support) are needed. I believe that clinical and administrative data from existing medical records are not appropriate for the development of a comprehensive risk model.

The level of significance was set at \( p \leq 0.01 \). This was lower than the conventional level of significance. Please provide solid justifications for this choice.

Please provide information on the computer program used for CHAID.

Please report the employed stopping rules (i.e., the criteria for when a node stops splitting and is defined as a leaf).

It was acknowledged that the number of missing values was considerable for some variables. However, it is not clear which of the several methods to handle missing values was used. There are some approaches that can handle missing data (e.g., multiple imputation). Moreover, there are some modeling techniques that handle missing data better than CHAID (e.g., C5.0). More information on handling missing values in data mining can be found in the book of Han et al. (2012).

I am suggesting using Exhaustive CHAID which is a modification of CHAID that can better examine all possible splits (although it takes longer to compute).

Please also provide information on accuracy of the training set and testing set and the Gini. Also, please provide the area under the curve (a goodness of fit measure for the classifier) of the training set and testing set. These data can reveal if the classification is precise with no overfitting. To improve stability and accuracy of the model, please consider using ensemble models (e.g. boosting or bagging).
I am suggesting dividing the dataset into training data (70%) and a test dataset (30 %).

The Strengths and limitations subsection is mainly about the strengths of the study. Many of the limitation of the study are not mentioned. For instance, the design of the study (retrospective analysis) does not allow making causal interpretations and unobserved third variables may account for the observed relations. Please also discuss the generalizability of the findings. Would we have achieved the same results had we used a different region in Germany or in other countries? The paper appears to answer this in the affirmative as not much thought is given to this in the discussion.

It is difficult for me to read Figure 2.

For more information on data mining, see the following books:


Tilo Wendler & Sören Gröttrup, Data Mining with SPSS Modeler, Springer International Publishing AG Switzerland."

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

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:

Acceptable

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