Reviewer's report

Title: A Comparative Analysis of Multi-Level Computer-Assisted Decision Making Systems for Traumatic Brain Injuries

Version: 1 Date: 15 February 2008

Reviewer: Enzo Grossi

Reviewer's report:

Check list

1. Is the question posed by the authors well defined? yes
2. Are the methods appropriate and well described? yes
3. Are the data sound? yes
4. Does the manuscript adhere to the relevant standards for reporting and data deposition? yes
5. Are the discussion and conclusions well balanced and adequately supported by the data? See comments below
6. Are limitations of the work clearly stated? See comments below
7. Do the authors clearly acknowledge any work upon which they are building, both published and unpublished? yes
8. Do the title and abstract accurately convey what has been found? yes
9. Is the writing acceptable? yes

- Major Compulsory Revisions (which the author must respond to before a decision on publication can be reached): none

- Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

One methodological criticism is that the authors have employed logistic regression to select significant variables to improve the performance of five machine learning methods.

This introduces a potential bias since a "quasi linear" method like logistic regression is establishing the best variables subset to be used by non linear methods, like machine learning ones.

Even if is true that, as authors say, logistic regression does not assume linearity of relationship between the independent variables and the dependent, it does, however, require that the independent variables be linearly related to the logit of the dependent. It is important to remind that Logistic regression is one of a class of models known as generalized linear models and the logistic regression equation is a linear equation.
I think that this concept should be cited as potential limitation of the study.

- Discretionary Revisions (which are recommendations for improvement but which the author can choose to ignore)

It would have been interesting to know how the trauma experts reacted to the "counterintuitive rules" described in point 8 of discussion. Is the clinical reasoning already prepared to accept non linearity inherent to biological phenomena?

Another point which the authors could consider is to add a research agenda after this study, for example concerning the feasibility of implementation of a software with trained algorithms for real world application.

**What next?:** Accept after minor essential revisions

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

**Quality of written English:** Acceptable

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

**Declaration of competing interests:**

'I declare that I have no competing interests'