Reviewer’s report

Title: Delirium detection in older acute medical inpatients: a multicentre prospective comparative diagnostic test accuracy study of the 4AT and the Confusion Assessment Method

Version: 0 Date: 09 Apr 2019

Reviewer: Rameela Chandrasekhar

Reviewer's report:

This is a prospective diagnostic test accuracy study set in Emergency Departments or acute medical wards involving 843 acute medical patients aged >=70. The goals of this study are to assess the accuracy of the 4AT for delirium detection and to compare the 4AT with the Confusion Assessment Method (CAM), another commonly-used delirium assessment tool. Patients first underwent reference standard delirium assessment based on DSM-IV criteria and then were randomized to either the 4AT (score range 0-12/ prespecified score of >3 considered positive) or the CAM (positive/negative). My comments are below.

1) The authors state that their primary goal is to assess the accuracy of the 4AT for delirium detection. In diagnostic test studies such as these, accuracy is defined as the calculate the proportion of true positive and true negative in all evaluated cases. Mathematically, this can be stated as: Accuracy=(TP+TN)/(TP+TN+FP+FN). It does not seem like this has been provided as results.

2) It is unclear what Odds Ratio and Difference in Proportions are used for in Table 2. Both seem to be quantities not relevant to the hypothesis and lead to more confusion.

3) Table 1: The baseline demographic and clinical characteristics are stratified by reference standard 1 delirium status. Since the patients are being randomized to the CAM and 4AT which are the two tools being compared, a table should be provided stratifying these characteristics by randomization arm.
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:
Acceptable

Declaration of competing interests
Please complete a declaration of competing interests, considering the following questions:

1. Have you in the past five years received reimbursements, fees, funding, or salary from an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

2. Do you hold any stocks or shares in an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

3. Do you hold or are you currently applying for any patents relating to the content of the manuscript?

4. Have you received reimbursements, fees, funding, or salary from an organization that holds or has applied for patents relating to the content of the manuscript?

5. Do you have any other financial competing interests?

6. Do you have any non-financial competing interests in relation to this paper?
If you can answer no to all of the above, write 'I declare that I have no competing interests' below. If your reply is yes to any, please give details below.

I declare that I have no competing interests

**Statement on potential review bias**

Please complete a statement on potential review bias, considering the following questions:

1. Did you co-author any publication with an author of this manuscript in the last 5 years?

2. Are you currently or recently affiliated at the same institution as an author of this manuscript?

If you can answer no to all of the above, write 'I declare that I did not publish with these authors in the last 5 years and also meet the affiliation criteria'. If your reply is yes to any, please give details below.

I declare that I did not publish with these authors in the last 5 years and also meet the affiliation criteria

I agree to the open peer review policy of the journal. I understand that my name will be included on my report to the authors and, if the manuscript is accepted for publication, my named report including any attachments I upload will be posted on the website along with the authors' responses. I agree for my report to be made available under an Open Access Creative Commons CC-BY license ([http://creativecommons.org/licenses/by/4.0/](http://creativecommons.org/licenses/by/4.0/)). I understand that any comments which I do not wish to be included in my named report can be included as confidential comments to the editors, which will not be published.

I agree to the open peer review policy of the journal