Reviewer's report

Title: Recognition of delirium in ICU patients: A diagnostic study of the NEECHAM confusion scale in ICU patients

Version: 1 Date: 22 June 2005

Reviewer: Koen Milisen

Reviewer's report:

General

The results of this manuscript give new evidence about the NEECHAM Confusion Scale holding promise as a valuable screening instrument for delirium in ICU nursing practice. Furthermore, and as far as I know, data about the user-friendliness of this instrument has never been reported before. However, the manuscript needs further elaboration before it can be accepted for publication. Also, the written English needs some editing.

Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)

Background section
- Since you mention the DSM-IV criteria in the introduction I would use the concept of delirium throughout the text instead of acute confusional state. Now, you are using both terms and this adds to the misconception of the syndrome.
- Second paragraph, last sentence: it is not clear what is meant with the last part of the sentence "Moreover, with the elderly patient in particular, it is regarded as dementia or another mental illness, and hospitals do not systematically screen for it".
- There is overlap between the last sentence of the third paragraph and the first sentence of the fourth paragraph. Please rewrite the transition between both paragraphs.
- Fourth paragraph: it is not clear what is meant with "... NEECHAM confusion scale, gives positive results when used in the general hospital population" and "A small pilot study in 19 ICU patients showed positive results". What do you mean with "positive results"?

Methods section, design and sample
- Second paragraph, first sentence: what do you mean with "... able to submit a case history"?

Methods section, procedures
- I think it is better to speak about 253 observations that were made instead of scales that were rated. Please do so throughout the text. Furthermore, were these ratings independent? If not; state it and discuss this issue in the discussion part.
- Last paragraph: do you mean At the end of the study in stead of After collecting the data in the unit?

Methods section about The NEECHAM Confusion scale
- Last sentence: what are the cut-off scores for the 4 grades of acute confusional state/delirium?

Analysis section
- Is the Pearsons inter-item coefficient the same analytic method as the Pearson product-moment coefficient used in the results section about reliability?
- It is not clear how concurrent validity ratings were performed. Were the total NEECHAM scores (measurement on ratio level) correlated with the geriatricians diagnosis (measurement on nominal/ordinal level). If so, is it really necessary to use all 5 tests methods? It is not clear for instance why a chi-square was used here.
- It is not clear what is meant with: user-friendliness was determined by the average score per question a cut-off point of 3.75. How to interpret this? To my opinion its better to give a frequency table for ordinal data in stead of mean values and cut-off scores.

Results section, reliability
- to my opinion, vital function/oxygen saturation correlated weekly to not at all in stead of less to not at all. Also No correlation to a low correlation in stead of A low correlation between vital, oxygen and other items.

Results section, validity
- Comparing and interpreting the results of the PCA analysis with the original subscales of the NEECHAM scale in this section of the paper is uncommon. Its better to discuss this in the discussion part of the manuscript. Furthermore, this info is redundant as it was already stated in the methods section about The NEECHAM Confusion scale. Therefore, delete the following sentence: This is in contrast with the three subscales (Subscale 1: Item 1, attention; Item 2, processing of commands; Item 3, orientation; Subscale 2: Item 4, appearance; Item 5, motor: Item 6, verbal; and Subscale 3: Item 7, vital function; Item 8, oxygen saturation; Item 9, urine continence) described by Neelon et al. [14].
- Furthermore, the last sentence of this first paragraph (The attention, processing commands, orientation, appearance, motor and verbal items load from fairly high (0.762) to high (0.949) on the first component. Vital function, oxygen saturation and urine continence score fairly high (0.71 0.74) on the second component.) tells the same as a few sentences before (Component 1 contains the items attention, processing of commands, orientation, appearance, motor and verbal. Component 2 contains the last three items: vital function, oxygen saturation and urine continence.)

Results section, User-friendliness
- second sentence: what do you mean with the application of the scale?
- third sentence: a few questions ; which questions do you mean? And what does the score of 3.75 mean? RE my comments about the analysis section: its better to give a frequency table for ordinal data in stead of mean values and cut-off scores.
- the precision of the scale was assessed as good. What are the scores for the 3 items mentioned between brackets?
- Content validity, measured by language used, was rated good. But was de score on this item?

Discussion section
- first paragraph: You mention that the physiological functions correlate with the total item coefficient of correlation. I think you mean that they do not correlate with the total item coefficient of correlation?
- A few sentences further, you mention that these items could be removed It is not clear which items you mean.
- the user-friendliness was generally rated as good. Do you mean in non-intubated ICU patients? Please give more details about how the scale should be adapted for use with intubated ICU patients?
- You conclude that the NEECHAM has good psychometric properties with ICU patients who are not intubated. On which results is this conclusion based? So did you make comparative analyses for psychometric properties RE intubated versus not intubated ICU patients?
- this study might indeed indicate that the scale could be shortened. However I think this should be done in further research and cannot be concluded on the results of the current study alone.
Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

Background section
- first sentence: the incidence/prevalence rates on ICU may be higher than mentioned in the text. E.g. Ely et al., JAMA 2004 mention that 81.7% of mechanically ventilated patients develop delirium at some point during the ICU stay.
- aim of the study: Perhaps it's better to state the specific psychometric aspects tested in the study, in stead of using general terms such as reliability and validity.

Methods section, design and sample
- first paragraph: to my opinion, it's redundant to state here that "Data regarding validity and reliability of the scale were collected from observing patients" and "Data regarding the user-friendliness of the scale were collected from nurses experiences with the scale." The reader will know this from the procedures section.
- second paragraph, second sentence. to my opinion, it's redundant to state here that "Patients who did not satisfy these criteria or were not able to sign the informed-consent form (too seriously ill, unconscious, foreign language) were excluded." This is clear from the former sentence.
- what was the SD of the average stay in ICU?

Methods section, procedures
- the full name of DSM is Diagnostic and statistical manual of mental disorders in stead of Diagnostic and statistical manual.
- Is the concept of diagnostic value used in this section the same as the concept of diagnostic precision in the analysis section? Perhaps its better to consistently use the same concepts.

Methods section about The NEECHAM Confusion scale
- The word behaviour is missing at the end of the sentence Subscale 2 (behaviour), contains the next three items: appearance, motor and verbal ???

Results section, reliability
- To my opinion, table 3 is redundant. If not, then please make clear which of the two raters is the reserachers observation?

Results section, User-friendliness
- last sentence about nurses asking to print the NEECHAM on an A4 page is a less relevant result to state with regard to the overall objectives of the manuscript.

Discussion section
- You state that the sensitivity is just as high as in other studies. Which studies do you mean?
- you state twice the same with the sentences The advantage of the NEECHAM confusion scale is low respondent and rater burden. and The NEECHAM confusion scale offers an opportunity to screen behaviour with little stress on either the seriously ill ICU patients or the busy ICU nurses.

The titles of most of the tables should be stated more precisely

Table 1
Layout of the headings!

Table 4
You should mention the golden standard

Check the spelling of the names of the authors in your references. For instance McNiccoll should be McNicoll and Abrahams should be Abraham
Discretionary Revisions (which the author can choose to ignore)

Discussion section
- The result of 2 components after PCA was not only found in the current study and Neelons study but also in the study of Milisen et al BMC Psychiatry 2005.

**What next?:** Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

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

**Quality of written English:** Needs some language corrections before being published

**Statistical review:** No

**Declaration of competing interests:**
I declare that I have no competing interests