Tools to detect delirium superimposed on dementia: a systematic review

CRD summary
This review concluded that the evidence on tools for detection of delirium superimposed on dementia was limited, but it supported the Confusion Assessment Method, its adaptation for the intensive care unit, and electroencephalography. Given the paucity of the evidence, the authors' conclusions and recommendations for further research seem reasonable.

Authors' objectives
To assess validated tools to diagnose delirium superimposed on dementia.

Searching
PubMed, EMBASE, and Web of Science were searched for studies published in English, between 1960 and January 2012; search terms were reported. Reference lists were scanned for studies published only as abstracts.

Study selection
Randomised controlled trials (RCTs) and longitudinal or cross-sectional observational studies, that validated tools to identify delirium, using the Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV or DSM-III criteria as the reference standard, in adults (18 years or older) with dementia or severe dementia (definitions given), were eligible for inclusion. Studies that assessed solely alcohol-related delirium were excluded.

Across the included studies, participant age ranged from 34 to 84 years. Testing occurred primarily in in-patient geriatric and medical units, stroke units, or intensive care units. Most studies included only a subgroup of participants with dementia, and most were conducted in the USA. The prevalence of dementia ranged from 12% to 100%; the severity of dementia was not reported, but some studies excluded patients with severe dementia. Six tools were used to assess delirium, and the most common was a Confusion Assessment Method (CAM), which was adapted for use in an intensive care unit (ICU) in some studies. The raters for delirium were neurologists, geriatricians, geriatric psychiatrists, or experienced neuropsychologists.

Two reviewers independently selected studies for the review; disagreements were resolved by discussion.

Assessment of study quality
Study quality was assessed using the STARD (maximum 25 points) and the 14-point QUADAS. Outcome reporting bias was evaluated by comparing the methods section of each article, with its results. The authors did not state how many reviewers assessed study quality.

Data extraction
The data were extracted to construct 2x2 tables of test performance. Sensitivity, specificity, and positive and negative likelihood ratios were calculated. The authors did not state how many reviewers extracted the data.

Methods of synthesis
Studies were combined in a narrative synthesis; differences between studies were discussed in the text and the study details were tabulated.

Results of the review
Nine studies met the inclusion criteria (1,569 participants; range 35 to 791). Across the studies, 401 patients had dementia and 50 had delirium superimposed on dementia (range seven to 12). Of the nine studies, 89% scored at least 10 on QUADAS, and 67% scored at least 20 on the STARD.

Confusion Assessment Method: Two studies assessed the CAM. One reported a sensitivity of 94% (95% CI 68 to 100) to 100% (95% CI 54 to 100) and specificity from 90% (95% CI 54 to 100) to 95% (95% CI 73 to 100), for 56 elderly patients. The second study reported a sensitivity of 77%, specificity of 96 to 100%, and a positive likelihood ratio of
19.2, for 39 elderly patients. Neither study reported the results for patients with dementia separately.

**CAM for the ICU:** Three studies assessed the CAM for the ICU. Two (134 patients) reported a sensitivity of 100% (95% CI 63 to 100) and specificity of 100% (95% CI three to 100) for the diagnosis of delirium superimposed on dementia, for 23 patients. The third study reported a sensitivity of 76% and specificity of 98%, for 129 stroke patients; the results for those with dementia were not reported separately.

**Electroencephalography:** One study reported a sensitivity of 67% and a specificity of 91%, for 35 patients with dementia.

**Other tools:** The Short-Portable Mental Status Questionnaire had a sensitivity ranging from 7.3% to 98% and a specificity ranging from 82% to 100%, for 282 elderly people. The Cognitive Test for Delirium reported a sensitivity of 100% and specificity of 95%, for 103 intensive care patients. The Delirium Rating Scale reported a sensitivity of 94% and a specificity of 82%, for 791 elderly people. None of these studies reported the results for those with dementia separately.

**Authors' conclusions**
The evidence on tools for the detection of delirium superimposed on dementia was limited, but it supported the CAM, the CAM for the ICU, and electroencephalography.

**CRD commentary**
The authors addressed a clear research question, with reproducible inclusion criteria. Relevant sources were searched, but only published studies in English were included, so some relevant studies could have been missed. Study selection was conducted in duplicate, but it was unclear whether similar methods were used to reduce error and bias in data extraction and quality assessment. Appropriate criteria were used to assess study quality, but only a composite score was provided for each study, making it unclear to which bias each study was prone. The decision to combine the studies in a narrative synthesis seems to have been appropriate. Two of the major limitations of the evidence were that most studies did not report the results for the subgroup of patients of interest, separately, and where they did, the number of patients with the target condition was extremely small.

Given the paucity of the evidence, the authors' conclusions and recommendations for further research seem reasonable.

**Implications of the review for practice and research**

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that further studies of existing or refined tools with larger samples and more-detailed characterisation of dementia were required to address the identification of delirium superimposed on dementia. They stated that the performance of these tools at the different stages and with different types of dementia, should be assessed. Some other tests, such as objective assessments of attention and examination of the discriminatory value of level of consciousness, were reported to be promising areas for future study.

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