COCHRANE CORNER

Mini-Mental State Examination (MMSE) for the detection of Alzheimer's disease and other dementias in people with mild cognitive impairment (MCI)

Ingrid Arevalo-Rodriguez, Nadja Smailagic, Marta Roqué i Figuls, Agustín Ciapponi, Erick Sanchez-Perez, Antri Giannakou, Olga L. Pedraza, Xavier Bonfill Cosp & Sarah Cullum

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See commentary on pp. 363–366, this issue.

Background

Dementia is a progressive global cognitive impairment syndrome. In 2010, more than 35 million people worldwide were estimated to be living with dementia. Some people with mild cognitive impairment (MCI) will progress to dementia but others remain stable or recover full function. There is great interest in finding good predictors of dementia in people with MCI. The Mini-Mental State Examination (MMSE) is the best known and the most often used short screening tool for providing an overall measure of cognitive impairment in clinical, research and community settings.

Objectives

To determine the diagnostic accuracy of the MMSE at various thresholds for detecting individuals with baseline MCI who would clinically convert to dementia in general, Alzheimer's disease dementia or other forms of dementia at follow-up.

Search methods

We searched ALOIS (Cochrane Dementia and Cognitive Improvement Specialized Register of diagnostic and intervention studies (inception to May 2014); MEDLINE (OvidSP) (1946 to May 2014); EMBASE (OvidSP) (1980 to May 2014); BIOSIS (Web of Science) (inception to May 2014); Web of Science Core Collection, including the Conference Proceedings Citation Index (ISI Web of Science) (inception to May 2014); PsycINFO (OvidSP) (inception to May 2014), and LILACS (BIREME) (1982 to May 2014). We also searched specialised sources of diagnostic test accuracy studies and reviews, most recently in May 2014: MEDION (Universities of Maastricht and Leuven, www.mediondatabase.nl), DARE (Database of Abstracts of Reviews of Effects, via the Cochrane Library), HTA Database (Health Technology Assessment Database, via the Cochrane Library), and ARIF (University of Birmingham, UK, www.arif.bham.ac.uk). No language or date restrictions were applied to the electronic searches and methodological filters were not used as a method to restrict the search overall so as to maximise sensitivity. We also checked reference lists of relevant studies and reviews, tracked citations in Scopus and Science Citation Index, used searches of known relevant studies in PubMed to track related articles, and contacted research groups conducting work on MMSE for dementia diagnosis to try to locate possibly relevant but unpublished data.

Selection criteria

We considered longitudinal studies in which results of the MMSE administered to participants with MCI at baseline were obtained and the reference standard was obtained by follow-up over time. We included participants recruited and clinically classified as individuals with MCI under Petersen and revised Petersen criteria, Matthews criteria, or a Clinical Dementia Rating 0.5. We used acceptable and commonly used reference standards for dementia in general, Alzheimer's dementia, Lewy body dementia, vascular dementia and frontotemporal dementia.

Data collection and analysis

We screened all titles generated by the electronic database searches. Two review authors independently assessed the abstracts of all potentially relevant studies. We assessed the identified full papers for eligibility and extracted data to create two by two tables for dementia in general and other dementias. Two authors independently performed quality assessment using the QUADAS-2 tool. Owing to high heterogeneity and scarcity of data, we derived estimates of sensitivity at fixed values of specificity from the model we fitted to produce the summary receiver operating characteristic curve.

Main results

In this review, we included 11 heterogeneous studies with a total number of 1569 patients with MCI followed for conversion to dementia. Four studies assessed the role of baseline scores of the MMSE in conversion from MCI to all-cause dementia and eight studies assessed this test in conversion from MCI to Alzheimer's disease dementia. Only one study provided information about the MMSE and conversion from MCI to vascular dementia. For conversion from MCI to dementia in general, the accuracy of baseline MMSE scores ranged from sensitivities of 23% to 76% and specificities from 40% to 94%. In relationship to conversion from MCI to Alzheimer's disease dementia, the accuracy of baseline MMSE scores ranged from sensitivities of 27% to 89% and specificities from 32% to 90%. Only one study provided information about conversion from MCI to vascular dementia, presenting a sensitivity of 36% and a specificity of 80% with an incidence of vascular dementia of 6.2%. Although we had planned to explore possible sources of heterogeneity, this was not undertaken due to the scarcity of studies included in our analysis.

Authors' conclusions

Our review did not find evidence supporting a substantial role of MMSE as a stand-alone single-administration test in the identification of patients with MCI who could develop dementia. Clinicians could prefer to request additional and extensive tests to be sure about the management of these patients. An important aspect to assess in future updates is if conversion to dementia from MCI stages could be predicted better by MMSE changes over time instead of single measurements. It is also important to assess if a set of tests, rather than an isolated one, may be more successful in predicting conversion from MCI to dementia.

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