

The limited utility of the Mini-Mental State Examination in screening people over the age of 75 years for dementia in primary care

Nia White, Anne Scott, Robert T Woods, G Clare Wenger, John D Keady and Manikkarasa Devakumar

SUMMARY

The Mini-Mental State Examination (MMSE) is used worldwide to assess cognitive status and it has been recommended for use in primary care to detect dementia. In this study, the MMSE was administered during annual health checks for patients over 75 years of age in nine practices by a member of the primary care team. The mean age was 80 years. Of the 709 patients screened, 286 scored at or below the cut-off point, which was set at 26/30 on the MMSE, and they were invited to be assessed further by a researcher, using the well-validated GMS-AGECAT diagnostic system. Eighty-four of these patients refused, 173 were identified as not having dementia, and 29 (14%) were identified as having dementia. These results, with an 86% false-positive rate, raise concerns regarding the utility of the MMSE as a screening instrument for dementia in primary care.

Keywords: Mini-Mental State Examination; dementia; over-75 annual health check.

Introduction

THE Mini-Mental State Examination (MMSE) is a brief assessment of mental state that is widely used to assess cognitive function in relation to dementia.¹ Guidelines^{2,3} recommend the MMSE as a screening instrument for identifying cognitive impairment in older people in primary care that is suitable for inclusion in the assessment for patients over the age of 75 years.⁴ However, some commentators have suggested that the MMSE is a poor screening test for dementia in primary care, particularly for early detection,⁵ and that scores are unduly influenced by age and educational level. This paper uses data from a larger study to evaluate the utility of the MMSE as a screening instrument for dementia in people over the age of 75 years in the primary care setting.

Method

Nine general practices in the former county of Gwynedd, North Wales, agreed to take part in a study conducted between January 1998 and July 1999. Members of the primary care team were asked to include the MMSE while undertaking the annual health screening for people over the age of 75 years, and a small honorarium was paid for each one completed. Training was given by the project researcher on the administration of the MMSE to all practice staff involved in the assessments; these included practice nurses and general practitioners (GPs). Those patients who scored at or below the cut-off point of 26/30, and who gave consent, were assessed further by a member of the research team in their own home using the well-validated GMS-AGECAT (GMS) diagnostic system.⁶ An organicity score of 03 or above on the GMS, which has been found to correspond to a clinical diagnosis of dementia,⁶ was used to identify case-level dementia. Both the MMSE and GMS were administered in Welsh or English, according to the patient's preference. The study protocol was approved by the North West Wales NHS Ethics Committee.

Results

Seven hundred and nine MMSEs were completed. While reflecting the sex distribution of people over the age of 75 years in the study area in the 1991 Census, the screened sample was skewed towards the younger end of this age range (Table 1).

Two hundred and eighty-six (40.3%) people scored 26 or less on the MMSE. Of these, 84 refused the GMS assessment. The distribution of scores between those who refused and those who were assessed did not differ. Of the 202 patients who were assessed on the GMS, 29 (14%) were identified as having dementia. The median MMSE score of patients with dementia was 22, and for those without, it was 25, but some overlap was evident in distributions of scores. The interquartile ranges were 17 to 24, and 23 to 26, respectively.

The MMSE cut-off of 26 adopted in this study resulted in a false-positive rate of 86%. More stringent cut-off points of 24 and 21 lead to some increase in predictive value in this sample, resulting in false-positive rates of 78% and 59%, respectively.

N White, BA, research officer, Centre for Social Policy Research and Development; R T Woods, MA, MSc, CPsychol, FBPSS, professor of clinical psychology of older people, School of Psychology; G C Wenger, PhD, professor of social gerontology/director, Centre for Social Policy Research and Development; J D Keady, RMN, PhD, senior lecturer in nursing, School of Nursing, Midwifery and Health Studies, University of Wales, Bangor. A Scott, MA, MPhil research officer, Department of Social Policy, London School of Economics. M Devakumar, MRCPsych, MD, consultant psychiatrist, North West Wales NHS Trust, Bangor.

Address for correspondence

Professor Bob Woods, Dementia Services Development Centre Wales, Neuadd Ardudwy, University of Wales Bangor, Holyhead Road, Bangor LL57 2PX. E-mail: b.woods@bangor.ac.uk

Submitted: 10 November 2000; Editor's response: 5 March 2001; final acceptance: 22 April 2002.

©British Journal of General Practice, 2002, 52, 1002-1003.

HOW THIS FITS IN*What do we know?*

The MMSE continues to be recommended as a screening tool for dementia in primary care, despite concerns about the effects of age on education scores.

What does this paper add?

The MMSE had an unacceptably high false-positive rate (86%) in identifying cases of dementia in primary care. Case identification should be based on history and complaints of memory problems from patients and/or supporters, not cognitive testing alone.

**Discussion**

This study highlights the difficulty of attempting to detect early dementia in primary care through screening people over the age of 75, using an assessment tool such as the MMSE. With the development of the anti-dementia acetylcholinesterase inhibitors (AChEIs), which are likely to have optimum benefit early on in the progress of the condition, early detection has taken on greater significance, and it is also thought to offer opportunities for adaptation and coping to many patients and families. Simply adding the MMSE to existing assessments of people aged over 75 is unlikely to be helpful, leading to a high rate of older people apparently requiring further assessment, and a high rate of false-positives. It is notable that the cut-off point of 26 used in this study is associated with mild dementia in the NICE guidelines⁷ on the use of the AChEIs.

As the prevalence of dementia rises greatly with advancing age, people aged over 75 have a relatively high risk. However, with a rate of about 6% of those living in the community, it is still low in absolute terms.⁸ Those patients aged over 75 years who took up the offer of a health check were at the lower end of this age range, so those most at risk were less likely to be screened. For any screening instrument to improve overall prediction at this low level of prevalence is a major challenge. The reduction of the false-positive rate to 59% achieved with a conservative cut-off point of 21 is at the expense of over half the cases identified in this study, whose scores exceeded 21, being missed.

Simply using a cognitive measure must inevitably be inadequate; diagnosis is also dependent on taking a history, the exclusion of

other conditions, and assessment of impact on daily living. Our recommendation would be to carry out cognitive screening where there are indications from the patient or from their supporters, or where there is observation of changes in memory and new learning in the clinical consultation. In the primary care context, brief cognitive screening, including orientation and new learning; for example, recall of a name and address over five minutes, is as reliable as a full MMSE,⁵ and potentially less arduous for the patient and the assessor.

References

1. Folstein MF, Folstein SE, McHugh PR. Mini-Mental State: a practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res* 1975; **12**: 189-198.
2. Eccles M, Clarke J, Livingstone M, *et al*. North of England evidence-based guidelines development project: guidelines for the primary care management of dementia. *BMJ* 1998; **317**: 802-808.
3. Audit Commission. *Forget Me Not: mental health services for older people*. London: Audit Commission, 2000.
4. Pritchard E, Dewing J. Screening for dementia and depression in older people. *Nurs Stand* 1999; **14**(5): 46-52.
5. Brooke P, Bullock R. Validation of a six-item cognitive impairment test with a view to primary care usage. *Int J Geriatr Psychiatry* 1999; **14**: 936-940.
6. Copeland JRM, Dewey ME, Griffiths-Jones HM. Computerised psychiatric diagnostic system and case nomenclature for elderly subjects: GMS and AGE-CAT. *Psychol Med* 1986; **16**: 89-99.
7. National Institute for Clinical Excellence. *Guidance on the use of donepezil, rivastigmine and galantamine for the treatment of Alzheimer's disease*. [Technology appraisal guidance 19.] London: NICE, 2001.
8. Burholt V, Wenger GC, Scott A. Dementia, disability and contact with formal services: a comparison of dementia sufferers and non-sufferers in rural and urban settings. *Health Soc Care Community* 1997; **5**(6): 384-397.

Acknowledgements

This project was conducted in collaboration with nine primary care teams based in the study area of North Wales. We wish to thank all of the primary care team staff and older people who agreed to participate. The study was supported by the Department of Health as part of the Outcomes of Social Care for Adults (OSCA) initiative. The views expressed in this publication are those of the authors and not necessarily those of the Department of Health.

Table 1. Demographics of screened sample and median MMSE scores by age and educational level.^a

| | n (%) | 1991 Census (%) | median MMSE |
|-------------------------------|----------|-----------------|-------------|
| Sex | | | |
| Males | 254 (36) | 34 | 27 |
| Females | 455 (64) | 66 | 27 |
| Age (years) | | | |
| 75 to 79 | 380 (54) | 38 | 27 |
| 80 to 84 | 199 (28) | 33 | 26 |
| 85+ | 130 (18) | 26 | 26 |
| Educational level | | | |
| Elementary (up to age 14) | 338 (48) | | 26 |
| Secondary (up to age 16) | 171 (24) | | 27 |
| Further (up to age 19) | 104 (15) | | 27 |
| Higher (diploma/degree level) | 60 (8) | | 28 |
| Education unknown | 36 (5) | | 29 |

^aDifferences in MMSE scores between age groups and education levels significant (Kruskal-Wallis test, $P < 0.001$). Differences in MMSE scores between males and females not significant (Mann-Whitney test, $P = 0.432$).