Leading Article

Brain stethoscopes: the use and abuse of brief mental status schedules

Desmond O'Neill

Department of Geriatric Medicine, Selly Oak Hospital, Raddlebarn Road, Birmingham B29 6JD, UK

The stethoscope was the most significant addition to clinical examination in the last century. Brief mental status schedules (also known as mental test scores) to examine cognitive function may represent the most significant innovation of this century for those looking after the largest subpopulation of health-care users, the elderly. In this group, clinically significant cognitive impairment is common, and intact social skills may disguise the deficit at a superficial interaction with a physician. Despite its importance, the measurement of cognitive function has been a relatively neglected domain for non-psychiatrists, with few helpful anamnestic aids apart from the formula of 'oriented in time, person and place'. Cognitive function can now be graded by clinicians in a simple way with a short questionnaire: many scores have cut-off points below which cognitive impairment is probable. In some forms of mental status schedules (MSS), individual areas of decline in higher function can be pinpointed. Cognitive impairment is not pathognomonic of conditions such as dementia or delirium but is suggestive of their presence, in the same way that crepitations on chest examination may indicate various forms of cardiopulmonary disease. Just as the diagnosis of pneumonia or congestive cardiac failure is not made by auscultation alone, a poor score on an MSS must be considered in conjunction with the rest of the history and examination. Indeed, the sensitivity and specificity of auscultation in the elderly¹ is probably less than that of many MSSs.

Simple clinical technology often has a sophisticated methodology: the first book in the English language on the use of the stethoscope was 226 pages long.² Similarly, there is a significant literature on the selection and application of MSSs. The choice of an MSS is complicated by the existence of over 40 simple instruments, analogous to early medical catalogues which described up to 25 types of stethoscopes. A further complication is

that some MSSs sport multiple versions. For example, four versions of the Folstein Mini-Mental State Examination (MMSE)^{3–6} and three of the Kew test^{7–9} have been described in the United Kingdom alone. Rational selection and choice of cut-off points depend on the setting in which the MSS is administered, precise methodology, suitable validation studies, attention to the effects of education and race, and the time needed to complete the test. This is true for the main groups who use the MSS for different purposes: clinicians, researchers and epidemiologists.

The setting in which an MSS is used is important for three reasons. The first is that the prevalence of illnesses causing cognitive impairment is higher in institutions and hospitals than in community-dwelling elderly people. This alters the clinical significance of published sensitivities and specificities. Secondly, most MSSs have been designed and validated in institutional settings, and often contain questions that relate to this environment. For example, one group of MSSs asks the patient to recognize two people, a question of limited utility in the home of an elderly person living alone.^{10–12} Such questionnaires need alteration and revalidation of their cut-off points to be of use in the community. The setting is also important because patients perform better in their own environment, by a margin of five points or more in 25% of cases with the MMSE.¹³ Among the better-known scores with published cut-off points for use in a non-domestic setting are the MMSE, Clifton Assessment Procedures for the Elderly,¹⁴ Information-Memory-Concentration test and its derivative scales, the Abbreviated Mental Test (AMT) Score and AMT₇,^{10–12} and Short Portable Mental Status Questionnaire (SPMSQ).¹⁵ MSSs which have been studied in the community include the community MMSE¹⁶ and the Information-Memory-Concentration test.

The MMSE is perhaps the most widely used and studied MSS and illustrates many of the methodological issues. This 30-item questionnaire, assessing time, place, registration and recall, attention and calculation, language and parietal skills,³ is unique in that it is well established on both sides of

Correspondence: D. O'Neill, M.D., M.R.C.P.I., Department of Geriatric Medicine, Meath Hospital, Dublin 8, Ireland.

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the Atlantic. In North America it has been selected as one of two questionnaires with the most robust scientific background in a recent Canadian review of MSSs¹⁷ and has also been cited in the National Institute of Neurological and Communicative Disorders and Stroke criteria for Alzheimer's disease. In the United Kingdom the MMSE is largely incorporated into a relatively lengthy dementia assessment instrument, the CAMDEX, and is part of the Medical Research Council's recommendations for minimum data to be collected in research studies in Alzheimer's disease.

Cultural factors and precise repeatable methodology have a significant effect on the MMSE. The hospital MMSE contains items which have an American bias and this has led to modified versions outside the United States.^{18,19} Problems with repeatable methodology are illustrated by the three community versions of the MMSE reported in the UK which vary in the orientation section^{4,5} and in the methods of scoring the attention/calculation section.⁴⁻⁶ Variations in scoring the attention/calculation section may be critical: the tasks are not of equivalent difficulty and do not measure the same cognitive function.²⁰ One group has made an effort to standardize the application of the MMSE, and this 'standardized' MMSE is partially successful in addressing these problems.²¹ An area of methodology which is often neglected is the problem of non-response: scoring non-responses as errors is the most sensible current approach.²²

Choosing a cut-off point or points for MSSs requires an appreciation that cognitive function is complex and cannot be characterized fully with relatively simple questionnaires. Many factors affect performance including age, educational attainment and race.²³⁻²⁵ proposals to correct the MMSE for educational bias need further evaluation.^{26,27} Affective illness may influence scores: nearly one-eighth of those scoring $\leq 23/30$ in the MMSE in one study were suffering from functional illnesses.⁴ Cut-off points based on validation studies in hospitals and clinics have tended to be fairly robust, probably because of the higher proportions of patients with cognitive impairment. Community validation studies are less encouraging and interpretation is hampered by slightly different versions used in separate studies. The largest United Kingdom study of a community MMSE found a true positive ratio of 55% for dementia or delirium at the hospital-based cut-off point of $\leq 23/30$.⁴ It is best to consider published cut-off points as a guide rather than as a rule, with a higher index of suspicion for patients with better education who score just above them and consideration of the patient's affect, educational status and ethnic background for those with low scores. A useful proposal is to consider more than one cut-off value. This has been illustrated for the MMSE, where a

score of ≤ 20 represents a high probability of cognitive impairment, a score of ≥ 26 a low probability, and intermediate scores need to be considered for more detailed evaluation.²⁸

Effective clinical instruments are not always appropriate for screening for disease. The clinical utility of the auscultation is not lessened because it is not suitable on its own for population screening of cardiorespiratory disease. The recent contractual requirement for general practitioners in the United Kingdom to offer a mental assessment to the over-75s has raised the issue of the value of MSSs in community screening of mental state. Apart from a quadrupling of awareness among family practitioners of cognitive impairment in elderly patients, from 15% in 1964²⁹ to 58% in 1988,³⁰ the evidence of benefit from mass screening for cognitive impairment has not been established.¹⁷ The low positive predictive values of MSSs in this setting may serve as a negative advertisement and deter practitioners from using a simple and effective clinical aid.

A very important (if less scientific!) consideration is that of time. If MSSs are to be used widely by busy physicians, they need to be as brief as possible. If the 5-10 minutes required for instruments such as the MMSE is considered too lengthy, time might be economized by using a shorter score. The compromise engendered by the shortest tests (about ten questions) is that they suffer from a more pronounced 'ceiling' effect whereby many patients with mild cognitive impairment may score no errors.⁶ Therefore those clinicians who feel that the MMSE is too lengthy for routine use might consider using a hierarchical approach, with a short MSS as a first-line instrument and the MMSE as a complementary test when there is concern about the possibility of cognitive impairment.

The measurement of longitudinal change in cognitive function is one aspect of MSS where the analogy with a stethoscope falls short. It is difficult to change an auscultatory examination by preparation. Although MSS have proved useful in research studies of changes in cognitive function,³¹ this may not be the case if they are used routinely: patients may become familiar with the questions and try to prepare for the administration of schedules.³² Many longer psychological tests have alternative forms to compensate for learning effects: this is not yet a feature of MSS. Only relatively large changes can be measured reliably and threshold effects may mask change. Therefore the relevance of modest changes to the clinician, as opposed to the researcher, is uncertain.

The methodology of MSSs is becoming more clear. If used appropriately, they are an effective and relevant clinical tool. The main danger is not to relate the score to the overall history, examination and functional assessment. As an MSS screens for a

state, cognitive impairment, and not directly for specific diseases, a positive result requires further evaluation. Accepted criteria for dementia and delirium³³ provide a useful template for clinical

decision-making. In case of doubt, longitudinal assessment³⁴ or referral for specialist advice is preferable to a precipitate diagnosis of dementia.

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