

Higher Cutoff Point on Dementia Screening Test Recommended for Educated Patients

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July 23, 2008 — Clinicians should send older, well-educated white patients for cognitive evaluation if they score less than 27 on the Mini-Mental State Examination (MMSE) rather than use the traditional cutoff point of 24, results of a new study suggest.

The study found that raising the cutoff value to 27 created the "ideal balance" of specificity and sensitivity to detect dementia, said one of the study authors, Sid O'Bryant, PhD, assistant professor and director of neuropsychology and neuroscience at Texas Tech University Health Sciences Center in Lubbock.

Refer for Full Evaluation

"When you have patients who are college graduates coming in with a complaint of memory problems," said Dr. O'Bryant, "whether it's them reporting it or someone else reporting it or perhaps a referral from a physician who has seen them and thinks something is going on, and that MMSE score is below the cut score of 27, you need to refer them for a full evaluation."

The study, published in the July issue of the *Archives of Neurology*, evaluated MMSE scores of 1141 patients from the Mayo Clinic Alzheimer Disease Research Center and Alzheimer Disease Patient Registry who had at least 16 years of education. The sample included 307 patients who had dementia according to a consensus panel using published criteria (164 men and 143 women), 176 with mild cognitive impairment (106 men and 70 women), and 658 control patients without dementia (242 men and 416 women). Their average age was 75.9 years, their mean educational level was 17.1 years, and most (93%) were white. There were no significant differences between the groups in age, sex, or level of education.

The study found that raising the cutoff point to 27 increased the sensitivity for detection of dementia to 89% (from 66% using a cutoff value of 24), although it lowered the specificity from 99% to 91%.

Statistics Skewed

In the study, the elevated cutoff value correctly classified 90% of the participants with dementia vs 89% with the traditional cutoff score. "This doesn't sound like a whole lot but...the sensitivity

and specificity statistics can be skewed a bit because of the overwhelming number of people without dementia," explained Dr. O'Bryant. In the study, it meant that 70 of the 104 patients who were not diagnosed with dementia with use of the traditional cutoff point were found to have dementia on the basis of the higher criteria.

For any mild cognitive impairment (dementia and mild cognitive impairment), the study found that the optimal balance between sensitivity and specificity is also at a cutoff score of 27, which afforded a sensitivity of 69% and a specificity of 91%, or a cutoff value of 28 (sensitivity and specificity of 78%). When the lower cutoff point of 24 is used, the false-negative rate often exceeds 50%, and because of the small number of true cases at this cutoff point, many patients with cognitive dysfunction are not being detected or referred for evaluation, said the authors.

The MMSE is used to screen patients for cognitive impairment, track changes in cognitive functioning, and assess the effects of therapeutic agents on cognitive function. Scores are affected by demographic variables and decrease with age. Although much research exists on the effects of limited education on these scores, few studies evaluate the appropriate cutoff point for highly educated people.

To date, a score of 24 on the MMSE has commonly been used by clinicians, nurses, psychologists, and others as a cutoff value for dementia evaluation in all patients. "It's easier to have that reference in mind than it is to go look up norms per education, per everything else, which is the most appropriate way to do it; it's just that not everyone has access to all the normative data," said Dr. O'Bryant.

However, university graduates appear to have more cognitive reserve, which could mask their symptoms of dementia and allow them to appear to function normally for a longer period. "They can go longer and further in the process of dementia before they get diagnosed," said Dr. O'Bryant.

Slipping Dementia Detection

This ability allows them to slip through the dementia detection net. "We see this all the time," said Dr. O'Bryant, who runs a memory clinic. "People who are very bright who score 26, 27, 28 on an MMSE, and yet when we conduct a comprehensive evaluation, including neuropsychological testing, we find that they have dementia."

There are "multiple theories" as to why these educated patients can function so well, said Dr. O'Bryant. For example, they may have more neuronal connections that allow them to sustain more cognitive damage.

However, by the time these educated patients are diagnosed, their dementia is often more advanced, and they have a "steeper trajectory of decline" vs patients who are less educated and diagnosed earlier, said Dr. O'Bryant.

"Pales in Comparison"

Although raising the cutoff value improves sensitivity, the downside is that it decreases specificity and increases the rate of false-positives. This increase, said Dr. O'Bryant, will drive up costs because more people are being evaluated, but it "pales in comparison to costs of not getting someone treatment for dementia as the treatments slow the progression of the disease and offer longer periods of improved quality of life for these patients."

Improving detection of dementia in highly educated patients is increasingly important in today's society as more people get a college or university degree. Also, said Dr. O'Bryant, as the population ages, "it's actually a good thing for these people to have baseline exams anyway."

The current findings do not necessarily apply to other ethnic groups or to non-English-speaking groups, the authors noted; however, Dr. O'Bryant and colleagues are examining the current findings in an ethnically diverse sample.

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Clinical Context

The MMSE is administered to assess cognitive functioning. In addition, it tracks changes in cognitive functioning with time, and it assesses the effects of therapeutic agents on cognitive functioning. The MMSE has been used extensively and is moderated by demographic variables, with scores decreasing with advanced age and less education. Most normative data have focused on the effect of less education; however, little is available regarding the usefulness of the MMSE to detect cognitive decline in highly educated individuals.

The aim of this study was to evaluate the usefulness of MMSE scores to detect cognitive dysfunction in a sample of highly educated individuals.

Study Highlights

- Archival data were reviewed for 4248 participants enrolled in the Mayo Clinic Alzheimer Disease Research Center and Alzheimer Disease Patient Registry database.
- A total of 1141 primarily white (93%) individuals with 16 or more years of self-reported education were identified.
- These included 307 patients (164 men and 143 women) with dementia (any type), 176 patients (106 men and 70 women) with mild cognitive impairment, and 658 control participants (242 men and 416 women) without dementia.
- There were no significant differences between the groups in age, sex, or level of education.

- Diagnoses included 202 patients with probable Alzheimer's disease (66%), 48 with dementia with Lewy bodies (16%), 18 with frontotemporal dementia (6%), 13 with vascular dementia (4%), and 25 with other causes of dementia (8%).
- The main outcome measured was the diagnostic accuracy estimates (sensitivity, specificity, and positive and negative predictive power) of MMSE cutoff scores in the detection of cognitive dysfunction.
- In this sample of highly educated, largely white older adults, the standard MMSE cutoff score of 24 (≤ 23) yielded a sensitivity of 0.66, a specificity of 0.99, and an overall correct classification rate of 89% in the detection of dementia.
- 104 patients with dementia (34%) in this sample were misclassified as not having dementia.
- A cutoff score of up to 27 (≤ 26) resulted in an optimal balance of sensitivity and specificity (0.89 and 0.91, respectively), with an overall correct classification rate of 90%. This cutoff score identified 70 of the 104 patients with dementia who were missed from use of the traditional cutoff point.
- In a cognitively impaired group (dementia and mild cognitive impairment), a cutoff score of 27 (sensitivity, 0.69; specificity, 0.91) or 28 (sensitivity and specificity, 0.78) might be more appropriate.

Pearls for Practice

- The MMSE is used to screen patients for cognitive impairment, track changes in cognitive functioning with time, and assess the effects of therapeutic agents on cognitive functioning.
- Older patients with a college education who present with complaints of cognitive decline and a score of less than 27 on the MMSE are at a greater risk of being diagnosed with dementia