SAGE Advice: Helping Patients Spot AD Earlier

It's not meant to replace clinical assessment, but there are hopes a new test will find Alzheimer's when treatments may be most effective.

A Q&A WITH DOUGLAS SCHARRE, MD

What is the SAGE test and how do you intend it to be used?

The Self-Administered Gerocognitive Examination (SAGE) is a valid and reliable brief cognitive assessment tool used to identify cognitive issues, changes in cognition over time, Mild Cognitive Impairment (MCI) and early dementia (available for download at sagetest.osu.edu). SAGE's self-administered feature, pen-and-paper format, and four equivalent interchangeable forms allows it to be given in almost any setting, does not require any staff time to administer, does not require a computer, and makes it practical to screen for cognitive impairment in a doctor's office, in the hospital, at health fairs, at memory screenings, and at community events.

SAGE measures cognitive function in the domains of orientation (date, 4 points), language (picture naming, 2 points and verbal fluency, 2 points), memory (2 points), executive function (modified Trails B, 2 points and problem solving task, 2 points), calculations (2 points), abstraction (2 points), and visuospatial abilities (copying 3-dimentional constructions, 2 points and clock draw, 2 points) in a 4-page, 22-point test that is self-administered. Detailed scoring information and instructions are available at sagetest.osu.edu. There are 4 approximately equivalent forms of SAGE (forms 1 through 4) each with minor differences designed to reduce learning effects from multiple administrations and provide advantages when administering the test simultaneously in large groups.

SAGE is best used in a health care setting so that its results can be interpreted based on the individual's health history and baseline talents.

SAGE also makes it easier to find potential research participants at the early and pre-dementia stages, to evaluate new therapies.

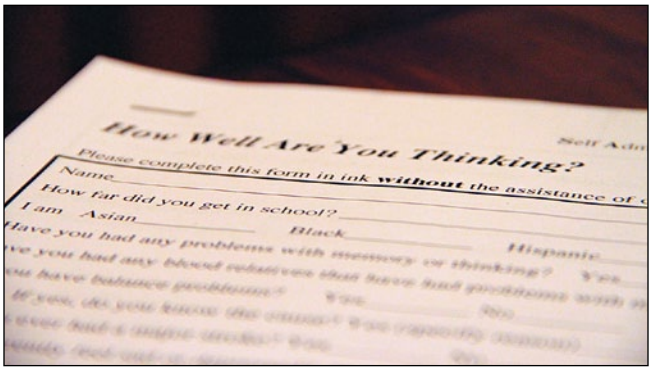

Figure 1. The SAGE is a valid and reliable brief cognitive assessment tool used to identify cognitive issues, changes in cognition over time, MCI, and early dementia.

Do you feel that because it is a self-administered test there is a higher standard to meet, or worry there will be skepticism? The Alzheimer's Association, for example, says that home screening tests cannot and should not be used as a substitute for a thorough examination by a skilled doctor.

SAGE is not diagnostic of any specific condition. Even if it is taken at home, we strongly recommend the test be given to the individual's physician for review. As a screening instrument, it is designed to only start the conversation between the physician and the patient regarding their brain health. It is absolutely not a substitute for evaluation by a health care professional.

However, SAGE does try to address a huge problem in dementia care and that is the delay in identification of

Most cognitively impaired patients do not seek early medical attention because of their impaired insight and often present to their doctor three to four years after condition onset.

early cognitive deficits at a time when treatments may be the most effective. Most cognitively impaired patients do not seek early medical attention because of their impaired insight and often present to their doctor three to four years after condition onset. During that time, the patient has not been afforded the potential advantages of cognitive therapies and may be making poor judgments with finances, driving, medication use, and symptom reporting.

Hopefully SAGE will serve to identify early signs of cognitive or brain dysfunction. Ideally it may be best used as a self-administered cognitive screening tool to be given at Annual Wellness Visits for those Medicare insured individuals.

How do you know it's an effective measure? Can you talk about the process of developing it?

As described in our 2010 paper (Scharre et al., *Alzheimer Dis Assoc Disord 2010*; 24:64-71) we evaluated SAGE against gold standard clinical assessments and neuropsychological evaluations. We found that the Spearman rank correlation between SAGE and a neuropsychological battery was 0.84. SAGE receiver operating characteristics on the basis of clinical diagnosis showed 95% specificity (90% for MMSE) and 79% sensitivity (71% for MMSE) in detecting those with cognitive impairment from normal controls. In our 2014 paper (Scharre, et al., *J Neuropsychiatry Clin Neurosci* 2014: [Epub ahead of print]) we evaluated over one thousand individuals and performed principal-component and correlation analysis that indicated that SAGE was an internally-consistent test that was very well balanced with language, reasoning/computation, visuospatial, executive, and memory domains. It suggested that no single domain was over- or under-represented in the scoring of the test.

The questions that make up SAGE were based on clinical experience and review of the literature and were adapted for self-administration. Multiple modifications over 5 years of clinical testing resulted in the current SAGE test (with its 4 forms). Questions covering a wide range of cognitive domains were chosen based on predictability for mild cognitive loss and not necessarily just to detect pre-Alzheimer disease. We strived to evenly capture brain functioning in right and left hemispheres and anterior and posterior brain regions. Test questions for the 4 forms were adjusted to attempt to make the degree of difficulty very similar among the four forms, which were found to be statistically equivalent.

How does the test compare to traditional mental tests like the mini-mental state exam and the mini-cog test?

SAGE has only been compared to the Mini-Mental Sate Examination (MMSE) and a neuropsychological battery. SAGE is "harder" than the MMSE with less of a ceiling effect for those with mild cognitive impairments due to greater question difficulty and more questions measuring executive functions. Based on our validity study, average scores for normal and MCI subjects were 19.8 and 16.0 respectively on SAGE (out of 22) and were 28.7 and 27.7 respectively on MMSE (out of 30). Both MMSE and SAGE were able to differentiate clinically defined normal and MCI subjects from dementia subjects. However, SAGE but not MMSE was also able to distinguish clinically defined normal from MCI groups. The key feature of SAGE compared to other mental status tests is that it is self-administered and does not require staff time to administer. It can be used for cognitive screening or as an office-based multi-domain mental status test.

What tips do you have for neurologists who want to provide the test, or are brought a completed test by a caregiver who's found it online?

The website sagetest.osu.edu contains detailed scoring instructions and scoring explanations. It takes only about 30 seconds to score. Typically, it is very obvious at a glance to determine that a person did or did not do well. Since SAGE is not diagnostic of any condition, the neurologist must interpret the results based on the individual's health history and projected cognitive baseline. If the score is in the normal range, the test can be kept as a baseline for future comparisons. If the score is borderline or low, than it may be very useful to obtain a family member's assessment of any cognitive or functional changes they may have observed. Further evaluations for specific conditions causing cognitive decline may also be indicated.

SAGE can also be used in the clinic to follow a patient's clinical cognitive course over time or to assess the cognitive effects of certain interventions or treatments. ■

Douglas Scharre, MD, is Director, Division of Cognitive Neurology, Associate Professor of Neurology, Medical Director of Neurobehavior and Memory Disorders Clinics, Medical Director of Forest Hills Center for Alzheimer's and Director of Neurodegenerative Disease Brain Tissue and Cerebrospinal Repository (Brain and CSF tissue banks) at The Ohio State University.