

Does This Patient Have Dementia?

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CLINICAL SCENARIO

Ms A, an 81-year-old retired nursing instructor who is recently widowed and lives alone, arrives in your office. She is accompanied by her daughter who decided to miss work and attend the appointment because she wanted you to know that her mother has become increasingly forgetful during the past 6 months. The patient is misplacing her glasses and keys more often, and she complains of difficulty sleeping and poor concentration. You must address whether the memory complaints are indicative of a dementia or if she has anxiety, depression, or is merely noting poorer recall associated with normal aging.

WHY IS THIS AN IMPORTANT QUESTION TO ANSWER WITH A CLINICAL EVALUATION?

Dementia is a prevalent problem. Depending on how cases are defined, estimates of dementia prevalence can range from 2.4 million to 4.5 million individuals in the United States.¹⁻⁴ In addition, many older adults notice difficulty with memory and other cognitive functioning.

See also Patient Page.

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Context While as many as 5 million individuals in the United States have dementia, many others have memory complaints. Brief tests to screen for cognitive impairment could help guide dementia diagnosis.

Objective To review the literature concerning the practicality and accuracy of brief cognitive screening instruments in primary care.

Data Sources A search of MEDLINE (including data from AIDSLINE, BioethicsLine, and HealthSTAR) and psycINFO was conducted from January 2000 through April 2006 to update previous reviews.

Study Selection Studies of patients aged 60 years and older and use of an acceptable criterion standard to diagnose dementia were considered.

Data Extraction Studies were assessed by 2 independent reviewers for eligibility and quality. A third independent reviewer adjudicated disagreements. Data for likelihood ratios (LRs) were extracted.

Data Synthesis Twenty-nine studies using 25 different screening instruments met inclusion criteria; some studies evaluated several different instruments, thus, information could be examined for 38 unique instrument/study combinations.

Results For the commonly used Mini-Mental State Examination, the median LR for a positive result was 6.3 (95% confidence interval [CI], 3.4-47.0) and the median LR for a negative result was 0.19 (95% CI, 0.06-0.37). Briefer approaches are available but have not been studied as frequently. Reports from an informant that the patient has memory loss yields an LR of 6.5 (95% CI, 4.4-9.6) for dementia. The Memory Impairment Screen takes 4 minutes to ask 4 items and has an LR for a positive result of 33 (95% CI, 15.0-72.0) and an LR for a negative result is 0.08 (95% CI, 0.02-0.3). Clock drawings are helpful in 1- to 3-minute forms, but must be scored appropriately and sensitivity to mild forms of impairment can be low.

Conclusions Clinicians should select 1 primary tool based on (1) the population receiving care; (2) an awareness of the effects of educational level, race, and age on scoring; and (3) consideration of adding 1 or 2 other tools for special situations as needed.

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Primary care physicians often do not recognize cognitive impairment in the brief time available for an office visit. Studies have found be-

tween 29% and 76% of cases of dementia or probable dementia are not diagnosed by primary care physicians.⁵⁻⁷

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The societal cost of caring for dementia is reported to be \$100 billion per year,⁸ with most of the direct costs attributable to inpatient services, home health care, and skilled nursing facilities.⁹⁻¹¹ Over the coming decades, the substantial increase in number of older adults presages an abrupt increase in the burden of dementia. Without scientific advances that lower the incidence and progression of Alzheimer disease and related dementia conditions, between 11 million and 18.5 million individuals in the United States will likely experience some level of dementia by 2050.¹²

Screening for disease when it is either clinically undetectable or in its early stages becomes rational when interventions can prevent or delay the consequences of the underlying disorder. The US Preventive Services Task Force (USPSTF) found that the published evidence did not demonstrate a clear benefit to screening all asymptomatic older individuals, nor did it rule out the possibility of a benefit.¹³ However, the task force emphasized the necessity of carefully assessing older adults presenting with cognitive or cognitive-related functional complaints. Whether or not clinicians screen all older individuals, every physician who provides care for adults will encounter patients with memory complaints, and therefore they must be able to assess them for dementing illnesses.

A definitive diagnosis of dementia allows patients and family members the opportunity to have important conversations about desired future care and the chance to arrange financial and legal matters while decision-making capacity remains. Early intervention can also provide early safety monitoring in such areas as medication administration, safe use of appliances and tools, and driving. These family and safety issues might justify screening even if early diagnosis affected no other outcomes. Fortunately, early patient and family education improve caregiver satisfaction, while more intensive outpatient care programs delay nursing home placement.¹⁴

A recent randomized trial of collaborative care for patients with dementia that used screening to identify participants demonstrated a decrease in psychological and behavioral symptoms of dementia and caregiver stress.¹⁵ In a recent trial, patients randomized to exercise plus education for their caregivers about behavioral management showed greater improvements in physical health, function, depression, and fewer days of restricted activity than patients receiving usual medical care.¹⁶ In trials of mild to moderately impaired outpatients, cholinesterase inhibitors led to small improvements in cognitive function, activities of daily living, and behavior.^{17,18} In a study of institutionalized patients with severe dementia, a cholinesterase inhibitor led to less decline and some improvement on a sensitive measure of cognitive change.¹⁹ Agents such as memantine, used alone or in combination with a cholinesterase inhibitor, can reduce clinical deterioration and may improve dementia-related behavioral problems.^{20,21} Memantine is currently indicated only for the treatment of moderate to severe dementia. The capability currently exists to decrease the burden of dementia, but achieving reductions first requires recognizing patients with dementia amenable to treatment.

Defining Dementia and Related Conditions

Dementia describes multiple cognitive deficits that include memory impairment and at least 1 of the following cognitive disturbances: agnosia, aphasia, apraxia, or a disturbance in executive functioning. The deficits that make up dementia can be diagnosed clinically. The deficits must be sufficient to cause functional impairment in home or work life and must represent a decline from previous functioning. A criterion standard diagnosis is established by a structured interview that follows the criteria outlined by the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* (BOX 1).²²

The *DSM-IV* criteria show good to excellent interrater reliability with κ scores ranging from 0.5 to 0.9.²³

Although *DSM-IV* is the current reference standard for dementia, the definition continues to evolve. Some disorders of cognitive decline seem to create dementing-like illness in which memory problems are not the cardinal disruption.^{23,24} Therefore, alternate definitions place less emphasis on memory impairment and define dementia as “a chronically progressive brain disease that impairs intellect and behavior to the point where customary activities of daily living become compromised.”²⁴ This definition more completely includes the frontotemporal dementias and entities, such as primary progressive aphasia that spare memory function.

Mild cognitive impairment is described as cognitive impairment beyond that anticipated with normal aging, but without other associated cognitive problems or functional deficits. It carries a high risk of progression to dementia with annual conversion rates reported between 6% and 25%.²⁵ Thus, patients with mild cognitive impairment should be reassessed frequently.

Delirium is characterized by a disturbance of consciousness, usually fluctuating, and a change in cognition developing over a short period of time.²² Delirium should be distinguished from dementia, although the 2 can coexist. Delirious patients typically have difficulty sustaining attention along with memory disturbance.

Normally aging individuals experience cognitive changes. These problems include decreases in the speed of processing of information, lessened spontaneous recall, and small decreases in executive skills.^{26,27} Nonverbal information is more affected by this decline than verbal information and recall of information is more affected than recognition of information. Older adults with normal cognition are able to learn new information, but acquisition speed is slower than that of younger adults. Starting around midlife, the ability to learn new information and recall it after a delay declines by approximately 10% per decade. This ability, the re-

tention of newly learned but not well-learned information, is tested by such tasks as learning lists of words. Deficits are exposed by free recall tasks without category prompts. Normally aging older adults are able to retain well-learned information nearly as well as younger adults.

Who Gets Dementia?

In adult primary care practices, prevalence rates of dementia are 6% to 16% among patients aged 65 years and older.^{6,28} The strongest risk factor for dementia is increasing age. The 1% prevalence of dementia for individuals aged 60 to 69 years doubles every 5 years to a prevalence of about 39% at age 90 to 95 years.^{3,29} Other consistently identified risk factors include stroke,³⁰ hypertension,^{31,32} and apolipoprotein E³³ status, with higher levels of education,³⁴ physical activity,³⁵ and moderate alcohol intake³⁶ proposed to be protective. However, while the risk of developing Alzheimer disease has been linked to the presence of vascular risk factors (diabetes, hypertension, heart disease, and smoking),³⁷ a community-based study,³⁸ which collected history and measured blood pressure, lipoprotein levels, fibrinogen, cholesterol levels, C-reactive protein, and hemoglobin A_{1c} levels found that vascular risk factors explained only 3% of the variance in the Mini-Mental State Examination (MMSE) score.

Alzheimer disease accounts for 50% to 80%³⁹ of the dementing illnesses. Frontotemporal dementias (12%-25%),⁴⁰ dementias with mixed etiologies (10%-30%),⁴¹ vascular dementia (10%-20%),⁴² and Lewy body dementia (5%-10%)^{43,44} account for the majority of the remaining ones. Some of the different pathological etiologies for dementia, such as Alzheimer disease, can be definitely diagnosed only by examination of brain tissue, but there are clinical differences between types of dementia, and specifying the cause of dementia with as much accuracy as possible is important for guiding treatment and providing prognostic information to the family. Alzheimer disease, de-

Box 1. Defining Dementia and Related Terms*

Dementia

The development of multiple cognitive deficits that include memory impairment and at least 1 of the following cognitive disturbances: agnosia, aphasia, apraxia, or a disturbance in executive functioning

Deficits must be severe enough to cause significant decline in social or occupational functioning and must represent a decline from previous baseline functioning

Agnosia

Failure to recognize or identify objects despite intact sensory function

Aphasia

Deterioration of language function (impairment)

Apraxia

Impaired ability to execute motor activities despite intact motor abilities, sensory function, and comprehension of the required task

Delirium

A disturbance of consciousness that is accompanied by a change in cognition that cannot be better accounted for by a preexisting or evolving dementia.

Executive Functioning

The ability to think abstractly and to plan, initiate, sequence, monitor, and stop complex behavior

Mild Cognitive Impairment†

Presence of a memory complaint, preferably corroborated by an informant, objective memory impairment, and normal general cognitive function

Activities of daily living should be intact and the patient cannot meet criteria for dementia

*All definitions are from the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*, unless otherwise noted.

†From the American Academy of Neurology guidelines for mild cognitive impairment.

pending on the severity, tends to involve rapid forgetting, especially of new material.^{39,40,45} Vascular dementia tends to have a more abrupt onset, to present with more language difficulties, and to have less rapid forgetting especially if cues are available to aid patient recall.⁴² Frontotemporal dementias tend to cause less pronounced memory difficulties and more marked problems in planning tasks. Early decline in interpersonal behavior and difficulty regulating personal conduct are core features.⁴⁶

Clinical history, physical examination, laboratory data, and diagnostic imaging all aid in determining the etiology of dementia but not in ruling dementia in or out. Ruling out depression is also important because de-

pression, even without comorbid dementia, causes cognitive deficits that may or may not respond to depression treatment.

Who Provides Information About the Patient's Memory Loss?

Patients can be evaluated with structured or semistructured interviews and with neuropsychological test batteries. However, this approach takes time and requires both specialized training and access to the tests.

Family members, spouses, or close friends (informants) often detect memory loss before the patient; however, memory complaints are a frequent concern of older adults. Various epidemiological surveys have found

complaints of memory problems in as many as 50% of older adults.⁴⁷⁻⁵⁰ Data on subjective memory loss reported by patients are conflicting. Some have found that subjective memory loss is associated with an increased risk of current or developing dementia,⁵¹⁻⁵³ while others have found that subjective memory complaints do not correlate with memory problems or may correlate better with depressive symptoms^{54,55} or personality traits.⁵⁶

The cognitive deficits associated with depression tend to be most pronounced on tasks requiring the most effort.⁵⁷⁻⁵⁹ Patients may frequently answer "I don't know" or have particular difficulty in tasks requiring the most sustained attention, such as trail making tasks, generating lists of words beginning with or not including a target letter, or a digit substitution task. Concerns regarding memory, whether expressed by the patient or an informant, should trigger an evaluation for both dementing illnesses and mood disorders.

Corroborating information from an informant is helpful, and information from this resource may be as good as many brief screening instruments for detecting dementia.⁶⁰ Informants' reports may predict the development of dementia in patients who currently have normal test results,^{53,55} but not all informants are equally helpful. Not surprisingly, it appears that spouses or others who live with the patient give the most accurate assessment of cognitive status.⁶¹ Unfortunately, many older adults do not have reliable and knowledgeable informants, which makes clinical evaluation even more important.

Questions to an informant can start generally as "has he or she had any problems remembering recent events?" The answers direct more specific questions to changes in personality or behavior, or the performance of daily activities such as occupational functioning, driving, money management, dressing, feeding, and toileting. If a clinician has concerns about a patient's cognitive status, a formal questionnaire can be completed by the infor-

mant. A combination of information from a reliable informant combined with cognitive testing is the most valuable means of assessing patients with memory problems.^{62,63}

Increased assessment time and more complicated scoring schemes are common drawbacks of such testing.

How Are Cognitive Deficits Detected?

Diagnosing dementia involves establishing that a patient has developed the requisite cognitive deficits. Each component in the *DSM-IV* criteria can be established with specific tests. Screening questionnaires can involve measures of each component or of just one.

Memory impairment can be evaluated by recall tasks such as asking a patient to remember words and then to recall those same words without prompts after a delay. Registration is the initial recognition and encoding that allows information to be moved to short-term memory. Tasks that ask a patient to recognize previously presented words or to recall words after being given cues such as a category can also be used to test memory. Problems are possible in registering information, storing information in short-term memory, retaining information, retrieving information, or recognizing information. Orientation can be tested for knowledge of one's own name, the date, location, and purpose of current activity.

Agnosia refers to an inability to recognize and name familiar objects when visual perception is adequate. A patient may be able to describe an item, for example its outline and color, but be unable to place the item in a context or state its use. Patients can be asked to name common objects or parts of objects, for example a watch, watch band, pen, or necktie. Patients with more advanced dementia can become unable to recognize even close family members.

Aphasia refers to a language disturbance and generally suggests damage to the cerebral hemisphere governing language.^{22,64} Asking a patient to repeat a simple phrase can detect a motor apha-

sia manifest by labored nonfluent speech that is interrupted by word-finding pauses. For example, a patient with dementia might respond to a question with "... day ... cold. ... rain" rather than with complete phrases. Motor aphasia should be distinguished from dysarthria, which is the inability to articulate clearly, often due to brainstem or posterior fossa lesions. Incorrect word use, use of nonsense words, or speaking in rhymes suggests a receptive or sensory aphasia. In a sensory aphasia, speech can be in sentences with correct grammar and emotion but without making sense.

Apraxia refers to the inability to perform a motor task despite intact motor function. Asking a patient to mime how she/he would comb her/his hair, brush teeth, or blow out a match are good clinical tests for apraxia. Patients with apraxia are often able to duplicate an examiner's demonstration of an action.

Executive functioning refers to the ability to think abstractly and to plan and carry out complex behaviors including initiating the steps necessary to do a task, monitoring progress, and stopping the task.⁶⁵ There are many tests of executive functioning including asking a patient to draw an analog clock, repeat a pattern, or mimic a series of hand sequences (slap, fist, cut).²² A clock-drawing test can take different forms. A patient can be asked to draw a clock on a blank piece of paper, copy a clock drawn by an examiner,⁶⁶ or place numbers inside a 10-cm circle to resemble a clock face. Often the patient is asked to draw hands so that the time reads 11:10. There are many different scoring methods that can be used, including a straightforward normal vs abnormal determination.⁶⁷ More complex approaches include a 20-point checklist,⁶⁸ a classification of 20 possible clock-drawing errors,⁶⁹ and an approach that divides the clock into quadrants and checks the number of digits per quadrant.⁷⁰ When untrained raters were asked to classify clocks as normal or abnormal, they had high levels of agreement with experts (>98%) for patients without dementia and for those

with moderate and severe dementias. Agreement was lower (60%) when rating clocks of patients with mild dementia.

A close informant can be especially helpful for assessing executive function. Informants may report problems with complex behaviors such as driving, balancing the checkbook, or shopping for food and cooking. Informants can also give a time course for changes in executive functioning.

The diagnosis of mild cognitive impairment is even more difficult than the diagnosis of dementia. Under the current most commonly used definitions, patients should not have significant impairment in functioning and thus, cognitive deficits must be significant yet still relatively mild enough to have not yet interfered with performance of activities. Under these circumstances, it is not surprising that the brief screeners do not have sufficient sensitivity to detect the disorder.

GOALS OF THIS SYSTEMATIC REVIEW

We reviewed the performance characteristics for a large number of screening tests that may be used by generalist physicians to detect dementia before it becomes clinically obvious. Once cued to the possible diagnosis of dementia, the physician can complete a careful examination to make a definitive diagnosis. Because an incorrect diagnosis of dementia could have negative psychosocial consequences, it might make sense to value the specificity of the test more than the sensitivity. The approach of using a screening test with the highest positive likelihood ratio (LR) means that the physician will be less likely to mislabel a patient who is aging normally as one with dementia and, perhaps, to embark on an expensive and potentially stressful series of tests for dementia. Alternatively, failure to diagnose dementia early means that interventions and education may be delayed to a point at which they become less effective. Thus, some patients and families would want their

physician to screen with tests that have the highest sensitivity. This approach uses the test with the best negative LR so that the physician will be less likely to mislabel a patient with dementia as experiencing normal aging. Since screening tests take time, few generalist physicians would choose 1 screening instrument for maximizing sensitivity and a separate screening instrument for maximizing specificity.

While choosing the “best” tests is always desired, the sensitivity, specificity, and LRs cannot be the only measures for identifying the best test—the test must be practical. While the MMSE is widely used, the test form itself is copyrighted by Psychological Assessment Resources, Inc (<http://www3.parinc.com>). The company does not grant permission to republish the MMSE in its entirety. The copyright issues concern many clinicians since the company prohibits unauthorized reproduction.⁷¹ The MMSE may be administered free of charge from memory, from an original paper,^{72,73} or from a source authorized by Psychological Assessment Resources to reprint the test. We suspect that most clinicians administer the MMSE legally from authorized reprints; otherwise there is a charge for using Psychological Assessment Resources’ score sheets (<http://www.minimental.com/>). Because of the recent renewed interest in the copyright issues, the MMSE may be a less practical solution for many clinicians. We sought to identify not only the tests with the highest overall accuracy and least administrative time, but also practical tests—those that examined more domains of cognition and dementia, or screening tests useful in special situations.

METHODS

Search Strategy

We updated a literature synthesis completed for the USPSTF by one of the authors (M.B.). This literature review evaluated studies of dementia screening instruments published from January 1994 until December 2000, incor-

porating and updating a previous USPSTF review covering literature before 1994. New searches were conducted for January 2000 through April 2006. MEDLINE (including data from AIDSLINE, BioethicsLine, and HealthSTAR) and psycINFO searches were conducted by combining the search terms *exp Alzheimer’s disease* and *exp dementia* with a previously validated search strategy for identifying diagnostic tests.⁷⁴ For the search in psycINFO, *sensitivity* and *specificity* were used as key words.

The 1096 MEDLINE and 152 psycINFO citations were reviewed using the inclusion criteria of “subjects with age >60 years” and use of an acceptable criterion standard to diagnose dementia. Exclusion criteria included non-English manuscripts (authors did not have access to translators; however, English-language manuscripts regarding studies outside of the United States were not excluded), studies conducted in inpatient or nursing home populations, and studies solely examining a memory disorder clinic population without an adequately characterized outside control group. Studies that used diagnostic imaging, laboratory, or physiological tests (eg, sense of smell and cerebrospinal fluid studies) were not evaluated. Articles that dealt with a population whose median education was less than 6 years were eliminated (n=8) as being not generally relevant to the average medical setting.

Data Abstraction, Quality Ratings, and Statistical Methods

For eligible studies, 2 independent reviewers abstracted data and assigned a quality rating based on the published methods of the USPSTF.⁷⁵ Quality ratings were based primarily on the size of the sample, the participant selection, and the use of a credible reference standard or an accepted means of establishing cognitive and functional status, applied blindly and independently. The quality ratings were then compared and a third reviewer adjudicated disagreements.

Design factors of high-quality studies included sample size of greater than 100 participants, the use of a reference standard regardless of the screen result, and the independent interpretation of reference standards and screening instruments. Factors that decreased quality ratings, in addition to the absence of those previously mentioned, included: (1) the use of previously diagnosed groups to evaluate screening instrument performance; and (2) the use of a screening instrument not actually given in the proposed form, but rather made up of questions asked as part of a longer evaluation and separated out retrospectively.

To be considered *good*, a study was conducted in a community or primary care setting, used random or consecutive sampling, and the intact instrument was administered in an independent and blinded fashion. *Fair* studies did not meet at least 1 of these criteria but had no critical flaw considered to invalidate results. *Poor* studies had a flaw thought possibly to invalidate the results, such as criterion evaluations being administered only to individuals with positive screening results.

Descriptive data were abstracted from articles including the population studied, screening instruments used, and the presence of selection or verification bias. Selection bias was introduced when the population studied was not representative of the population of interest.⁷⁶ Verification bias^{76,77} was introduced when the screening test results were used to determine which patients would undergo a full evaluation. Data necessary to construct 2 × 2 tables were abstracted and sensitivity, specificity, and LRs were calculated. Positive LRs are the ratio of the likelihood of a positive test result in an individual with the condition to the likelihood of a positive test result in an individual without the condition. If an LR is 2, a positive test result (in this case, a positive score on a dementia screen) is twice as likely to occur in an individual with dementia

as opposed to in an individual without dementia. A negative LR of 0.2 means that a negative screening result is one fifth as likely to occur in an individual with dementia as opposed to an individual without dementia. Because the study designs differed substantially on important design elements (such as the threshold for a positive screening result), a meta-analysis was not conducted; instead, we report the median and range for LRs.

RESULTS

Previous Literature Synthesis

The 1996 USPSTF literature review⁷⁸ identified 4 screening instruments that were considered generally equivalent. The familiar MMSE tests multiple domains of cognition. The Short Test of Mental Status is an 8-item scale that tests abstraction and remote over-learned memory (such as birthday or the number of weeks in a year) in addition to the domains tested with the MMSE. The patient is asked to draw a cube and a clock face. Four items are used for immediate and delayed recall. The Blessed Information Memory Concentration Test is a 26-item screening instrument examining orientation, attention, recall, and remote memory. The Blessed Orientation Memory Concentration Test comprises 6 items from the Blessed Information Memory Concentration Test testing orientation, recall, and attention. The Functional Activities Questionnaire, a 10-item questionnaire to be completed by informants, was noted as particularly useful in the initial evaluation of functional impairment. Some items include a rating of the patient's ability to assemble tax records or balance a checkbook. The 2003 USPSTF¹³ update found relevant new data only for the MMSE; no other instruments had studies of sufficient validity to evaluate their performance in a primary care population. For the MMSE, thresholds for a positive test varied widely from 16 to 25. The median LR for a positive MMSE was 9.5 (range, 2-23); the

median LR for a negative MMSE was 0.18 (range, 0.08-0.34).^{13,79} The MMSE takes 7 to 10 minutes to administer. In the next section, we review the current evidence on the MMSE and newer screening instruments with data published since the second USPSTF review.

Study Quality of Newly Identified Studies

Twenty-nine studies met inclusion criteria and rated 25 different screening instruments as either good (n=3) or fair (n=26; TABLE 1). Some studies evaluated several different instruments so information could be examined for 42 unique instrument/study combinations. Of the 25 instruments, 18 were completed by patients only; 3 were completed by informants (the Dementia Questionnaire, the AD8, and the Informant Questionnaire for Cognitive Decline in the Elderly), and 4 used information from both patients and informants (the Psychogeriatric Assessment Scales, General Practitioner Assessment of Cognition, a simple question to informants and patients about subjective complaints, and the Community Screening Interview for Dementia).

Studies were not usually designed with the primary goal of evaluating the performance of the screening instruments. Thus, methodological problems were common. Five large studies performed criterion standard examinations on fewer than 50% of study participants.^{92,94,96,102,103} In these studies, all participants who performed poorly on the screening instruments were offered criterion standard evaluations along with a proportion of individuals who scored better; results were not adjusted for verification bias. Eight selected studies were facilitated with patients who were previously diagnosed with dementia plus controls with normal screening results, which introduced potential spectrum bias.* In 8 studies, the screening instrument was not given independently

*References 55, 80, 82, 83, 86, 93, 100, 101.

Table 1. Dementia Screening Performance*

Source	Sample, Setting, Country	Instrument	Positive Screen Cut Point†	Positive Likelihood Ratio (95% Confidence Interval)	Negative Likelihood Ratio (95% Confidence Interval)
Standard instrument‡					
Frank and Byrne, ⁸⁰ 2000	Consecutive, specialty, Australia	MMSE	25	13 (3.5-51.0)	0.12 (0.04-0.35)
Rait et al, ⁸¹ 2000	Convenience, mixed, Great Britain	MMSE	25	3.8 (2.2-6.4)	0.21 (0.03-1.3)
Hogervorst et al, ⁸² 2002	Convenience, specialty, Great Britain	MMSE	24	47 (12.0-190.0)	0.17 (0.11-0.27)
Kirby et al, ⁸³ 2001	Convenience, primary care, Ireland	MMSE	23	7.1 (5.5-9.2)	0.14 (0.06-0.32)
Brodady et al, ⁸⁴ 2002	Consecutive, primary care, Australia	MMSE	24	3.4 (2.6-4.4)	0.26 (0.17-0.76)
Heinik et al, ⁸⁵ 2003	Consecutive, specialty, Israel	MMSE	23	5 (2.3-11.0)	0.06 (0.02-0.16)
Kuslansky et al, ⁸⁶ 2004	Mixed, mixed, United States	MMSE	24	3.9 (3-5.2)	0.37 (0.26-0.53)
Borson et al, ⁸⁷ 2003	Convenience, community, United States	MMSE	24	11.8 (8.9-16.0)	0.31 (0.22-0.44)
Cullen et al, ⁸⁸ 2005	Aged >65 years, primary care, Great Britain	MMSE	24	7.0 (5.8-8.4)	0.10 (0.04-0.27)
De Lepeleire et al, ⁸⁹ 2005	Convenience, community, the Netherlands	MMSE	24	5.65 (3.1-10.0)	0.25 (0.1-0.6)
Mackinnon and Mulligan, ⁸³ 2003§	Convenience, community, Australia	MMSE plus Informant Questionnaire for Cognitive Decline in the Elderly	MMSE 26 or Informant Questionnaire for Cognitive Decline in the Elderly >3.6	4.2 (3.5-5.0)	0.11 (0.04-0.33)
Brief instruments					
Kuslansky et al, ⁹⁰ 2002	Mixed, community, United States	Memory Impairment Screen	4	33 (15.0-72.0)	0.08 (0.02-0.3)
Rait et al, ⁸¹ 2000	Convenience, mixed, Great Britain	Abbreviated Mental Test	6	12 (4.3-33.0)	0.35 (0.11-1.1)
Brodady et al, ⁸⁴ 2002	Consecutive, primary care, Australia	Abbreviated Mental Test	7	6 (3.4-11.0)	0.63 (0.52-0.76)
Storey et al, ⁹¹ 2001	Consecutive, specialty, Australia	Clock drawing	Different methods tested	1.2-3.1	0.13-0.71
Kirby et al, ⁸³ 2001	Convenience, primary care, Ireland	Clock drawing	5 (Sunderland Method)	4 (3.1-5.1)	0.3 (0.17-0.52)
Heinik et al, ⁸⁵ 2003	Consecutive, specialty, Israel	Clock drawing	11 (Friedman Method)	7.8 (2.5-22.0)	0.17 (0.1-0.29)
Solomon et al, ⁹² 2000	Consecutive, primary care, United States	7-Minute Screen	Logistic regression	47 (3-730)	0.09 (0.01-0.59)
Robert et al, ⁹³ 2003	Convenience, mixed, France	Short Cognitive Evaluation Battery	Logistic regression equation 0.356	6.3 (3.6-11.0)	0.07 (0.02-0.21)
Brodady et al, ⁸⁴ 2002	Consecutive, specialty, Australia	General Practitioner Assessment of Cognition	10	4.8 (3.5-6.6)	0.22 (0.14-0.41)
Kuslansky et al, ⁹⁰ 2002	Mixed, community, United States	3-Word Recall	0	4.3 (2.8-6.6)	0.42 (0.24-0.69)
Carr et al, ⁵⁵ 2000	Convenience, community, United States	Subjective complaints	Positive response	Informant 6.5 (4.4-9.6), Patient 1.8 (1.5-2.2)	Informant 0.1 (0.07-0.14), Patient 0.36 (0.28-0.47)
Callahan et al, ¹⁰³ 2002¶	Convenience, mixed, United States	6-Item Screener	≥3 Errors	7.3 (5.1-10.0)	0.15 (0.04-0.14)
Borson et al, ⁸⁷ 2003¶	Convenience, community, United States	Mini-Cog	2	13.0 (9.9-17.0)	0.25 (0.17-0.37)
Belle et al, ¹⁰² 2000¶	Random, community, United States	Short and Sweet Screening Instrument	MMSE 26 Verbal fluency <23 Temporal orientation >2 (errors increase points indicating dementia)	11 (8.9-13.0)	0.06 (0.02-0.16)
Mendiondo et al, ¹⁰⁶ 2003¶	Convenience, specialty, United States	Brief Alzheimer Screen	26	25.0 (17.0-35.0)	0.02 (0.01-0.04)

(continued)

Table 1. Dementia Screening Performance* (cont)

Source	Sample, Setting, Country	Instrument	Positive Screen Cut Point†	Positive Likelihood Ratio (95% Confidence Interval)	Negative Likelihood Ratio (95% Confidence Interval)
More comprehensive instruments					
Hall et al, ⁹⁴ 2000	Random, community, United States and Canada	Community Screening Interview for Dementia	Formula with site-dependent coefficient	United States 3.1 (2.4-4.0), Canada 10.7 (6.7-17.0)	United States 0.15 (0.07-0.35), Canada 0.08 (0.01-0.53)
Heinik et al, ⁹⁵ 2003	Consecutive, specialty, Israel	Cambridge Cognitive Examination	80	13 (3.4-49.0)	0.01 (0.0-0.16)
Lolk et al, ⁹⁵ 2000	Random, community, Denmark	Cambridge Cognitive Examination	Formula used	3.7 (2.3-6.0)	0.25 (0.11-0.56)
Khachaturian et al, ⁹⁶ 2000	Random, community, United States	Community Screening Interview for Dementia	86	3.1 (2.8-3.5)	0.04 (0.01-0.12)
Hayden 2003	Random, community, United States	Modified Mini-Mental State Examination	82	9.2 (6.7-12.0)	0.10 (0.04-0.53)
Bland and Newman, ⁹⁷ 2001	Random, community, Canada	Modified Mini-Mental State Examination	77	8.6 (7.0-11.0)	0.14 (0.07-0.3)
Hayden, 2003	Random, community, United States	Modified Mini-Mental State Examination plus Dementia Questionnaire	Modified Mini-Mental State Examination 83 if aged >80 years, 86 if aged <80 years Dementia Questionnaire 2	17 (11.0-27.0)	0.17 (0.09-0.33)
Instruments for special situations					
Lipton et al, ⁹⁸ 2003	Mixed, mixed, United States	Memory Impairment Screen-Telephone Version	4	11 (6.9-18.0)	0.24 (0.12-0.49)
Lipton et al, ⁹⁸ 2003	Mixed, mixed, United States	Telephone Interview for Cognitive Status	28	5.3 (3.7-7.7)	0.30 (0.16-0.57)
Swearer, ⁹⁹ 2002	Mixed, mixed, United States	Cognitive Assessment Screening Test	33	17.0 (4.2-66.0)	0.13 (0.02-0.81)
Hogervorst et al, ⁸² 2002	Convenience, specialty, Great Britain	Hopkins Verbal Learning Test	Memory score 24 Total recall 14	48 (12.0-190) 49 (13.0-200.0)	0.16 (0.1-0.26) 0.14 (0.08-0.24)
Frank and Byrne, ⁸⁰ 2000	Consecutive, specialty, Australia	Hopkins Verbal Learning Test	18	4.8 (2.3-9.9)	0.05 (0.01-0.34)
Kuslansky et al, ⁸⁶ 2004	Mixed, mixed, United States	Hopkins Verbal Learning Test	15	4.9 (3.8-6.4)	0.21 (0.13-0.35)
Nasreddine et al, ¹⁰⁰ 2005	Convenience, mixed, United States	Montreal Cognitive Assessment	25	7.7 (4.4-12.7)	0.01 (0.0-0.61)
Galvin et al, ¹⁰¹ 2005	Convenience, community, United States	AD8	>2	5.6 (3.6-8.9)	0.23 (0.17-0.3)
Mackinnon and Mulligan, ¹³⁰ 2001¶	Random, community, Switzerland	Psychogeriatric Assessment Scales	Cognitive impairment (patients test) Cognitive decline (informants test)	Geneva 3.6 (2.7-5.1), Zurich 3.6 (2.9-4.5) Geneva 4.8 (3.4-6.7), Zurich 10.0 (6.8-14.7)	Geneva 0.3 (0.2-0.7), Zurich 0.13 (0.03-0.5) Geneva 0.34 (0.2-0.6), Zurich 0.13 (0.05-0.4)

Abbreviation: MMSE, Mini-Mental State Examination.

*Some studies are listed more than once because multiple instruments were evaluated. Unless noted, instruments were rated as fair except Brodaty et al (Abbreviated Mental Test and General Practitioner Assessment of Cognition), Solomon et al, and Hall et al, which received the quality rating of good. Good ratings required a pool of 100 or more previously undiagnosed participants, chosen randomly or consecutively in a primary care or community setting, and given an independently administered and blindly interpreted reference standard evaluation. Fair studies lacked some of these qualities but were not thought by reviewers to have an invalidating flaw (see the "Data Abstraction, Quality Ratings, and Statistical Methods" section in "Methods.")

†Instruments (scoring ranges): MMSE (0-30); Informant Questionnaire for Cognitive Decline in the Elderly (1-5); Memory Impairment Screen (0-8); Abbreviated Mental Test (0-10); clock drawing test, Sunderland Method (0-10); clock drawing test, Friedman Method (0-15); General Practitioner Assessment of Cognition (0-15); 3-Word Recall (0-3); 6-Item Screener (0-6); Mini-Cog (0-5); Short and Sweet Screening Instrument (MMSE [0-30], temporal orientation test [0-113, errors are given points so a low score is better], fluency score [can score as high as the patient can reach]); Brief Alzheimer Screen (includes a fluency test that can score as high as the patient can reach plus 9 other points for which patients are tested); Cambridge Cognitive Examination (0-105); Modified Mini-Mental State Examination (0-100); Dementia Questionnaire (0-5); Memory Impairment Screen-Telephone Version (0-8); Telephone Interview for Cognitive Status (0-41); Cognitive Assessment Screening Test (0-40); Hopkins Verbal Learning Test (Hogervorst et al,⁸² [memory score, 0-48; total recall, 0-36]; Frank and Byrne,⁸⁰ and Kuslansky et al,⁸⁶ [0-36]); Montreal Cognitive Assessment (0-30); AD8 (0-8); Psychogeriatric Assessment Scales (cognitive impairment, 0-21; cognitive decline, 0-10).

‡Psychological Assessment Resources Inc now holds the copyright for the MMSE. The MMSE may be administered free of charge from memory, from a reprint of the original paper, or from a source authorized by Psychological Assessment Resources Inc to reprint the test. Otherwise, there is a charge for the use of the Psychological Assessment Resources, Inc's score sheets.

§Populations with low educational levels were excluded with use of the Informant Questionnaire for Cognitive Decline in the Elderly instrument.

||Confidence intervals are not shown because researchers assessed 5 separate methods for clock scoring; instead, a range of likelihood ratios are provided.

¶Screening instruments in these studies were not administered by methods suggested by the authors of the instruments. These instruments were included in the analysis of this study, but they were added retrospectively and not as part of the original meta-analysis. Scores for these instruments were based on item scores from items originally administered as part of other instruments.

from the criterion standard interview and the diagnosis of dementia was not made blinded to the screening results.^{87,95,97,102,104-107} In 8 studies, the screening items were not administered as an intact instrument^{85,87,102-106,108} and the questions comprising these instruments were drawn retrospectively from a larger group of questions. In

each instance, these study design factors bias the results toward improved performance.

Domains Tested by Screening Instruments Given to the Patient. Multiple dimensions of cognitive functioning are tested by the various

screening instruments (TABLE 2). The most commonly tested areas are visuospatial, recall, and orientation skills. The clock-drawing test primarily examines visuospatial skills. Some instruments such as the Hopkins Verbal Learning Test, the Memory Impairment Screen, and 3-Word Recall check only for registration (the

Table 2. Dementia Screening Instruments: Domains and Administration Times

Scale	Time to Administer, min*	Memory				Praxis, Visuospatial	Aphasia, Verbal Fluency	Attention	Abstraction	Executive Functioning Functional Status
		Orientation	Registration Recall	Remote/Over Learned Memory						
Subjective questions to patient and informant	1-2									
6-Item Screener	1-2	X	X							
Clock Drawing	1-3				X					
3-Word Recall	3		X							
Mini-Cog	3-4		X		X					
Memory Impairment Screen	4		X							
Brief Alzheimer Screen	3-5	X	X			X	X			
AD8	3-5	X	X						X	
General Practitioner Assessment of Cognition	4-5	X	X		X				X	
Blessed Orientation Memory Concentration Test†	4-6	X	X				X			
Hopkins Verbal Learning Test	5		X							
Abbreviated Mental Test	5-7	X	X	X			X			
Informant Questionnaire for Cognitive Decline in the Elderly	5-7	X		X	X				X	
Telephone Interview for Cognitive Status	7-9	X	X	X			X	X		
7-Minute Screen	7-9	X	X		X	X				
Montreal Cognitive Assessment	10	X	X		X	X	X	X		
Short Cognitive Evaluation Battery	8-12	X	X		X	X				
Short and Sweet Interview for Dementia	10	X	X		X	X	X			
Short Test of Mental Status†	10-12	X	X	X	X		X	X		
Mini-Mental State Examination	7-10	X	X		X		X			
Blessed Information Memory Concentration Test†	10-12	X	X	X			X			
Functional Activities Questionnaire†	10-15	X			X		X		X	
Modified Mini-Mental State Examination	10-15	X	X	X	X	X	X	X		
Montreal Cognitive Assessment	10	X	X		X	X	X	X	X	
Cognitive Assessment Screening Test	15‡	X		X	X				X	
Cambridge Cognitive Examination	20	X	X	X	X	X	X	X	X	
Psychogeriatric Assessment Scales	20-30‡	X	X	X	X		X		X	
Community Screening Interview for Dementia	30	X	X		X			X	X	
Dementia Questionnaire	20-30	X	X		X	X			X	

*Administration times obtained from published figures when available; otherwise, from field tests for this study.

†These instruments were reviewed in the 1996 US Preventive Health Services Task Force report.¹³ There were no new studies identified in the current review.

‡The Cognitive Assessment Screening Test is completed by the patient; therefore, 15 minutes of provider time is not needed. The Psychogeriatric Assessment Scales test has informant and patient parts, each taking 15 minutes.

immediate recording of the words) and recall ability. Other screening instruments test a variety of domains. The Cambridge Cognitive Examination and the Modified Mini-Mental State Examination test the most separate domains examining visuospatial, registration/recall, orientation skills, verbal fluency, attention, abstraction, and remote/over learned memory. The Montreal Cognitive Evaluation tests all of these domains except remote memory.

Instruments Given to Informants. There are several informant questionnaires available that may be helpful in screening for cognitive impairment including the Informant Questionnaire on Cognitive Decline in the Elderly (available in 26- and 16-item formats), the Dementia Questionnaire, the Functional Activities Questionnaire, and an informant scale modified from the Cambridge Cognitive Examination. A 1996 meta-analysis of 7 studies comparing the Informant Questionnaire on Cognitive Decline in the Elderly with the MMSE in heterogeneous populations found the Informant Questionnaire on Cognitive Decline in the Elderly comparable with the MMSE in screening for dementia.¹⁰⁹ The AD8 is a promising brief informant questionnaire but it has been evaluated in only 1 study.¹⁰¹ The informant scales ask for information about a patient's memory, orientation, and functional abilities.

Accuracy of Screening Instruments for Dementia

When tests of cognitive functioning are given, it is possible that a patient's educational level, age, sex, and race can influence results. The norms for various groups have been most studied for the MMSE, but any instrument could be affected.

Mini-Mental State Examination. The Mini-Mental State Examination is the most studied of the brief cognitive tests. Cut points have varied widely (from 16-26), with scores less than 23 and less than 24 being the most common thresholds for an abnormal result. Reported sensitivities and specificities have also

varied. A 1996 meta-analysis⁷⁸ found sensitivities between 71% and 92% and specificities between 56% and 96%. In the current review, the median LR for a positive MMSE test result was 6.3 (range, 3.4-47.0) and the median LR for a negative MMSE test result was 0.19 (range, 0.06-0.37). These results are similar to results reported in the 2003 USPSTF¹³ update.

The MMSE remains a reasonable screening instrument for assessing the severity of dementia and communicating the severity to other clinicians. MMSE cut points should be adjusted for a patient's age. MMSE scores have been shown to be influenced by educational levels^{72,110-121} although not in all samples.^{110,122-124} Using information derived from the Modified Mini-Mental State administration to 7754 participants in the Canadian Study of Health and Aging, Bravo and Hebert¹²⁰ found that 12% of the variance of MMSE scores was accounted for by age and education. In one study of hospitalized patients,¹¹⁷ all of the false-positive screens from the MMSE were from patients with less than 9 years of education. In another study of patients in a geriatric primary care practice,¹²¹ 25% of those with an eighth grade education or less scored between 18 and 23 on the MMSE, a range that would generally be considered impaired. Age- and education-adjusted norms have been published for the MMSE,^{72,120,123,125} but no simple point adjustment for lower education below a certain point has been recommended. The MMSE can also show a ceiling effect¹²⁶⁻¹²⁸ allowing many individuals, especially those with a higher level of education, even those with cognitive impairment, to have a perfect score of 30/30. This ceiling effect may limit the sensitivity of the MMSE, especially for individuals with mild cognitive impairment or mild dementia.

Brief Instruments. Subjective complaints of memory problems may arise during the course of any patient visit. We identified a single study that found an LR of 1.8 for a report of memory complaints (95% CI, 1.5-2.2).⁵⁵ Sub-

jective complaints of memory problems lack specificity because they are also associated with depression (further complicated by an association between depression and dementia). A subjective report from an informant that the patient has memory problems, particularly an informant who lives with the patient, is more associated with cognitive decline than reports from the patient with an LR for a positive response of 6.5 (95% CI, 4.4-9.6).⁵⁵ Typically, self-reported memory problems or the report of an informant should trigger further evaluation with a standardized instrument for dementia.

Several brief tests exhibit promising performance and can be completed in less than the 7 to 10 minutes required for the MMSE. The Memory Impairment Screen is a quick test of recall ability (4 minutes to perform); LR for a positive test result is 33 (95% CI, 15.0-72.0) and LR for a negative test is 0.08 (95% CI, 0.02-0.3).⁹⁰ The patient is given the name of items representing each of 4 different categories (eg, an animal, a city, a vegetable, and a musical instrument). The patient is asked to remember them and given a brief diversionary task. If the words are not then spontaneously recalled, patients are prompted to recall the name of each item (eg, "tell me the name of the city"). Two points are given for each freely recalled word and 1 point for each word recalled only after prompts.¹²⁹ The Albert Einstein College of Medicine owns the copyright to the Memory Impairment Screen and permits use of the Memory Impairment Screen for research use, but licenses the test for commercial use. However, advantages of the scale include the simplicity of the approach and uncomplicated scoring.

The Abbreviated Mental Test (5-7 minutes) adds orientation, remote memory, and a test of attention (2 studies; positive LR, 6 and 12, negative LR, 0.35 and 0.63).^{81,84} Clock drawings are helpful in some forms (1-3 minutes), but sensitivity to mild forms of impairment can be low and the clocks must be scored appropriately.

In the 3 articles using different clock-scoring methods, the LRs for a positive test ranged from 1.2 to 7.7 with LRs for a negative test ranging from 0.13 to 0.71.⁹¹ The 7-minute screen and closely related Short Cognitive Evaluation Battery involve logarithmic scoring and often take more than 7 minutes to administer, but they test several cognitive domains and have good discriminate power.^{92,93} The General Practitioner Assessment of Cognition is a promising screening instrument (4-5 minutes), although only 1 study was identified in this set (positive LR, 4.8; 95% CI, 3.5-6.6; negative LR, 0.22; 95% CI, 0.14-0.41).⁸⁴

The performance of the Mini-Cog, the Short and Sweet Screening Instrument, the Brief Alzheimer Screen, the 6-Item Screener, and the Psychogeriatric Assessment Scales cannot be determined with confidence because none of these screens were actually administered in their suggested forms.^{87,102,103,106,130} However, the performance suggested by the retrospective analyses reported in these articles is promising.

Comprehensive Instruments. A number of instruments evaluate multiple domains of cognition, thus having the potential to increase accuracy at the cost of increased administration time. For this group of questionnaires, the median LR for a positive test result is 8.9 (95% CI, 3.1-17.0). The median LR for a negative test result is 0.12 (95% CI, 0.01-0.25). The Modified Mini-Mental State Examination adds a cued recall (eg, offering the prompt *an animal* for the word dog) if needed, a test of verbal fluency (number of 4-legged animals), and a brief similarities test asking the patient to identify what things have in common (eg, arm and leg) to the MMSE. The additional domains create a wider range for scores, but the Modified Mini-Mental State Examination takes 10 to 15 minutes to administer. The Cambridge Cognitive Examination (the neuropsychological battery from the Cambridge Mental Disorders of the Elderly Examination) appears to have good discriminative ability with LRs for a positive test of 3.7 and

Box 2. Most Practical Screening Instruments for Generalist Physicians by Clinical Issue and Appropriate Test

Want to Find Cognitive Impairment of at Least Moderate Severity

Mini-Mental State Examination

Suspicion of Mild Impairment or Highly Educated Patient

Hopkins Verbal Learning Test or the Word List Acquisition Test

Very Little Time Available

Memory Impairment Screen or the Clock Drawing Test

Plenty of Time Available

Cambridge Cognitive Examination, Modified Mini-Mental State Examination, Community Screening Interview for Dementia, or the Montreal Cognitive Assessment

13 in 2 studies and LRs for negative tests of 0.01 and 0.25, but requires 20 minutes to administer.^{85,95}

Instruments for Special Situations.

Other screening tests could be useful in special situations. The Cognitive Assessment Screening Test,⁹⁹ also represented here by only 1 study, is promising for patients who are able to complete a paper and pencil instrument independently while waiting. Aside from the informant questionnaires and sections, the Cognitive Assessment Screening Test is the only instrument that includes questions about functional impairment. All others focus exclusively on cognitive screening. Screening instruments administered over the telephone, such as the Telephone Interview for Cognitive Status and Memory Impairment Screen–Telephone Version⁹⁸ could be useful for brief evaluations outside the pressed atmosphere of the primary care appointment. The Hopkins Verbal Learning Test^{86,131,132} shows good discriminative ability with LRs in 3 studies of 4.8 to 49 for a positive test result and 0.05 to 0.21 for a negative test result. It has no ceiling effects, making it useful in highly educated patients. It is administered by presenting 12 words, then checking recall on 3 separate trials. This is followed by presenting the 12 words admixed with decoy words to test recognition. It requires purchase of materials (Hopkins Verbal Learning Test–

Revised available from www.parinc.com). The Psychogeriatric Assessment Scales¹³⁰ can screen for depression and stroke as well as for dementia but takes approximately 30 minutes.

SCENARIO RESOLUTION

A patient presenting with subjective complaints of memory impairment should be evaluated for dementia, delirium, and depression.

You do a Mini-Mental State Examination with Ms A who scores 28/30 points. She misses 1 point for concentration and 1 for recall of words after a delay. She denies feeling depressed and enjoys shopping and spending time with her friends and family. Her PHQ-9 (the patient health questionnaire, a depression measure) score is 6 indicating minimal depressive symptoms. She consents to your discussing her situation with her daughter who reports that for the last 6 months her mother has been forgetting recent conversations, failed to remember a lunch appointment, and forgot to pay some of her bills. There is no evidence of an altered level of consciousness. You decide that given her educational level, she should undergo another screening. You administer the Hopkins Verbal Learning Test and based on her score of 17, decide there is a reasonably high likelihood that she may have dementia. You refer her for further evaluations. These evaluations

should include a medical history, physical examination, and laboratory testing, and may include neuroimaging and neuropsychological testing.

CONCLUSION

Many instruments exist for evaluating a patient with suspected cognitive impairment. For many reasons, including time-constrained general medical appointments, the subtlety of early impairment, and the poor sensitivity of many brief screening instruments, no single instrument is ideal for all settings (BOX 2). To determine the presence and severity of cognitive impairment that is at least moderate in degree, the MMSE is the most studied instrument and a reasonable choice. Clinicians who have not memorized the MMSE must either administer it from an approved copy^{72,73} or purchase copies. If a brief instrument is needed and sensitivity is not of paramount importance, a quick screen such as the Memory Impairment Screen or a scored clock test can be used. When more time is available to evaluate cognitive status, the Cambridge Cognitive Examination, Modified Mini-Mental State Examination, or Community Screening Interview for Dementia may yield greater accuracy. To look for cognitive decline in a high-functioning, educated population, an instrument with less of a ceiling effect is required (such as word list acquisition test or Hopkins Verbal Learning Test), but none are short and readily administered in a primary care setting.

As the population ages and the number of patients with dementia increases rapidly, primary care settings will see many more patients at various stages of dementia. Clinicians should pick 1 primary tool that is population appropriate, then consider adding 1 or 2 others for special situations as needed.

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Study concept and design: Holsinger, Deveau, Boustani, Williams.

Acquisition of data: Holsinger, Deveau, Williams.

Analysis and interpretation of data: Holsinger, Boustani, Williams.

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