

Functional assessment

Easy-to-use screening tools speed initial office work-up

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The mnemonic DEEP-IN stands for a series of easy-to-administer, office-based screening tests designed to streamline initial assessment of the geriatric patient. These screens can quickly identify signs of delirium, dementia, depression, and adverse drug effects; vision and hearing deficits; risk for future impairments in activities of daily living; incontinence, and malnutrition. The author developed the mnemonic from personal experience and from an evidence-based application of validated geriatric and geropsychiatric studies.

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An older patient's functional status is one of the most important considerations in the initial geriatric assessment. Declining functional status is a marker for underlying conditions that as yet may be undiagnosed. Performing an assessment that reveals emerging problems is challenging, however, because certain syndromes and conditions manifest differently in the geriatric patient than in younger populations. But the effort can be streamlined by using screening tools that are tailor-made for the primary care setting.

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Systematic screening for common geriatric syndromes can help reduce the chances that a problem will go untreated and worsen with time.^{1,2} Screening results can also spur medical or lifestyle interventions that produce improvements in functional disabilities. Such progress is important because even incremental gains can produce significant positive effects for older patients and their families.

This article describes how to use a series of easy-to-administer, office-based screening tests designed to streamline initial assessment of the geriatric patient. These screens can quickly identify conditions that undermine physical and cognitive status, independence, and quality of life.

DEEP-IN

The mnemonic DEEP-IN (table 1) can help physicians quickly identify older patients who are frail or at high risk for frailty. The disorders encompassed by DEEP-IN go beyond the medical conditions and syndromes typically

screened for in older patients and include delirium, dementia, depression, polypharmacy side effects, vision and hearing impairments, decline in general physical performance, incontinence, and malnutrition.

The screens suggested by the mnemonic are not diagnostic, but their results can indicate which patients may benefit from further testing or intervention. The "D" in the mnemonic represents delirium, dementia, depression, and drugs. The subsequent categories are "EE" for eyes and ears, "P" for physical performance, "I" for incontinence, and "N" for nutrition.

Delirium

For cases of suspected delirium in an older adult, a good rule of thumb is to consider any change in mental status to be a delirium until proven otherwise. This is particularly true if the episode occurs when a patient is in the emergency department, the hospital, a nursing home, or an assisted living setting. The Confusion Assessment Method³ can be used to identify the presence of a delirium in a patient who meets the first two criteria and either of the other two:

- acute onset and fluctuating course (Is there evidence of an acute change in mental status, and does the behavior come and go?)

- inattention (Does the patient have difficulty focusing attention? Is the patient easily distracted or having difficulty following what is being said?)

- disorganized thinking (Is the patient's speech rambling or irrelevant, or switching from one subject to the next?)
- an altered level of consciousness. (A normal patient should be alert; any other assessment of the patient's level of consciousness [eg, lethargic, stupor, or hyperalert] is abnormal.)

Younger persons with a delirium, including those experiencing alcohol withdrawal syndrome, typically exhibit a hyperkinetic, hyperalert delirium. In older persons, however, a delirium tends to be "quiet." It is marked by lethargy and difficulty responding to stimuli, and patients are hypokinetic and hypoalert. Causes include drugs; electrolyte imbalance; organ-specific illnesses such as lung, liver, cardiac, and renal disease; common infections such as pneumonia, gallbladder sepsis, and urinary tract infections; and pain.

Lingering effects. Most clinicians presume that an episode of delirium is reversible, but the data suggest otherwise. One important study looked at the outcomes of 325 hospitalized older patients with delirium who were admitted from either the community or a long-term care facility.⁴ Using DSM-III criteria, the researchers found complete resolution of delirium symptoms in 4% of patients at hospital discharge, in 20% after 3 months, and in 17% after 6 months. Average length of hospitalization was 19 days for patients with a delirium, compared with 7 days for those without one. Finally, older patients with a delirium had a seven-fold increased risk for nursing home placement.

Thus, when counseling the family of a patient with delirium, it is important for physicians to discuss potential outcomes frankly and realistically. Complete resolution of delirium is often a slow process; in some cases, it can take months to years.

Dementia

The Folstein Mini-Mental State Examination (MMSE) is widely used to help evaluate patients with suspected dementia, but it can be time-consuming to administer and its results difficult to

Table 1 DEEP-IN mnemonic for geriatric functional assessment

- D** Delirium, dementia, depression, drugs
- E** Eyes (vision impairment)
- E** Ears (hearing impairment)
- P** Physical performance and "phalls" (falls)
- I** Incontinence
- N** Nutrition

Source: Prepared for Geriatrics by Fredrick T. Sherman, MD, MSc

interpret, particularly in patients with little education. An alternative is an easily administered, inexpensive, and effective screen that allows the physician to quickly identify patients who warrant a more thorough examination.

Although many tools are available, the five discussed below evaluate recent memory, verbal fluency, and constructional abilities. They accomplish the goal of distinguishing the remarkable from the unremarkable patient. If the results of any of these screens raise suspicions of dementia, the MMSE should be administered.

Three-item recall. To conduct this test, tell the patient that you are going to name three objects (eg, ball, flag, and tree) and that you want her to remember them so that she can recite them 1 minute later. Recall of all three items suggests a low probability of dementia, whereas recall of only one or two is associated with a moderate increase in the odds of dementia.⁵

Animal-naming test. This screen is used to gauge impairment of verbal fluency and access to semantic memory. Ask the patient to name as many animals as he or she can in a 1-minute span. The typical response of a patient with Alzheimer's disease would be: "dog, cat, cow, [long pause] dog. . ." Then the patient's attention will drift off, and he or she will lose focus.

Older persons without dementia can usually name 18 different animals within the 1-minute span. Anything less than 12 is abnormal and correlates well with an MMSE score of less than 23. Animal-naming test scores can vary depending on the patient's age and

level of education, but 18 and 12 are generally good cutoff points for normal and abnormal results, respectively.⁶

Clock completion test. This test evaluates nondominant parietal lobe function, which is often diminished in early-stage Alzheimer's disease. To perform the test, draw a circle approximately 3 inches in diameter on an unlined piece of white paper, then ask the patient to write the numbers 1 through 12 in the circle so that the result resembles a standard clock face. Patients with dementia tend to bunch the numbers in an uneven manner, usually placing most of them on the right half of the circle. The most accurate way to score this test is to section the clock face into quadrants after the patient has completed the task (figure). On a properly performed exam, each quadrant will contain three numbers (12 to 2, 3 to 5, and so on).⁷

The patient's entries in the first three quadrants are scored as either 0 (normal) or 1 (abnormal). The fourth quadrant (9 to 11), which is the most sensitive indicator of dementia, is scored as either 0 (normal) or 4 (abnormal). Add up the scores of the four quadrants (maximum, 7). Any score of 4 or more is a good indication of the presence of dementia. Because of the high number of points assigned to it, results from the fourth quadrant alone are often diagnostic.

The clock completion test was validated in a study that compared its results with those using standard mental status tests such as the Short Blessed Test.⁷ The investigators retrospectively reviewed the results of clock-drawing tests taken from 76 consecutive out-

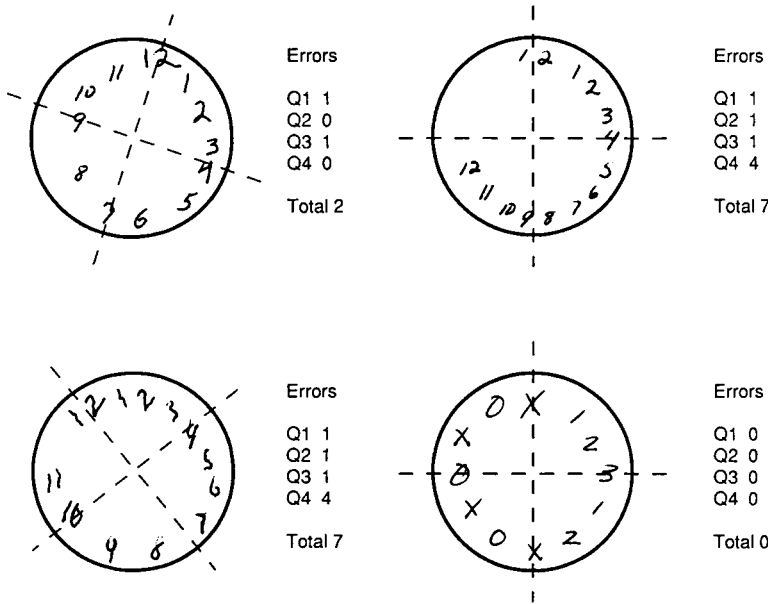


Figure. The clock completion test begins by asking the patient to write the numbers 1 through 12 in a 3-inch circle so that the result represents a standard clock face. The dotted lines illustrate the sectioning of the clock face into four equal quadrants based on the digit that best represents the 12 of a correctly completed clock. The quadrant error scores flank each of the clocks. As the clock in the bottom right hand corner shows, positioning of the digits, rather than listing the correct clock face numbers, is the focus of the test.

Source: Reprinted with permission from Watson YI, Arfken CL, Birge SJ. Clock completion: An objective screening test for dementia. *J Am Geriatr Soc* 1993; 41:1235-40.

patients, age 55 to 92 (mean, 76), of whom 40 had dementia. The researchers found the clock completion test to be a reliable method of identifying dementia, with sensitivity of 87% and specificity of 82%. The clock test, however, was not found to be an accurate indicator of the severity of dementia.⁷ A patient who scores a 6 is not necessarily more cognitively impaired than a patient who scores a 4.

Four IADL score: Although there are seven recognized instrumental activities of daily living (IADLs), the Four IADL Score⁸ relies on the following four measures:

- money management
- medication management
- telephone use
- and traveling.

If your patient is physically able to perform these IADLs but needs assistance, suspect a developing dementia. Simply asking a family member or friend if the patient needs assistance is all that is required to administer the

test. It is important to ask the primary caregiver because patients with mild cognitive impairment often do not realize the extent of their disability and deny any functional impairment. The more IADLs that are impaired in a community-residing older person, the greater the probability that dementia will develop within 1 year.

7-minute battery. The 7-minute neurocognitive battery (also the 7-minute screen) consists of four sets of questions that focus on orientation to time and date, memory, visuospatial skills, and verbal fluency. Three of its four tests are similar versions of the three-item recall, animal-naming test, and clock-completion test mentioned above. The 7-minute screen is clinically appealing because it:

- can be administered and scored in approximately 7 minutes and 40 seconds (hence the screen name)
- can be administered in the outpatient setting by a trained assistant
- has a sensitivity of 92% and specificity of 96% for detecting Alzheimer's disease.⁹

(For more information on the 7-minute screen, visit <http://www.7minutescreen.com>.)

Depression

Depression is no more common in older adults than in middle-aged or younger populations, but it can be more devastating. Suicide is the most extreme consequence of depression in older persons. An older white man who verbalizes suicidal intent is at highest risk for carrying out a self-destructive act. Older male patients who do commit suicide tend to use violent, aggressive measures. Thus statements of intent should be taken seriously.

The depression screen should begin

Table 2 Five-item version of the Geriatric Depression Scale

1. Are you basically satisfied with your life?
2. Do you often get bored?
3. Do you often feel helpless?
4. Do you prefer to stay home rather than going out and doing new things?
5. Do you feel pretty worthless the way you are now?

Positive answers for depression screening are "yes" to questions 2, 3, 4, and 5 and "no" to question 1. A score of 0 to 1 positive answer suggests the patient is not depressed; a score of 2 or higher indicates possible depression

Sensitivity: 97%; specificity: 85%; positive predictive value: 85%; negative predictive value: 97%

Source: Reprinted with permission from Hoyl MT, Alessi CA, Harker JO, et al. Development and testing of a five-item version of the Geriatric Depression Scale. *J Am Geriatr Soc* 1999; 47(7):873-8.

with a single question: “Do you often feel sad or depressed?” Sensitivity and specificity for this question are 85 and 65%, respectively, so it is a relatively sensitive but nonspecific question. It is, however, a start. If the patient answers affirmatively, further screening can be performed using the five-item Geriatric Depression Scale (table 2).¹⁰

If results of either test are positive, the primary care physician should perform a thorough interview that evaluates neurovegetative signs, including sleep and appetite disturbances. Antidepressant therapy and referral for psychotherapy should be initiated. Failure of antidepressants or the expression of suicidal thoughts warrant referral to a psychiatrist.

Drugs

Any older patient who is taking more than four prescribed drugs has an increased risk for falls. Certain drug classes pose more risk of falls than others, including any of the “anti” agents—antipsychotics, antidepressants, and antihypertensives. The long-acting benzodiazepines have been associated with cognitive impairment and falls in older adults. Over-the-counter agents and alternative or complementary supplements can also pose risks of interactions when used with prescription agents, so always ask patients about their use of nonprescribed remedies.

Ears (hearing impairment)

Before performing any hearing test, check the patient’s ear canal for obstructions and remove excess cerumen. Sometimes cerumen removal alone can resolve hearing impairment. Patients who score poorly on hearing tests should be referred to an audiologist.

Whisper test. An audiscope is an effective screening tool for hearing impairment, but an economical and equally effective alternative is the “whisper test.” To perform this screen, place yourself directly in front of and a few feet across from the patient (patient and physician should both be seated or standing). Explain that you

are going to whisper some numbers; then ask the patient to close his eyes.

Lean toward the patient to within 12 to 18 inches from his face, exhale (to standardize the volume) and whisper four random single numbers at 1-second intervals. Ask the patient to repeat all the numbers you whispered. A patient who does not hear at least two of the numbers fails the test, which has a sensitivity of 80 to 100% and specificity of 80 to 90%.

Audioscope. The audioscope delivers four high-frequency (500, 1,000, 2,000 and 4,000 Hz) tones at approximately 40 dB. A patient unable to discern the 1,000- or 2,000-Hz tone in either or both ears is considered to have a hearing impairment. Sensitivity and specificity of audioscopic testing are 94 and 72%, respectively (roughly comparable to the whisper test).

Eyes (vision impairment)

The first step in screening for a visual impairment is to ask the patient, “Because of your eyesight, do you have any difficulty driving, watching television, reading, or performing any other daily activity?” Even if the patient answers “no,” test each eye with a small Snellen eye chart to confirm the patient’s self-assessment.

Patients who use glasses or contacts should wear them during testing. Hold the Snellen chart 14 inches from the patient’s eyes for the exam. A score of less than 20/40 indicates a need for further vision testing.

Physical performance

Physical performance and cognitive function are intimately linked. Poor physical performance often reflects poor cognitive status and poor ability to perform activities of daily living (ADL). Performance testing can predict whether your patient is facing an imminent inability to live independently. The easily administered tests summarized below can be repeated and quantified, confirm or refute discrepancies between the patient’s and caregiver’s assessments of physical per-

formance, and help identify patients at high risk for loss of independent function. Specific screens include the manual counting, rapid gait, and chair rise tests, and the “get up and go” test for assessment of risk of falling.

Results from performance testing can help predict an imminent inability to live independently

Manual counting. The manual counting test measures manual, visual, and cognitive capacity. You will need a change purse that contains a \$1 bill, a quarter, two dimes, a nickel, and three pennies. Direct the patient to open the purse, take out all the money, count it, and pronounce a total. If the patient gives an incorrect total, repeat the exercise. Note the amount of time it takes the patient to correctly count the money. Stop the test after three failed attempts or if 5 minutes elapses without a correct response.

In general, patients who perform the task correctly within 45 seconds will maintain their ADL status for approximately 1 year, whereas those who require more than 70 seconds are at risk for loss of one or more ADLs within 1 year.¹¹ This screen has a sensitivity of 83% and a specificity of 75%.

Rapid gait. This test requires an unobstructed 10-foot path in the office, examination room, or hallway. As you keep time (using the second hand of a watch or clock), ask the patient to walk 10 feet, turn, and walk back as quickly as possible. Patients who routinely use canes or other assistive devices should also use them during testing. Those who complete the test within 10 seconds are likely to remain stable in ADL status for at least 1 year.

Chair rise. The first step in this screen is the qualitative chair rise. The test be-

gins with the patient seated, hands folded on the lap. Then ask the patient to stand up. A patient passes the test by rising without using his arms for assistance. A patient who fails this screen has a 40% chance of developing an ADL impairment within 1 year if no intervention is initiated.¹²

For patients who pass the first test, the second step is the quantitative chair rise test. Ask the patient to stand up and sit down three times (without using his arms) while you time the activity. The cutoff for predicting ADL stability is 10 seconds. Patients who pass both the rapid gait and chair rise tests have a 96% chance of maintaining ADL stability over the next year.¹²

Falls ("Phalls"). The first phase of falls testing consists of asking the patient about any history of falls. A patient who reports a recent fall should undergo balance and gait assessment. If the patient has no history of falls, one of two performance tests can be administered. If results for either are positive, the patient is at increased risk of falling.

In the "get up and go" test, a patient rises from a chair, walks 10 feet, turns around, walks back to the chair, and sits down again. If completion of the task takes longer than 20 seconds, the patient is at increased risk for falls.

Testing for static (standing) balance can also predict fall risk. After the clinician demonstrates each one, the patient is asked to assume three stances, keeping the eyes open for each: side-by-side stance (feet parallel); semi-tandem stance (feet parallel, but one of them ahead of the other by one-half of a foot length), and tandem stance (one foot directly in front of the other). Patients unable to hold these stances for more than 10 seconds (without marked swaying) are at increased risk for falls.

Incontinence

Screening for incontinence involves asking two basic questions: "In the past year, have you ever lost your urine and gotten wet? If so, have you lost it on at least six separate days?" A "yes" answer

to both of these questions indicates that the patient has a high probability of being incontinent and that this probability will be borne out on urologic assessment. Be proactive in making these inquiries because patients in general are reluctant to volunteer information about incontinence.


Nutrition

The screening test for malnutrition is one question: "Have you lost 10 pounds over the past 6 months without trying to do so?" Any patient who answers yes is at an increased risk of mortality. Other possible indicators of malnutrition are:

- body weight <100 lbs
- body mass index <22.

Approximately 75% of all cases of dangerous weight loss are linked to disease, whereas the remainder are associated with difficulties in obtaining food, chewing or swallowing problems, and poor oral hygiene.

Conclusion

Delirium, dementia, depression, polypharmacy, hearing and vision deterioration, physical performance, incontinence, and malnutrition are key considerations in the initial assessment of the older patient. Functional assessment need not be time-consuming. How well an older person can perform activities of daily living can be gauged quickly and effectively using screening tools that can be administered in the office setting. The mnemonic DEEP-IN is easy to remember, and the screens it represents are easy to administer. Integrating DEEP-IN into the initial patient assessment can help identify problems that might otherwise be missed during a routine evaluation. 

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CME Exam

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