Screening Older Adults for Executive Dysfunction

An essential refinement in cognitive assessment.
Overview: Studies suggest that executive cognitive dysfunction can more reliably predict loss of autonomy than memory impairment can. Executive cognitive function allows for abstract thought, the planning and taking of actions toward a goal, and adaptation to the unexpected. And because executive function and memory operate in distinct regions of the brain, executive dysfunction can occur even when memory isn’t impaired. The detection of executive dysfunction is essential to helping a patient remain as safe and independent as possible. Watch a free video demonstrating best practices for evaluating executive dysfunction in older adults at http://links.lww.com/A326.

Matthew Lee, an 88-year-old retired chef, was recently hospitalized after falling in his apartment; it’s his second recent hospitalization. (This case is a composite based on our clinical experience.) Mr. Lee, a widower with two daughters, has lived in his apartment for more than 40 years. The first hospitalization was for a right-hip fracture six months ago; a neighbor had found Mr. Lee outside his apartment in a confused state hours after his fall. Two days ago he fell in his bathroom and was again found in a confused state, this time by one of his daughters. He arrived by ambulance at the ED, where he was diagnosed with a urinary tract infection and admitted. Such infections can result in confusion, especially in the elderly. The infection responded to antibiotics, and Mr. Lee, who now appears alert and no longer confused, will soon be discharged.

But his daughters tell the discharge planning team that Mr. Lee has seemed confused more often during the past several months, frequently repeating himself and not answering the telephone. The daughters are afraid he’ll no longer be safe at home alone and they ask the social worker to arrange for home health care. But Mr. Lee objects to the request: “I don’t need somebody hanging over me.”

The team members are of mixed opinion. Yesterday he refused to take a Mini-Cog (a screening test for cognitive impairment), and all agree that he would probably refuse cognitive assessment by a neurologist or psychiatrist. The social worker argues that since Mr. Lee is verbal and alert, his autonomy must be respected. The geriatrician isn’t convinced that Mr. Lee has significant cognitive impairment. But the nurses report that Mr. Lee’s ability to meet his needs is compromised. For instance, although he identifies his toothbrush and insists he doesn’t need help in using it, when left alone he seems unable to begin brushing his teeth.

The day-shift nurse, Eileen Dove, says that she’s developed a rapport with Mr. Lee and might be able to evaluate his executive cognitive function (also simply called executive function) if the test is brief and not called a “memory test.”

Why Screen for Executive Dysfunction?
Executive function “involves the ability to think abstractly and to plan, initiate, sequence, monitor, and stop complex behavior,” according to the Diagnostic and Statistical Manual of Mental Disorders, fourth edition, text revision (DSM-IV-TR). Cooney and colleagues describe executive function similarly as “an integrated set of cognitive abilities, including flexibility, concept formation, and self-monitoring.”

In other words, it allows one to think abstractly, order actions toward a goal, and adapt to the unexpected. (See Figure 1, page 64.)
Impairment in executive function is associated with dementia—the *DSM-IV-TR* identifies executive dysfunction as one element of the criteria for both Alzheimer’s disease and vascular dementia, noting that it’s common in all dementias. But executive dysfunction may occur even when dementia isn’t thought to be present or when memory appears to be intact. Indeed, executive function and memory operate in distinct areas of the brain. (Executive function depends on working memory, which resides mainly in the prefrontal cortex, whereas other types of memory reside in the temporal lobes.)

And whether or not memory is impaired, executive dysfunction can degrade one’s ability to carry out activities of daily living and independent activities of daily living and to direct one’s caregivers. Its detection is critical to the patient’s safety and independence. Indeed, neuropsychological studies of older adults suggest that executive dysfunction may more reliably predict loss of autonomy than memory impairment.

Brief tests of executive dysfunction allow for early detection. Discharge planning for hospitalized older adults who live alone, or who are suspected of having diminished ability to care for themselves, should include screening for executive dysfunction.

**EVALUATING MR. LEE**

Mr. Lee’s case presents several challenges. First, the patient and his family see things differently: his daughters want their father to be safe, but he’s adamant about preserving his independence. Second, his nurses and daughters have noticed his diminished ability to care for himself, but he claims to be “just fine.” Additionally, Mr. Lee has already refused to participate in one examination and might resist further cognitive assessment.

During this hospitalization, routine physical and laboratory assessments—including a computed tomographic scan of the brain and a complete blood count, as well as tests of vitamin B₁₂, folic acid, thyroxine, and thyroid-stimulating hormone levels—exclude reversible causes of falling, delirium, and dementia. Depression, anxiety, psychosis, severe memory impairment, and aphasia have also been ruled out. It’s time to determine whether undetected executive cognitive dysfunction might be a factor.

The team knows that Mr. Lee’s daughters have his best interests at heart; their opinions cannot be dismissed. And because it seems likely that some degree of cognitive impairment is present, and given Mr. Lee’s refusal to take the Mini-Cog, the team agrees that a short test of cognition is preferable to a longer, albeit more sensitive, battery of tests.

Before assessing for executive dysfunction, Ms. Dove confers with the unit social worker and Mr. Lee’s daughters. She learns that although Mr. Lee tends to be reserved, his wife was outgoing, and they’d enjoyed a robust social life. In his career he went from counterman at a deli to chef in several Manhattan hotels. At home he was often argumentative but also devoted; after his wife’s stroke, he visited her daily in the nursing home until her death four years ago. He was a self-made man with a strong desire for independence balanced by a capacity for interdependence. The team decides that it would be best to assess him privately.

When she meets with Mr. Lee, Ms. Dove is open and patient. She is frank about the differences of opinion concerning his situation, so that he understands the purpose of the assessment and can give informed consent: “Now that we have some time to talk, I understand that your daughters think you need help at home. I know you don’t think so. Could we do a test or two, so that I might give you my opinion?” Mr. Lee agrees.

**ADMINISTERING BRIEF TESTS OF EXECUTIVE DYSFUNCTION**

Cognitive testing requires sensitivity; patients may feel apprehensive or affronted by the suggestion that such testing is needed. Regardless of whether cognitive deficits are present—and if they are, whether or not the patient is aware of them—a nonthreatening approach will help to allay anxiety and likely permit a complete assessment.
The test environment should be quiet and private. The patient’s attention level, degree of literacy, and ability to use the dominant hand should be assessed first. If the patient has fluctuating awareness or attention levels, assessment should take place during a period of clarity. If the patient has paresis or arthritis of the hands, the nurse should choose a test that doesn’t require manual dexterity, such as the oral version of the Trail Making Test or the Controlled Oral Word Association Test (COWAT). If the person doesn’t read or write, or it’s not possible to administer oral tests in the patient’s primary language, a clock drawing test such as the CLOX would be preferable. Patients who normally use glasses or hearing aids should have these available. To view the portion of the online video demonstrating how to use the screening tests for assessing and interpreting executive dysfunction, go to http://links.lww.com/A327.

The Trail Making Test, oral version. In part A the patient is asked to count from 1 to 25; in part B the patient is asked to pair numbers and letters in a sequence: 1-A, 2-B, continuing up to 13-M.6,7 (At our facility, we also ask patients to recite the alphabet, to verify that they know it, before proceeding to part B.) It may be helpful for the nurse to have a written list of the correct number and letter pairs. Incorrect responses shouldn’t be cause for interruption but should be recorded discreetly. If the patient has difficulty, the nurse might offer encouragement by saying, “Keep going; we’re almost done.”

Ms. Dove says, “This first test is like a connect-the-dots puzzle, except I’ll ask you to connect letters to numbers. First, please recite the alphabet.” Mr. Lee does this without hesitation. Ms. Dove: “Now please count from 1 to 25.” Mr. Lee again does so, confirming that he has no communication deficits such as aphasia. Ms. Dove: “OK. Now what letter corresponds to the number one?” Mr. Lee: “A; it’s 1-A.” Ms. Dove: “That’s right; now keep going until I say ‘Stop.’” Mr. Lee: “2-B, 3-C, 4-D, 5-E— [he pauses]—7-F, 8-H, 9-I, 11-J, 12-K, 13-L, 14-M. Oh, I might have gotten mixed up there.” Ms. Dove replies, “Good effort. It’s hard to do this in your head. Let’s try one that’s easier.”

The COWAT. After hearing a given letter, the patient is asked to name, for a period of one minute, all the words beginning with that letter that come to mind.8 (The test is sometimes called “the F-A-S test,” after the letters used, which are common in both English and Spanish. Other versions of the COWAT use different letters.) Both correct and incorrect responses should be recorded. The nurse might introduce the test by saying, “For the next few minutes, I’m going to ask you to name words that begin with certain letters, and I’ll write down your responses. Now I’d like you to tell me all the words you can think of that start with the letter F.” Then the nurse asks the patient to name words beginning with the letter A, then words beginning with the letter S. It’s important to say the letters F and S clearly, as people with impaired hearing might have difficulty distinguishing them. If hearing impairment is present or suspected, an example can be added: “I’d like you to name words that start with F, like Frank.” If the patient is at a loss for words, encourage her or him to take one or two deep breaths and try again.

Ms. Dove asks Mr. Lee to name all the words he can think of in the next minute that start with the letter F. Mr. Lee says, “Fat, fire, firefly, fly, fist, fighter, fit, future, futile, forgiving, forget, force, four, fifteen, fifty, fighter.” Ms. Dove: “Excellent. Now, for the next minute, I’d like you to name words that begin with the letter A.” Mr. Lee: “Apple, ark, article, artwork, artist, arty, affable, ate, ant—I don’t think I can come up with any more!” Ms. Dove: “We still have a bit of time, any more words that start with A?” Mr. Lee: “Antiques, artist—and stops. Ms. Dove says, “We’re almost done. Now for the next minute, I’d like you to name words that begin with the letter S.” Mr. Lee jokes, “I should have memorized the dictionary!” and they both laugh. Mr. Lee begins, “Start, shell, stake, ache, acre—” He pauses, then says, “That’s it; I’m done!” Ms. Dove: “Any more words? No? Okay, good job.”

The CLOX has two parts. In CLOX 1, the patient is asked to draw a clock in accordance with the nurse’s oral instructions; in CLOX 2, the patient copies the nurse’s drawing. (Several variants of clock drawing tests are available; at our facility we use the CLOX because it’s predictive of nursing home placement.) The two parts serve to “discriminate the executive control of clock drawing from clock drawing itself.” The patient will need a pen and a sheet of paper with a circle on one side. The patient should be positioned such that she or he can draw comfortably. Patients who use glasses should

Go to http://links.lww.com/A326 to watch a nurse assess executive function in a hospitalized patient. Then watch the health care team plan interventions.

View this video in its entirety and then apply for CE credit at www.nursingcenter.com/ AJNolderadults; click on the How to Try This series link. All videos are free and in a downloadable format (not streaming video) that requires Windows Media Player.
Directions can be repeated until the patient understands them; but once the patient begins to draw, the nurse should give no further assistance. No clocks or watches should be visible to the patient during the test. No time limit is specified; at our facility we give patients 60 seconds.

Ms. Dove hands Mr. Lee the paper with the blank side up and a pen, and instructs, “Please draw me a clock that says 1:45. Draw the hands and numbers on the face so that even a child could read them.” Ms. Dove watches as Mr. Lee draws a circle, adds numbers, and prints the words “one forty-five” across the face. Ms. Dove: “Now please turn the paper over and hand it to me. I’m going to draw a clock inside this circle.” Ms. Dove places the numbers 12, 6, 3, and 9 first. Then she draws the clock hands set to 1:45, adding an arrow at the tip of each hand. Ms. Dove points to the blank area below her clock and says, “Now I’d like you to copy my clock here.” Mr. Lee: “I’ll try.”

### Figure 2. The Complete CLOX

#### STEP 1:
Turn this form over on a light-colored surface so that the circle below is visible. Have the subject draw a clock on the back. Instruct him or her to “Draw me a clock that says 1:45. Set the hands and numbers on the face so that a child could read them.” Repeat the instructions until they are clearly understood. Once the subject begins to draw no further assistance is allowed. Rate this clock (CLOX 1).

#### STEP 2:
Return to this side and let the subject observe you draw a clock in the circle below. Place 12, 6, 3, and 9 first. Set the hands to 1:45. Make the hands into arrows. Invite the subject to copy your clock in the lower right corner. Score this clock (CLOX 2).

### Rating

<table>
<thead>
<tr>
<th>Organizational Elements</th>
<th>Point Value</th>
<th>CLOX 1</th>
<th>CLOX 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does figure resemble a clock?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outer circle present?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diameter &gt; 1 inch?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All numbers inside the circle?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12, 6, 3, and 9 placed first?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spacing intact? (Symmetry on either side of the 12–6 axis?) If “yes” skip next.</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If spacing errors are present, are there signs of correction or erasure?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Only Arabic numerals?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Only numbers 1–12 among the Arabic numerals present?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sequence 1–12 intact? No omissions or intrusions.</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Only two hands present?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All hands represented as arrows?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hour hand between 1 and 2 o’clock?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minute hand longer than hour hand?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None of the following:</td>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td>1) hand pointing to 4 or 5 o’clock?</td>
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<tr>
<td>2) “1:45” present?</td>
<td></td>
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<tr>
<td>3) intrusions from “hand” or “face” present?</td>
<td></td>
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<tr>
<td>4) any letters, words, or pictures?</td>
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<tr>
<td>5) any intrusion from circle below?</td>
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</tbody>
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**Total**

The complete CLOX. Copyright 1995 by Donald R. Royall. Adapted with permission.
SCORING AND INTERPRETATION

The Trail Making Test, oral version. For the purpose of evaluating executive function, only part B is scored. More than two errors in 13 number–letter pairings indicates possible impairment.

Mr. Lee made eight errors: he answered correctly until he missed 6-F, and never recovered the correct pairing.

The COWAT. Correct answers—words starting with the requested letter—receive 1 point each. Repeated words or variants of a word already scored (such as plurals or other tenses) receive 0 points. For a person with at least a high school education, a total of 30 or more points indicates no impairment.

Mr. Lee names 15 words beginning with F, 10 beginning with A, and three beginning with S for a total of 28 points. Ms. Dove notes that he repeated words in two of the letter categories and inserted two A words in the S category, none of which are counted. Repetition and insertion errors are common in people with executive dysfunction.

The CLOX. Several aspects of CLOX 1 are assessed. When done correctly, the clock face should be drawn as a circle with the Arabic numerals 1 through 12 shown in the correct sequence and placement, and with two hands anchored in the center and pointing to the requested time. The maximum score is 15; for each error, one point is subtracted (for the complete list of required elements, see Figure 2, page 66). A score of 10 or less on CLOX 1 indicates impairment. CLOX 2 is scored the same way, except that a score of 12 or less indicates impairment. People with executive dysfunction will have difficulty only with CLOX 1, not with CLOX 2. People with additional cognitive deficits such as dementia will have difficulty with both.

Mr. Lee’s hand-drawn clock reflects some cognitive impairment. Mr. Lee was able to draw a figure that resembled a clock: he drew a circle with a diameter greater than one inch, placed numbers inside the circle, and used only Arabic numerals 1 through 12. But he made numerous errors: he crowded most of the numerals onto one side and omitted the clock’s hands and tip arrows. Mr. Lee scores 6 points on the CLOX 1. He was able to copy Ms. Dove’s drawing without errors for a perfect score of 15 on CLOX 2. (For an example of how a person with executive dysfunction might respond, see Figure 3, above.)

COMMUNICATING THE RESULTS

In light of Mr. Lee’s recent history and laboratory testing showing no reversible causes of dementia or delirium, it’s likely that his executive dysfunction isn’t reversible. The discharge planning team agrees that although further testing for dementia would be prudent, their immediate priority is to ensure his safety at home. They arrange to meet with him and his daughters. But Ms. Dove is also concerned about Mr. Lee’s perception of his performance on the tests, and decides to first talk with him privately.

Ms. Dove: “Did you make any mistakes?” Mr. Lee: “I don’t think so, at least not for a man my age.” Ms. Dove: “Parts of the tests were harder for you than for most people of your age and education. So let me ask a practical question—if you were alone and needed help immediately, what would you do?” Mr. Lee: “I’d call my daughters.” Ms. Dove: “And if your daughters didn’t answer?” Mr. Lee can’t think of any appropriate next steps, such as calling a neighbor or dialing 911. Because Mr. Lee seems unaware of his deficits and the degree to which they affect his ability to take care of himself, his judgment can’t be considered intact. Ms. Dove says, “The safest plan is for you to have a little help with cooking, cleaning, and shopping, at least a few days a week. It’s a way for you to keep your independence. Let’s meet with the rest of the team and your daughters, and talk it over.” Mr. Lee replies, “We can meet, but I don’t need anybody coming into my house. And I’m going home tomorrow—no new tests and no new pills. End of discussion.”

At the meeting the next day, the social worker voices concerns about Mr. Lee’s safety at home alone. Mr. Lee interrupts angrily, saying, “No, I don’t need anybody!” Ms. Dove touches his fore-
How To

try this

Demonstrating and interpreting core geriatric assessments

For more information on this and other geriatric assessment tools and best practices go to www.ConsultGeriRN.org—the clinical Web site of the Hartford Institute for Geriatric Nursing, New York University College of Nursing, and the Nurses Improving Care for Healthsystem Elders (NICHE) program. The site presents authoritative clinical products, resources, and continuing education opportunities that support individual nurses and practice settings.

For versions of the CLOX in other languages, including a validated Spanish translation, contact Dr. Donald R. Royall, Department of Psychiatry, the University of Texas Health Science Center at San Antonio: royall@uthscsa.edu.


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arm gently and says, “Mr. Lee, remember how hard you worked to finish the tests yesterday? Let me tell them about the tests. You can stop me if you disagree.” She explains that despite Mr. Lee’s best efforts, he had more difficulty with the tests than others of his age and level of education, and he seems unaware of his difficulty. Mr. Lee, still unsettled, says, “I remember what you said, but I won’t have a stranger move in and make me a prisoner in my home. And I won’t go to a nursing home.” The geriatrician reassures Mr. Lee that no one’s suggesting he go to a nursing home. The social worker suggests that he try to have a home health care aide for eight hours every day, explaining that this will help maintain his health and his independence. Ms. Dove says, “Perhaps your daughters could check in with you on weekends; that way you’d only need an aide five days a week.” Mr. Lee continues to resist this idea, although less vehemently. His daughters finally say, “Dad, if you’re going to live alone, you have to do this.” They believe that in time he’ll accept having a home health aide stay with him part-time, and agree to help him set up his pill organizer, pay bills, and hire the aide through a local agency. Ms. Dove: “Sounds like they mean business. I think you should give it a try.” Mr. Lee: “Can we hire you?”

CHALLENGES

First, the complex nature of executive function, including its interdependence on other domains such as memory and communication, make it difficult to determine the presence of dysfunction with certainty. Indeed, the criteria for a finding of executive dysfunction are only now emerging in clinical practice. Second, many tests require additional materials (such as puzzles or preprinted test forms) or are lengthy or otherwise difficult to administer. For more, see The Challenges of Screening for Executive Dysfunction at http://links.lww.com/A588. To view the portion of the online video where experts discuss the importance of understanding executive function in maintaining independence, go to http://links.lww.com/A328.

CONSIDER THIS

What evidence supports the use of these brief tests of executive function?

The Trail Making Test, Part B, oral version. In a study of patients ages 65 and older by Grober and colleagues, three or more errors was the cutoff score used to indicate impaired executive function among people taking this test. It demonstrated “modest” sensitivity (44%) and good specificity (84%), so it’s more likely to miss finding executive dysfunction in some people than to identify executive dysfunction in people who don’t have it.

The COWAT is one example of a verbal fluency test; in such tests, the respondent is asked to produce items from a specific category, in this case words starting with particular letters. Verbal fluency tests generally have high sensitivity and specificity for executive dysfunction. Monsch and colleagues, using the COWAT, found it had 89% sensitivity and 85% specificity for Alzheimer’s disease, but it was less sensitive and specific when compared with verbal fluency tests using animal, fruit, or vegetable categories.

The CLOX has been shown to be a valid measure of executive dysfunction. Its developers found that it had good reliability, with a Cronbach α of 0.82. Interrater reliability was high for both CLOX 1 and CLOX 2 (0.94 and 0.93, respectively). CLOX 1 and CLOX 2 have both construct validity and discriminant validity. Both were able to correctly classify 92% of the Alzheimer’s disease subgroups. An unspecified clock drawing test was found to have modest sensitivity (47%) and high specificity (92%), indicating that this type of test is more likely to identify those who don’t have cognitive impairment than those who do.

Because of the varying psychometric properties in these tests for executive dysfunction, it’s best to use multiple tests.

How valid are brief tests of executive function among different cultural and ethnic groups? The
Brief Evaluation of Executive Dysfunction: An Essential Refinement in the Assessment of Cognitive Impairment

By: Gary J. Kennedy, MD, Albert Einstein College of Medicine; Division of Geriatric Psychiatry, Montefiore Medical Center

WHY: A hospital admission may surface a previously undetected dementia in some older adults. While at home in a familiar environment, patients and family members may fail to recognize subtle, slowly progressive cognitive changes. Such changes however, often become apparent in the unfamiliar, disorienting setting of the hospital provoking family to report “my mother was never like this at home.”

This Try This recommends assessing executive function for older patients not thought to have dementia prior to hospitalization but where the patient, family or staff feel the patient has not returned to baseline cognitive status at the time of discharge. Particularly when the older patient is alert and verbal and memory is not obviously impaired, screening for executive dysfunction can be critical to a safe, realistic treatment and discharge plan. Patients who exhibit executive dysfunction should be referred to their primary care provider, or to a provider with expertise in dementia assessment.

Executive dysfunction defined: Executive function is an interrelated set of abilities that includes cognitive flexibility, concept formation, and self-monitoring. Assessing executive function can help determine a patient’s capacity to execute health care decisions and with discharge planning decisions. With impaired executive dysfunction, instrumental activities of daily living (accounting, shopping, medication management, driving) may be beyond the person’s capacity even though memory impairment is mild. The person’s capacity to exercise command and self-control, and to direct others to provide care, becomes diminished. Executive dysfunction is one element in the DSM-IV criteria for the diagnosis of dementia and occurs in all dementing diseases.

NOTE: Patients with impaired executive function need not have impaired memory.

BEST PRACTICES: Few practitioners are familiar with testing for executive function, yet there are brief valid and reliable instruments. The instruments listed below have good internal consistency, inter-rater reliability and are strongly correlated with the Folstein Mini-Mental Status Exam (MMSE) and with lengthener neuropsychological assessments of executive function:
- Royall’s CLOX (clock drawing),
- Controlled Oral Word Association Test, and
- Trail Making Test, oral version.

TARGET POPULATION: Older patients:
- Not thought to have dementia prior to hospitalization but where the patient, family or staff feel the patient has not returned to baseline cognitive status at the time of discharge.
- For whom other screening (e.g., Try This: Mini-Cog, CAM) reveals no discernable cause for a cognitive impairment.
- For whom cognitive impairment, observed as alterations in memory, use of language and abstract thinking, and spatial sense, persists even when delirium has been identified and treated or ruled out.

VALIDITY AND RELIABILITY: Studies of executive dysfunction suggest that its presence predicts level of care among community residents making the transition to less independent living. And among older adults without dementia who have recovered from a major depressive episode, the presence of executive dysfunction is associated with excess, persistent disability.

STRENGTHS AND LIMITATIONS: The accurate characterization of executive dysfunction is confounded by language, education, and time of assessment. If the patient and examiner do not share a common mother tongue, the Controlled Oral Word Association and the oral version of the Trail Making tests become too difficult. Persons who are educationally disadvantaged may also perform in the impaired range but do not behave genuinely dysfunctional. Over the course of hospitalization executive dysfunction often improves but may persist at reduced but disabling levels. When executive dysfunction occurs in depression, problem solving psychotherapy may lessen the disability.
MORE ON THE TOPIC:

For complete versions of the CLOX, including a validated Spanish Translation, write to Donald R. Royall MD, Department of Psychiatry, The University of Texas Health Science Center at San Antonio, 7703 Floyd Curl Drive, TX 78284-7792.

Screening Tests of Executive Function

The following brief screening tests of executive function can be administered in the hospital and in the ambulatory setting:

- **Royall's CLOX Clock drawing:** First ask the patient to “Draw me a clock that says 1:45. Set the hands and numbers on the face so that a child could read them.” Once the task is complete, draw a clock with a 2 inch diameter, with all the numbers in place, and the hands set at 1:45. Then ask the patient to copy it. An unimpaired person will draw a round figure with the following elements: recognizable circle at least one inch in circumference with all the numbers present and in correct, symmetrical sequence. There will be two hands anchored in the center pointing to the correct time. If any of the above elements are missing the person is possibly impaired. If more than one element is missing the person is probably impaired. Intruded elements such as words or letters indicate impairment. Persons with only executive dysfunction will exhibit errors on the first clock but not the second. Those with both executive function and construction apraxia usually as a result of moderate Alzheimer’s disease or stroke will fail both.

- **The Controlled Oral Word Association Test:** With categories beginning with the letter “F”, then “A”, then “S”, the Controlled Oral Word Association Test by Spreen and Benton (1977) requires respondents to fill the category by providing words of 3 or more letters. For example, correct responses to the category cue “F” would include “fish, foul, fact” etc. This test reflects abstract mental operation related to problem solving, sequencing, resisting distractions, intrusions and perseverations. It is considered a “frontal” task as the organization of words by first letter is unfamiliar, and requires conscious, effortful, systematic organization and the filtering of irrelevant information such as natural taxonomic categories. Persons free of executive dysfunction will produce 10 words in each category within one minute.

- **The Trail Making Test, Oral Version:** (Ricker & Axelson, 1994) requires the subject to count from 1 to 25 and then recite the 26 letters of the alphabet. For testing the subject is asked to pair numbers with letters in sequence e.g. “1-A, 2-B, 3-C, etc.” until the pair “13-M” is reached. This version does not make visual scanning or visually guided motor demands. However, the individual is required to keep the number and letter sequences in working memory so as not to lose place. More than 2 errors in 13 pairings are considered impairment.
Trail Making Test and the CLOX have been validated in ethnically diverse populations. For details, see More on the Validity of Brief Tests of Executive Function, http://links.lww.com/A589.

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REFERENCES

Go to www.nursingcenter.com/CE/ajn and receive a certificate within minutes.

GENERAL PURPOSE: To instruct registered professional nurses in the use of various tests that screen older adults for executive cognitive dysfunction.

LEARNING OBJECTIVES: After reading this article and taking the test on the next page, you will be able to:
• understand the nature of executive cognitive function and why screening for dysfunction is important.
• summarize the development of brief tests that screen older adults for executive dysfunction.
• outline the administration and scoring of three such tests.

TEST INSTRUCTIONS
To take the test online, go to our secure Web site at www.nursingcenter.com/CE/ajn.

To use the form provided in this issue,
• record your answers in the test answer section of the CE enrollment form between pages 64 and 65. Each question has only one correct answer. You may make copies of the form.
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