

Brief Evaluation of Executive Dysfunction: An Essential Refinement in the Assessment of Cognitive Impairment

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WHY: In the familiar environment and daily routine of the older adult's home life, slowly progressive subtle cognitive changes may not be apparent. Such changes, however, often become obvious in the disorienting setting of the hospital provoking family members to report "my mother was never like this at home." Even when delirium has cleared with resolution of the acute event, unrecognized cognitive impairment can jeopardize safe return to the community.

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. Data also suggests that if memory and learning are intact, executive dysfunction can be ameliorated by training the person to anticipate and compensate for the deficits.

Executive dysfunction defined: Executive function is an interrelated set of abilities that includes cognitive flexibility, concept formation, problem solving, and self-monitoring. Assessing executive function can help determine a patient's capacity to execute health care decisions and discharge plans. 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 of the environment and self-control, and to direct others to provide care, becomes diminished. Executive dysfunction is one of the neurocognitive domains in the DSM-5 criteria for the diagnosis of dementia and occurs in all dementing diseases. Progressive, disabling executive function even in the absence of memory impairment may be sufficient for the diagnosis.

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 Folstein's Mini-Mental Status Exam (MMSE) and with lengthier neuropsychological assessments of executive function:

- Royall's CLOX (clock drawing)
- Controlled Oral Word Association Test
- 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 instruments (e.g., *Try This*® MoCA, Mini-Cog, CAM) reveals minimal or no cognitive impairment.
- For whom cognitive impairment, observed as alterations in memory, use of language and abstract thinking, and manipulation of objects in space 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, and poorer response to antidepressant medication.

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 not be 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:

Best practice information on care of older adults: <https://consultgeri.org>.

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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 Part B, Oral Version:** (Ricker & Axelrod, 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 10 pairings following the examiners three examples are considered impairment.