Cognitive Screening

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Topic

Cognitive screening aims to obtain a broad—yet admittedly shallow—understanding of an individual's higher cortical functioning. This type of limited evaluation may be necessary due to such factors as the individual's health, physical needs, pain, fatigue, sensory impairment, interruptions and environmental distractions, and time constraints, all of which can affect the reliability and validity of results.

Importance

A. ***Intensive Care and Other Acute Hospital Units***

Many screenings occur in intensive care and other acute hospital units for patients being evaluated for rehabilitation potential. The findings of cognitive screening may highlight neurocognitive domains of deficit that warrant further examination and suggest potentially effective interventions based on areas identified as relatively intact. However, as Larner [1] states, "Cognitive screening instruments are not equivalent to a neuropsychological assessment administered by a clinical neuropsychologist, which remains the gold standard for cognitive assessment" (p. 5). This is not to demean the value of screening, a common practice of clinicians throughout health care. Nonetheless, given the brevity of screenings, the likelihood of false positives and false negatives must be kept in mind. More detailed, reliable, and informative testing will likely need to be deferred until the patient's transfer to the rehabilitation unit, by which time the impact on test performance of at least some of the above-noted factors ought to have declined.

B. ***Rehabilitation Settings***

In requested, the majority of diseases and injuries treated (e.g., traumatic brain injury, stroke, brain tumor, multiple sclerosis) have cognitive consequences. However, many conditions not previously thought to be accompanied by cognitive decline (even peripheral vascular disease) have also been shown to affect higher cortical functions [2, 3]. Thus, cognitive screening may be frequently requested.

C. ***Reasons for Cognitive Screening***

For most individuals, because a diagnosis will have been established by the time of transfer to rehabilitation, staff may have

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certain expectations about the individual's cognitive functioning based on what is known about the "neuropsychological signature" of the condition(s). However, referrals for cognitive screening occasionally involve a request for assistance with differential diagnosis, such as confusion in a senior adult that could reflect age-related cognitive changes, evolving dementia, sleep disturbance, novelty of the hospital environment, or medication side effects.

D. ***Decision-Making Capacity***

Assessment of decision-making capacity is not addressed in this chapter as this is an issue which cannot be adequately addressed by brief cognitive testing. While a cognitive screening instrument might be a component of such an evaluation, it is not sufficient; thus, the evaluator should be knowledgeable about their state requirements and ethical guidelines.

Practical Applications

A. ***Test Content and Selection***

Although some [4] have suggested using single measures, most cognitive screening tests assess multiple domains including orientation, simple attention (e.g., digit repetition), short-term memory, spatial construction (drawing a clock face or geometric design), and verbal comprehension and expression. Some instruments also include tasks requiring delayed memory (an area of particular importance in rehabilitation where therapeutic success relies substantially on the patient's capacity to learn and recall)[1] and executive functions. Although not usually construed as a "cognitive" area, formal assessment of emotional status is typically presumed to be the psychologist's responsibility, although valuable observations can be obtained from other staff members. While speech therapists and/or occupational therapists may have initiated screening of certain cognitive abilities (e.g., expressive language, visual-perceptual skills), requests are often directed to a neuropsychologist or rehabilitation psychologist for assessment of memory, problem-solving, and executive abilities to provide broader and deeper understanding of the case at hand.

In selecting an instrument, consideration should be given to patient limitations (e.g., hemiparesis; visual field cut, aphasia) that might impede task completion or, at a minimum, introduce "noise" because of factors irrelevant to the skills or functions the test purports to assess.[2] In recognition of these possible extraneous influences, some judicious use of nonstandard techniques based on the notion of "reasonable accommodation" may be indicated (see [6, 7]); in such instances, the examiner should justify and describe the modifications and note the risk in using conventional normative data bases for comparison and interpretation.

The choice of instruments should take into account the measure's positive and negative predictive power, reliability, validity, sensitivity and specificity. Lezak et al. (2012, p. 127) describe the latter factors as follows: "The sensitivity of a test is the proportion of people with the target disorder who have a positive result" (i.e., the probability of correctly identifying a true instance of the specific disorder). "Specificity is the proportion of people without the target disorder whose test scores fall within the normal range; this proportion is useful for confirming a disorder" (i.e., the probability of correctly identifying a "true negative"). Positive predictive power is the likelihood that an examinee who earns a "positive" score (in this scenario, one who falls in the "impaired" range) truly has

[1] Note, however, that learning and retaining verbal material such as story content or word lists differs from the "procedural learning" required in physical and occupational therapies.

[2] However, some studies have shown little intermanual difference in performance of such tasks as the Trail Making Test, suggesting that useful data may be obtained from persons with hemiplegia who use their unaffected (even if nondominant) hand (e.g., [5]).

the condition in question, while negative predictive power reflects the probability that an individual who scores in the "unimpaired" range does not have the condition.

B. ***Utility of findings***

The obtained test data are typically interpreted with reference to available applicable normative data bases (except as noted above)—in light of factors that can affect test performance (e.g., age, educational/vocational history, preexisting health conditions, alcohol and substance use, depression)—and estimated premorbid level, against which current findings are compared to gauge degree of change. Comparisons are also made with findings of other pertinent specialties (e.g., speech therapy, occupational therapy) to determine consistency or variability of performance.

Cognitive screening may provide insight into the cortical basis of behaviors interfering with rehabilitation. Consider, for example, a middle-aged individual who exhibits aggressive behavior following repair of a ruptured cerebral aneurysm. Belligerence, emotional lability, and other erratic behaviors can be incongruent or exaggerated responses to a benign situation. Understanding the neural origin of emotional disinhibition and anger can prove critical in developing management strategies. Cognitive screening may uncover an immediate memory deficit that, coupled with impaired reasoning, leads the individual to misconstrue therapists' instructions, fostering frustration and behavioral outbursts. The rehabilitation psychologist can help staff appreciate that the individual's emotional response derives from their injured brain's (mis)interpretation and inability to modulate their behavior. Such insight helps prevent unjustified negative labeling of patients as "difficult" or "hateful" [8, 9].

The characteristics of several common cognitive screening instruments are displayed in Tables 43.1 and 43.2. Interested readers should consult Larner [1] and Lezak et al. [10], Chaps 9 and 18, for detailed treatments of these and other screening measures.

While most of the above tests offer adequate reliability and validity, the majority are affected by education in that adults with less education tend to score lower than better-educated same-age peers, increasing the potential of false positive findings and warranting caution in interpretation. Education history has a greater impact on language-based tasks.

Tips

A. ***Before screening***

First, clarify the referral question(s). While the referral may originate from a physician (or be automatic in some settings), interview of the medical rehabilitation team members and nursing staff can help to clarify and specify the question(s), concerns and desired information. Through record review, identify patient variables pertinent to test selection (e.g., diagnosis, age, education, sensory difficulties, cultural background and language, medical/psychiatric history, vocational status, frustration tolerance). Determine what, if any, cognitive tests have been given by other team members.

B. ***Conducting the screening***

If possible, identify a quiet location or, if the patient cannot be moved, inform staff that you will need a short period of uninterrupted time with the door closed. This will help to elicit the individual's best performance.

Introduce yourself to the patient and family (if the latter are present) and explain your role. Describe the purpose of assessment and how the information will be used. Discuss confidentiality and the limits on same. Ask for and obtain consent from the patient, if possible, or from a qualified surrogate, if circumstances warrant. Interview the patient to confirm/refute demographic, medical, and neurobehavioral information obtained from chart review. Determine their understanding of and interpretation of the impact of their injury or illness. Gauge the patient's endurance, motivation, and insight.

Table 43.1 General brief screening batteries

Test	Montreal cognitive assessment (MoCA) [11]	Mini mental status exam (MMSE) [12] Modified MMSE (3MSE) [13]	Repeatable battery for assessment of neuropsychological status (RBANS) [14]	Dementia rating scale 2 (DRS2) [15]	Cognistat assessment system (formerly called Neurobehavioral cognitive status examination) [16]	Brief cognitive status exam of WMSIV (BCSE) [17]	Neuropsychological assessment battery (NAB) screening module [18]
Response	Verbal, writing, drawing	Verbal, writing, drawing	Verbal, writing, drawing	Verbal, drawing, hand movements	Verbal, drawing, writing	Verbal, drawing	Verbal, hand movement, drawing
Assessment target	MCI, CVA, Alzheimer's, vascular dementia, substance abuse	MCI, dementia, stroke	Brain injury, concussion, dementia, stroke, substance abuse	Dementia	MCI, dementia, stroke	Screens significant cognitive impairment	Adults-severely impaired to intact
Time to administer	10 min	8–20 min	25–30 min	20–30 min	10–30 min	5–10 min	45 min
Cognitive domains	VC, Mem, Attn, VF, Abst, Nm, Or, CD	Orientation, Attn, Nm, VC, Calc, Rep	Attn, Mem, Lang, VC, VF, perseveration	Attn, Lang, Mem, VC, Abst	Attn, Lang, Mem, VC, Abst	Orientation, VC, speed, mental control, CD, Nm, Ri, VF	Attention, language, memory, spatial, executive
Cut-off score	>26/30 = nml	=/>26/30 3MSE > 75	By age	By age	Uses a "screen and metric" format with cut-offs for each area	Ave, low ave, borderline, low, very low	Standard scores and %ile
Age range	>50	18–85 3MSE + 65	20–89	≥55	Adol-96	16–90	18–97
Sensitivity/ specificity	83–92 % Improved: <23	76–84 % 18–23 (mild imprmt)	Strong for MCI, cognitive screen	<123 Total score—83 % Alz and Vasc Dem	Ave, mild, mod, severe levels	Borderline and higher not likely to have cognitive impairments	0.95/44-/75 for mod-severe
Considerations	Multiple English language versions; French version. Correlates with certain neuropsychological tests	Age, education, and cultural effects	Individual subtest scores available by age (see [10], p. 759); parallel forms	Mayo older adult norms, age and education effects	Stand alone domain scores available		

Abst abstraction, *Attn* attention, *Calc* calculation, *CD* clock drawing, *MCI* mild cognitive impairment, *Mem* memory, *Nm* naming, *Or* orientation, *Rep* repetition, *Ri* response inhibition, *VC* visual construction, *VF* verbal fluency

Table 43.2 Orientation assessment

Test	Galveston orientation and amnesia test (GOAT) [19]	Orientation Log (O-Log) [20]	Cognitive Log (Cog-Log) [21]	Confusion assessment method for the ICU (CAM-ICU) [22]
Response style	Verbal	Verbal	Verbal, hand movement	Yes/no
Assessment target	TBI	TBI, CVA, anoxia	TBI, CVA, anoxia	Adults
Time to administer	5 min	10 items	10 items	2 min
		5 min	7–10 min	
Cut-off score	≥75/100 (nml)	>24/30	≥25	>0 = altered mental status
Considerations	Strong association with injury severity	Cues allowed. Useful for serial assessment. Correlates with certain neuropsychological tests	Use with O-Log of >15. Useful for serial assessment. Correlates with certain neuropsychological tests	Assessment of delirium in ICU setting
	Can modify for aphasia % vented patients			

The essential cognitive domains to be addressed are listed above. During testing, be cognizant of signs of distractibility, fatigue, pain, or failure to comprehend task instructions. End with praise for the individual's effort.

C. ***After screening***

Enter the findings in the chart using terms likely to be familiar to team members, and attend team meetings to clarify findings and implications and answer questions.. Note your impression of the reliability and validity of the results. Offer suggestions for treatment strategies. Meet with the patient and family to discuss the results and possible implications with due attention to limitations.

D. ***Caveats and Encouragements***

1. **Don't over-reach with your data**—acknowledge the inferential and interpretive limitations of screening results. Screenings likely involve individuals with acute conditions that can diminish performance. Furthermore, test performances are multiply determined, and low scores can reflect many factors, some of which may be transient. Nonetheless, a set of scores that comports with established neuropsychological patterns may permit stronger inferences, therefore…
2. **Look for coherence in the data**—i.e., internal consistency and congruence with what is known about the cognitive consequences of the medical condition and functional status. Inconsistencies may result from attentional fluctuation (which could itself be caused by fatigue or pain) or variable effort, among other factors. Unexpected results need to be explained.
3. **Identify both weaknesses AND preserved functions.** The former may guide therapists in targeting impaired skills while the latter may suggest relatively intact abilities that can be capitalized upon.
4. **Recommendations should be clearly stated, feasible and functionally relevant** so as to: (a) foster understanding of the individual's functional status and coping skills, (b) promote the individual's ability to profit from rehabilitation, and (c) be understood by those who will use the data.
5. **Recognize that your results reflect a certain point in time** and that recommendations may well require revision as changes occur in the individual's condition.
6. **Help the treating team grasp how the person's cognitive status affects their behavior** as well as their interpretation of the illness/injury/disease and understanding of treatment goals.

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