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Evaluation of Cognition in the Elderly Rehabilitation Patient

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Certain cognitive skills are necessary if a patient is to participate successfully in a treatment program. Nowhere is this more important than in the rehabilitation environment. Numerous studies, however, suggest that clinicians often have difficulty recognizing cognitive disturbances in their patients. Williamson et al (1) found that only 13% of demented subjects were recognized as such by the physicians in charge of their care. Other, more recent studies (2-4) on inpatient services have found that one third to one half of cognitively impaired patients went unidentified by clinical staff. Since the likelihood of cognitive impairment increases dramatically in the older patient, evaluation of the cognitive abilities of geriatric patients is crucial to designing successful rehabilitative programs. The clinician caring for the older patient must have an understanding of the cognitive changes that occur in normal aging and age-related diseases in order to detect and circumvent these problems.

CHANGES OF NORMAL AGING

Age-related declines of cognitive functioning have been given a variety of terms in the literature. In 1962, Kral coined the phrase "benign senescent forgetfulness." He described this as "the inability of the subject to recall relatively unimportant data and parts of an experience, like a name, a place, or a date, whereas the experience . . . can be recalled" (5p257). The forgotten information was often remote, could frequently be recalled on another occasion, and did not seriously impair functional abilities. The example was given of a woman who could remember attending, some years before, the wedding of her son in a New England city, but was sometimes unable to recall the name of the specific city. While this type of memory loss is familiar to all of us, the example is difficult to generalize to the clinical setting.

More recently, Crook and associates (6) developed the concept of "age-associated memory impairments" in

persons over 50 years of age who have complaints of memory loss. Operationally, it is defined as memory test performance that is at least one standard deviation below the mean established for young adults on a standardized test of secondary memory. This conceptualization of age-related memory loss is problematic because of the inclusion of such a wide variety of individuals with memory loss, many of whom may be depressed, delirious, or in the process of developing clinical dementia. The authors acknowledge this problem but offer no solution for potential discrimination of "organic" losses from "normal" declines.

Many of the declines of "normal" aging have been derived from cross-sectional studies comparing young individuals to older subjects (7, 8). Studies of this type cannot control for a variety of cohort effects and other factors that may strongly influence the results. Ideally, the cognitive changes of aging should be measured using the same subjects over the lifespan. A study of this type, the Baltimore Longitudinal Study of Aging (BLSA) (9) is a prospective investigation of normal aging that has been conducted for over 30 years. The effort has included almost 1,800 subjects and is now a part of the Gerontology Research Center, National Institute on Aging. The goal of the BLSA is to trace the true effects of aging as distinguished from disease, socioeconomic disadvantage, and other processes. The BLSA has documented age-related declines in a variety of psychologic and physiologic domains. It has also been noted that some functions, particularly in the realm of cognition, improve with age (Table 24.1).

Overall, the BLSA has demonstrated that declines of cognitive function are a part of the normal aging process, but probably start later in life than previously thought, may be smaller in magnitude, and may include fewer functions (9). Of prime importance, these changes have not significantly impaired social functioning in BLSA participants. Simple strategies adopted by the subjects have easily overcome these minor losses in daily life. They

Table 24.1. Cognitive Changes in Aging—Baltimore Longitudinal Study of Aging^a

Measures Showing Decline over Time	Measures Stable or Increasing over Time
Benton Visual Retention Test	Wais Vocabulary
Concept Problem Solving	Digit Span Forward
Paired Associate Learning	Memory for Text

^aAdapted From Shock NW, Greulich RC, Costa PT, et al. *Normal Human Aging: The Baltimore Longitudinal Study of Aging*. US Department of Health and Human Services, Baltimore City Hospitals; 1984.

include note writing, fewer instructions over more time, and “guided encoding,” which is the process of making associations with the information to be remembered, as in mnemonics.

ELDERLY PATIENTS IN THE REHABILITATIVE ENVIRONMENT

Unfortunately most patients in need of rehabilitative services cannot be expected to be normal. Medical illnesses, multiple medications, reactive grief, and numerous other factors are likely to impair cognitive functioning. In particular, dementia, delirium, and depression or a combination of these are exceptionally frequent in the elderly patient. Failure to recognize these problems is common and will sabotage rehabilitation efforts.

Dementia

DEFINITIONS AND PREVALENCE

The definition of dementia (compatible with DSM III-R criteria) is a loss of cognitive abilities of sufficient severity to interfere with social or occupational functioning with loss of memory and at least one other area of cognition (language, calculations, attention, apraxias, and agnosias) in an alert patient (10).

The prevalence of dementia in community samples has been reported between 6.6 and 15.8 per 100 for those over 65 years of age (11). A recently published survey in East Boston reported 47% of those over the age of 85 years to be suffering from probable Alzheimer’s disease (12). Regardless of the exact percentages, it is clear that dementia is one of the leading obstacles to healthy aging (13) and will adversely affect rehabilitative efforts.

The most common causes of dementia are Alzheimer’s disease (AD) (65%), multiinfarct dementia (MID) (10%–15%), and mixed dementia (AD and MID) 15%–20%). Other etiologies include medical illnesses such as B₁₂ deficiency, thyroid disease, and syphilis. Medications, such as the benzodiazepines and beta-blockers, have been reported to produce dementia. In addition, depression has been associated with a reversible dementia, frequently termed pseudodementia. These are the most frequent causes of dementia although over 100 causes

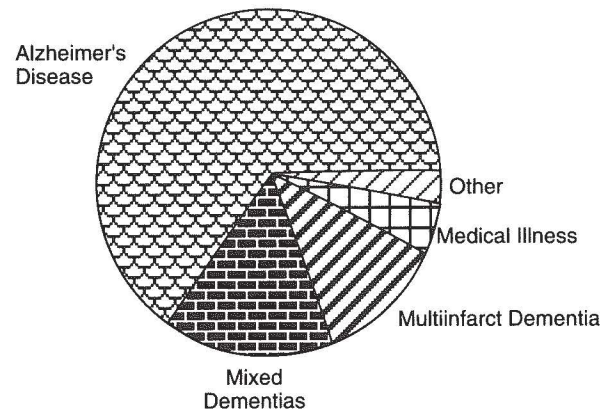


Figure 24.1. Causes of Dementia.

have been described (14). The goal of the rehabilitative staff is not to specifically diagnose a dementia but to detect its presence and the need for further workup (Fig. 24.1).


INITIAL SCREENING

Screening procedures can be very brief but still provide considerable information about the patient’s cognitive status. The Mini-Mental State Examination (MMSE) (15) has been used extensively as a screening tool. Originally designed as “a practical method for grading the cognitive state of patients for the clinician,” it generally requires only 5 minutes and can be administered by lay personnel with very little training. It has demonstrated high test-retest reliability (.89) and inter-rater reliability (0.82) (15, 16). To some extent, sensitivity and specificity of the MMSE depend on the characteristics of the population being screened. Among hospital patients, the MMSE was 87% sensitive and 82% specific in detecting dementia and delirium (cut off score 23/24) (17). False positives were most likely in patients with low education levels (Fig. 24.2).

The Blessed Information-Memory-Concentration (IMC) test (18) is also useful as a screening instrument. In clinicopathologic studies, it has shown correlation with numbers of senile plaques detected in the cerebral cortex. Although it contains many items similar to the MMSE, it does not include items that test language (reading/writing) or motor skills—an advantage when evaluating patients with limited sight or extremity paralysis. Error scores of greater than 10 are consistent with a diagnosis of dementia, but scores of 5 to 10 errors suggest possible early dementia as reported by Katzman and colleagues (19).

Instruments such as the Mini-Mental and the Blessed can be used to screen for cognitive impairment. They also provide a way of measuring improvement or decline over time. They do not, however, provide specific diagnoses. When cognitive impairment is suspected, further clinical and psychometric evaluation is necessary to identify the etiology. Table 24.2 shows the

Figure 24.2. Mini-Mental State.^a

I. ORIENTATION (Ask the following questions)		
What is today's date?	Date (e.g., Jan. 21)	<input type="checkbox"/>
What is the year?	Year	<input type="checkbox"/>
What is the month?	Month	<input type="checkbox"/>
What day is today?	Day (e.g., Monday)	<input type="checkbox"/>
Can you also tell me what season it is?	Season	<input type="checkbox"/>
Can you also tell me the name of this hospital (clinic)?	Hospital (Clinic)	<input type="checkbox"/>
What floor are we on?	Floor	<input type="checkbox"/>
What town or city are we in?	Town or City	<input type="checkbox"/>
What county are we in?	County	<input type="checkbox"/>
What state are we in?	State	<input type="checkbox"/>
II. IMMEDIATE RECALL		
Ask the subject if you may test his/her memory. Then say "ball," "flag," "tree" clearly and slowly, about one second for each. After you have said all 3, ask him/her to repeat them. This first repetition determines his/her score (0-3), but keep saying them until he/she can repeat all 3, up to 6 tries. If he/she does not eventually learn all 3, recall cannot be meaningfully tested.	"Ball" <input type="checkbox"/> "Flag" <input type="checkbox"/> "Tree" <input type="checkbox"/> Number of Trials: _____	
III. ATTENTION AND CALCULATION		
Ask the subject to begin with 100 and count backwards by 7. Stop after 5 subtractions (93, 86, 79, 72, 65). Score the total number of correct answers.	"93" <input type="checkbox"/> "86" <input type="checkbox"/> "79" <input type="checkbox"/> "72" <input type="checkbox"/> "65" <input type="checkbox"/>	
If the subject cannot or will not perform "the count backwards test" task, ask him/her to spell the word "world" backwards. The score is the number of letters in correct order. For example, dlrow is 5, dlorw is 3.	D <input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> O <input type="checkbox"/> W <input type="checkbox"/>	
IV. RECALL		
Ask the subject to recall the 3 words you previously asked him/her to remember. Score 0-3.	"Ball" <input type="checkbox"/> "Flag" <input type="checkbox"/> "Tree" <input type="checkbox"/>	
V. LANGUAGE		
NAMING Show the subject a wrist watch and ask him/her what it is. Repeat for pencil.	Watch <input type="checkbox"/> Pencil <input type="checkbox"/>	
REPETITION Ask the subject to repeat, "No ifs, ands, or buts."	Repetition <input type="checkbox"/>	
3-STAGE COMMAND Give the subject a piece of plain blank paper and say, "Take the paper in your right hand, fold it in half and put it on the floor."	Takes paper in right hand <input type="checkbox"/> Folds paper in half <input type="checkbox"/> Puts paper on floor <input type="checkbox"/>	
READING On a blank piece of paper print this sentence "Close your eyes," in letters large enough for the subject to see clearly. Ask him/her to read it and do what it says. Score correct only if he/she actually closes his/her eyes.	Closes Eyes <input type="checkbox"/>	
WRITING Give the subject a blank piece of paper and ask him/her to write a sentence. It is to be written spontaneously. It must contain a subject and a verb and be sensible. Correct grammar and punctuation are not necessary.	Writes Sentence <input type="checkbox"/>	
COPYING On a clean piece of paper, draw intersecting pentagons, each side about 1 inch, and ask subject to copy it exactly as it is. All 10 angles must be present and two must intersect to score one point. Tremor and rotation are ignored.	Draws Pentagons <input type="checkbox"/>	
e.g. 		
DERIVING TOTAL SCORE		
Sum the number of correct replies to the test items. If item "world spelled backward" was used then add the number of correct letters given in proper sequence (one to five). The maximum score is 30 for this test.		
TOTAL SCORE		

^aReprinted with permission from Folstein MF, Folstein SE, McHugh PR. Mini-Mental State. A practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res.* 12:189-198, 1975.

Table 24.2. Work-up for the Differential Diagnosis of Dementia^a

By the examiner	
History	
Mental status examination	
Physical examination	
Neurologic examination	
Special tests ^b	
CT scan or MRI	
Chest X-ray	
ECG	
EEG	
Blood	
CBC, metabolic screen, thyroid profile,	
B ₁₂ level, VDRL, FTA-abs	
Psychometric Evaluation	

^aModified from Wells CE. *Dementia*. 2nd ed. Philadelphia, Pa: F. A. Davis; 1978.

^bCT = computed tomography; MRI = magnetic resonance imaging; ECG = electrocardiogram; EEG = electroencephalogram; CDC = complete blood count; VDRL = Venereal Disease Reference Laboratory.

major components for a work-up of dementia. It is not within the scope of this chapter to elaborate on the diagnostic criteria for different dementias. For further information on this topic, see Katzman et al, 1988 (20). It should be emphasized that the detection of dementia and the diagnosis of its etiology are very dependent on history. Seeking information from family and friends regarding the patient's functional abilities provides the basis for diagnosis to a greater extent than any psychometric, laboratory, or radiologic procedures.

Depression

DEFINITIONS AND PREVALENCE

The essential feature of a major depressive episode, as defined by the DSM III-R, is depressed mood or loss of interest or pleasure in most activities for a period of at least 2 weeks. The symptoms represent a change from previous functioning and are relatively persistent; that is, they occur for most of the day, nearly every day. Associated symptoms include appetite disturbance, change in weight, sleep disturbance, psychomotor agitation or retardation, decreased energy, feelings of worthlessness, inappropriate guilt, difficulty thinking or concentrating, and recurrent thoughts of death or suicide (10).

The reported prevalence of depressive symptomatology in the elderly ranges from 5% to 65% in hospital and community populations (21). Despite these variations, it is generally agreed that depression is more prevalent in older persons than in any other age group (22). Furthermore, it is well recognized that depression can be associated with reversible dementia. Termed pseudodementia (23) or the dementia associated with depression (16), characteristic symptoms include lack of motivation and drive, difficulty with verbal elaboration, poor memory retrieval, and improved performance with

Table 24.3. Geriatric Depression Scale (GDS) Sensitivity and Specificity^a

	Cut-off Scores		
	9	11	14
Sensitivity	90%	84%	80%
Specificity	80%	95%	100%

^aFrom Brink TL, Yesavage JA, Lum O, Heersema PH, Adey M, Rose TL. Screening tests for geriatric depression. *Clin Gerontol*. 1:37-43, 1982.

encouragement (24). It is easy to understand the potential impact of these symptoms on rehabilitative efforts. Successful treatment of depression can be very effective in improving rehabilitative outcome, making recognition of the problem imperative.

Depression in the elderly may not have the classic vegetative signs of weight loss, sleep disorder, or changes in libido. Even when present, these signs may be attributed to the patient's age or medical illness. Although nothing can replace the clinical examination by an experienced psychiatrist, numerous instruments have been developed to assess depressive symptomatology in populations.

INITIAL SCREENING

There are two varieties of depression scales: examiner-rating and self-rating. Overall, the former is considered superior but requires a trained interviewer and extensive time. The prototype examiner-rating scale is the Hamilton Scale (25), which takes up to an hour to administer. This is an excellent instrument if time allows. Self-rating scales such as the Zung Scale (26) and the Beck Scale (27) have been widely used but can be misleading in the elderly. Age-related illnesses such as arthritis can result in high "somatic complaint" scores, making elders with good mental health appear depressed on the screening instrument. The Geriatric Depression Scale (GDS) (28) was designed to specifically evaluate the common manifestations of depression in later life. It consists of a 30-item questionnaire answerable with yes/no responses. Correlation with the Zung and Hamilton Scales is high, but superiority has been reported in elderly populations with the GDS. Cut-off scores for different sensitivities/specificities are shown in Table 24.3 and Figure 24.3.

DEPRESSION AND STROKE

A particular situation deserving of attention is the recently appreciated relationship between depression and stroke. Although any individual faced with medical disability (e.g., hip fracture, loss of limb, etc.) is likely to feel depression, stroke is an illness affecting the organ that is responsible for our affective state. Depression has not been clearly localized, but recent studies point to certain areas of the brain as being more closely associated with the development of depression and cognitive

Figure 24.3. Geriatric Depression Scale.^a

1. Are you basically satisfied with your life?	yes/no
2. Have you dropped many of your activities and interests?	yes/no
3. Do you feel that your life is empty?	yes/no
4. Do you often get bored?	yes/no
5. Are you hopeful about the future?	yes/no
6. Are you bothered by thoughts you can't get out of your head?	yes/no
7. Are you in good spirits most of the time?	yes/no
8. Are you afraid that something bad is going to happen to you?	yes/no
9. Do you feel happy most of the time?	yes/no
10. Do you often feel helpless?	yes/no
11. Do you often get restless and fidgety?	yes/no
12. Do you prefer to stay at home, rather than going out and doing new things?	yes/no
13. Do you frequently worry about the future?	yes/no
14. Do you feel you have more problems with memory than most?	yes/no
15. Do you think it is wonderful to be alive now?	yes/no
16. Do you often feel downhearted and blue?	yes/no
17. Do you feel pretty worthless the way you are now?	yes/no
18. Do you worry a lot about the past?	yes/no
19. Do you find life very exciting?	yes/no
20. Is it hard for you to get started on new projects?	yes/no
21. Do you feel full of energy?	yes/no
22. Do you feel that your situation is hopeless?	yes/no
23. Do you think that most people are better off than you are?	yes/no
24. Do you frequently get upset over little things?	yes/no
25. Do you frequently feel like crying?	yes/no
26. Do you have trouble concentrating?	yes/no
27. Do you enjoy getting up in the morning?	yes/no
28. Do you prefer to avoid social gatherings?	yes/no
29. Is it easy for you to make decisions?	yes/no
30. Is your mind as clear as it used to be?	yes/no

^aReprinted with permission from Brink TL, Yesavage JA, Lum O, Heersema PH, Adey M, Rose TL. Screening tests for geriatric depression. *Clin Gerontol*. 1:37-43, 1982.

impairment. Robinson and colleagues (24) have reported that stroke patients with left frontal brain injury are more severely depressed than are those with lesions in other areas (29, 30). In addition, they have demonstrated a relationship between depression and severity of intellectual impairment that depended on the laterality of the lesion. Depression associated with right hemisphere injury produced no cognitive impairment. In patients with a single left hemisphere lesion, over 50% had significant intellectual impairment. The degree of intellectual impairment was associated with the severity of depression; all patients with major depression had cognitive impairment, as compared with 40% of the nondepressed patients. Moreover, during the course of a 6-month follow-up, there was improvement in MMSE scores in nondepressed patients, while depressed patients showed either no change or a slight decline (31). Treatment of poststroke depression with tricyclic anti-

depressants has been shown to improve rehabilitative outcome and should be considered in patients, particularly after left hemisphere cerebrovascular accidents.

Delirium

DEFINITIONS AND PREVALENCE

The DSM III- R (10) defines delirium as reduced ability to maintain attention to external stimuli and to appropriately shift attention to new external stimuli. Disorganized thinking, as manifested by rambling, irrelevant, or incoherent speech is usually present. The syndrome also involves a reduced level of consciousness, sensory misperceptions, disturbances of the sleep-wake cycle, disorientation to time, place, or person, and memory impairment. The onset is relatively rapid, and the course typically fluctuates.

While most clinicians associate fluctuating level of consciousness with the diagnosis of delirium, their interpretation of this is often limited. Patients who frequently sleep when left unstimulated or those who have fluctuating or poor attention are likely to be exhibiting symptoms of delirium.

The prevalence of delirium in hospitalized patients is unclear, but the elderly patient is particularly vulnerable to this problem. Medications, fevers, hypoxia, relatively mild infections, and organ failure may all contribute to delirium and cognitive impairment in the elderly.

SCREENING AND EVALUATION

The screening instruments for dementia (MMSE and Blessed IMC Test) can be useful for detection of the patient with delirium. In addition, the electroencephalogram (EEG) often shows characteristic changes and can be useful for the diagnosis. The primary clue for this problem is often contained in the patient history. The course of most dementias is gradual decline after an insidious onset. Relatively abrupt or subacute changes in mental status or sleep/wake cycles are suggestive of a toxic-metabolic etiology and should be regarded with suspicion. History should be reviewed with special attention to recent changes in medications. Laboratory studies, including complete blood count (CBC) (infection/anemia), hepatic and renal functions, arterial blood gases, glucose, electrolytes, and other serum chemistries should all be obtained.

MANAGEMENT OF COGNITIVE IMPAIRMENTS

Elderly patients frequently suffer multiple illnesses. Cognitive impairments in elderly patients are also often the result of multiple etiologies. Emphasis should be placed on discovering treatable diseases. One third of

demented patients are also suffering from depression (32). Treatment of the latter can significantly improve the patient's cognitive status and general well-being. Reduction or elimination of medications, particularly those with psychotropic activity, can improve the patient's ability to participate in treatment programs. Recognition of the cognitive impairments that cannot be reversed allows the therapist to modify treatment strategies accordingly. An awareness of the cognitive changes of normal and pathologic aging is the key to devising optimal treatment for the elderly patient.

SUMMARY

The elderly are the leading consumers of health care, and the physical medicine team must be aware of the special needs of this group of patients. Cognitive impairment is more common in the elderly patient than in any other age group. Recognition of a patient's intellectual abilities is essential for devising appropriate treatment strategies. Screening for dementia, depression, and delirium should be a part of each patient's evaluation in order to provide optimal care. The routine evaluation of cognitive abilities when assessing elderly patients would greatly improve the quality and outcome of rehabilitative care.

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