Function and Cognition in Older Adults

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Why Assess Elderly for Cognition?

- Understand baseline cognitive level, potential cognitive fluctuations, and how cognition impacts:
  - Activities of daily living
  - Safety
  - Driving
  - Self care
  - Memory
  - Ability to manage financial affairs
  - Etc….

What is Cognition?

A person's ability to:

- Learn new information
- Reason & problem solve
- Sustain focus and attention
- Recall Items
- Maintain short and long term memory

Cognition and Memory

Memory is further subdivided into:

- Problem-solving memory
- Working memory
- Long term (secondary) memory
- Very long-term (remote) memory

Changes in Cognition

Mild Cognitive Impairments (MCIs)

- Definition = changes in memory and other areas of cognitive function that may be seen in healthy, older adults of average intelligence
- Involves decreased performance in learning, recall of information, and memory impairments
- Likelihood increases with age

Bonder & Bello-Haas, 2009

More Significant Cognitive Disorders

- Dementia (slow, insidious)

Progressive neurological diseases:

-Alzheimer's -Parkinson's -Huntington's (rare)

-Multi-infarct -Multiple Sclerosis -Benign, Senile

- Delirium (acute, fluctuates dramatically)

Can coexist, and dementia can be a risk factor for development of delirium (Cassel et. al, 2003)

Hallmark distinction between delirium and dementia is inattention

Cognitive Changes with Normal Aging

Cognitive Abilities	Changes
Problem solving memory	Declines tend to be delayed until the 70s
Working memory retained	Some limitations minimize the amount of material that can be retained
Long term (secondary)	Some decline; deficits in encoding processes
Very long term (remote)	Little decline in remembering information such as details from personal childhood or early adulthood
Psychomotor skills	Decline may begin in early 50s
Speed of processing	Slowing may begin in early 50s and continue through late life
Verbal skills	Declines late in life, but changes are relatively minor
Reasoning	Older adults may be less proficient on laboratory tests but may not experience changes in daily life

TABLE 7-1 Changes in Cognition with Normal Aging

Bonder & Bello-Haas, 2009

Effects of Cognitive Changes

Components of Cognition	Effects on Daily Activities
Long-term memory	Difficulty in remembering newly learned facts such as telephone numbers, associating faces and names
	Problems may be experienced in the workplace if job requires high level of memorization
	Misplacing objects, forgetting appointments
Speed of processing	Some difficulty following and remembering the content of fast-paced television programs or movies
	Could lead to difficulties in reaction time or decision making while driving

TABLE 7-2 Effects of Age-Related Changes in Cognition on Daily Activities of Older Adults

Bonder & Bello-Haas, 2009

Impact of Cognitive Changes

Cognitive changes are known to impact a patient's:

- functional dependence, length of hospital stay, mortality, hospital discharge destination, and caregiver burden (Milisen, Lemiengre, Braes & Foreman, 2010)
- Are common in intensive care, neurosurgery cardiac, orthopedic &oncology patients, or as a result of baseline dementia.

Cognitive Assessment Tools

- MMSE
- SLUMS
- MOCA
- ACLS-5

Cognitive Assessments Tools

- For patients with apparent cognitive changes, screening tools can assess the severity and specificity of the impairments
- 4 Common cognitive screens:
  - Mini-mental State Examination (MMSE)
  - Saint Louis University Mental Status (SLUMS)
  - Montreal Cognitive Assessment (MoCA)
  - Allen's Cognitive Level Screen (ACLS-5)

Mini-Mental Status Exam (MMSE)

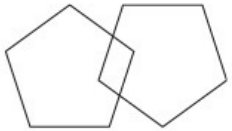
- Reliable, valid, sensitive (1975)
- Takes 5-10 min, 30 point scale
- Easy to administer in office, clinic
- Tests recall, attention, calculations, language, orientation and ability to follow simple commands
- 24-30: none ;18-23 mild; 0-17 severe

Mini-Mental Status Exam (MMSE)

The Mini-Mental State Exam

Patient_____ Examiner _____ Date_____

Maximum	Score	
		Orientation
5	( )	What is the (year) (season) (date) (day) (month)?
5	( )	Where are we (state) (country) (town) (hospital) (floor)?
		Registration
3	( )	Name 3 objects: 1 second to say each. Then ask the patient all 3 after you have said them. Give 1 point for each correct answer. Then repeat them until he/she learns all 3. Count trials and record. Trials _____
		Attention and Calculation
5	( )	Serial 7's. 1 point for each correct answer. Stop after 5 answers. Alternatively spell "world" backward.
		Recall
3	( )	Ask for the 3 objects repeated above. Give 1 point for each correct answer.
		Language
2	( )	Name a pencil and watch.
1	( )	Repeat the following "No ifs, ands, or buts"
3	( )	Follow a 3-stage command: "Take a paper in your hand, fold it in half, and put it on the floor."
1	( )	Read and obey the following: CLOSE YOUR EYES
1	( )	Write a sentence.
1	( )	Copy the design shown.



____ Total Score

ASSESS level of consciousness along a continuum _____

Alert Drowsy Stupor Coma

[1]MINI-MENTAL STATE." A PRACTICAL METHOD FOR GRADING THE COGNITIVE STATE OF PATIENTS FOR THE CLINICIAN. *Journal of Psychiatric Research*, 12(3): 189-198, 1975. Used by permission.

Mini-Mental Status Exam (MMSE)

Advantages:

- Useful for testing significant cognitive impairment
- Useful for serial testing in patients with cognitive impairment
- Screening tool
- Ease of use

Mini-Mental Status Exam (MMSE)

Limitations:

- Lacks utility in patients with lower education levels, non English speakers
- Less effective in patients with mild cognitive impairment
- Lacks visual-spatial measures

St. Louis University Mental Status Exam (SLUMS)

- 11 questions, 30 point scale
- Validated, reliable, reproducible results
- Tests for mild cognitive impairment
- Tests memory, orientation, attention, size differentiation, executive function,
- St. Louis

St. Louis University Mental Status Exam (SLUMS)

Advantages:

- Overcomes limitations of MMSE to include education (special scoring for high school vrs non high school education and sensitivity to mild cognitive function)

VAMC
SLUMS Examination

Questions about this assessment tool? E-mail aging@slu.edu.

Name_____ Age _____
Is patient alert?_____ Level of education _____

__/1 (1) **1. What day of the week is it?**
__/1 (1) **2. What is the year?**
__/1 (1) **3. What state are we in?**

4. Please remember these five objects. I will ask you what they are later.
Apple Pen Tie House Car

5. You have $100 and you go to the store and buy a dozen apples for $3 and a tricycle for $20.
(1) **How much did you spend?**
__/3 (2) **How much do you have left?**

6. Please name as many animals as you can in one minute.
__/3 (0) 0-4 animals (1) 5-9 animals (2) 10-14 animals (3) 15+ animals

__/5 **7. What were the five objects I asked you to remember?** 1 point for each one correct.

8. I am going to give you a series of numbers and I would like you to give them to me backwards. For example, if I say 42, you would say 24.
__/2 (0) 87 (1) 649 (1) 8537

9. This is a clock face. Please put in the hour markers and the time at ten minutes to eleven o'clock.
(2) Hour markers okay
__/4 (2) Time correct

__/2 (1) **10. Please place an X in the triangle.**

(1) **Which of the above figures is largest?**

11. I am going to tell you a story. Please listen carefully because afterwards, I'm going to ask you some questions about it.
Jill was a very successful stockbroker. She made a lot of money on the stock market. She then met Jack, a devastatingly handsome man. She married him and had three children. They lived in Chicago. She then stopped work and stayed at home to bring up her children. When they were teenagers, she went back to work. She and Jack lived happily ever after.

(2) **What was the female's name?** (2) **What work did she do?**
__/8 (2) **When did she go back to work?** (2) **What state did she live in?**

_____ **TOTAL SCORE**

Department of Veterans Affairs

SAINT LOUIS UNIVERSITY

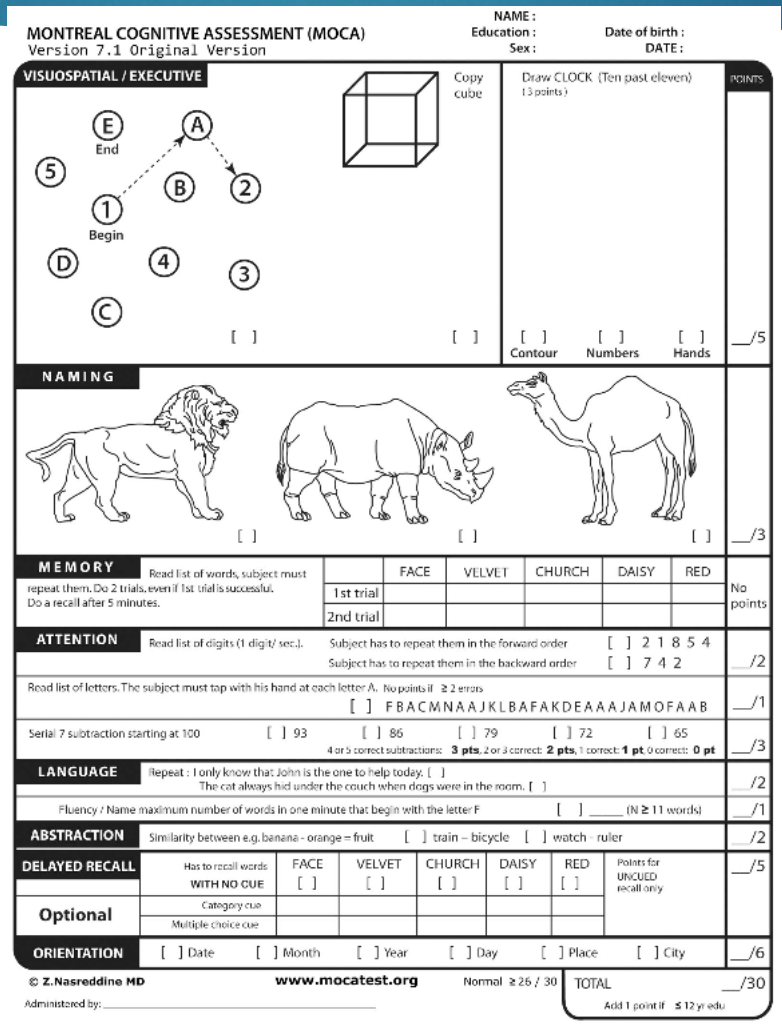
SCORING

High School Education		Less than High School Education
27-30	Normal	25-30
21-26	MNCD*	20-24
1-20	Dementia	1-19

* Mild Neurocognitive Disorder

SH Tariq, N Tumosa, JT Chibnall, HM Perry III, and JE Morley. The Saint Louis University Mental Status (SLUMS) Examination for Detecting Mild Cognitive Impairment and Dementia is more sensitive than the Mini-Mental Status Examination (MMSE) - A pilot study. J am Geriatri Psych (in press).

Montreal Cognitive Assessment (MoCA)



MONTREAL COGNITIVE ASSESSMENT (MOCA)
Version 7.1 Original Version

NAME :
Education : Date of birth :
Sex : DATE :

VISUOSPATIAL / EXECUTIVE — POINTS

Copy cube

Draw CLOCK (Ten past eleven) (3 points)

E End, A, 5, B, 2, 1 Begin, D, 4, 3, C

[ ] [ ]

[ ] Contour [ ] Numbers [ ] Hands

__/5

NAMING

[ ] [ ] [ ]

__/3

MEMORY Read list of words, subject must repeat them. Do 2 trials, even if 1st trial is successful. Do a recall after 5 minutes.

	FACE	VELVET	CHURCH	DAISY	RED
1st trial					
2nd trial					

No points

ATTENTION Read list of digits (1 digit/ sec.).

Subject has to repeat them in the forward order [ ] 2 1 8 5 4

Subject has to repeat them in the backward order [ ] 7 4 2

__/2

Read list of letters. The subject must tap with his hand at each letter A. No points if ≥ 2 errors

[ ] F B A C M N A A J K L B A F A K D E A A A J A M O F A A B

__/1

Serial 7 subtraction starting at 100 [ ] 93 [ ] 86 [ ] 79 [ ] 72 [ ] 65

4 or 5 correct subtractions: **3 pts**, 2 or 3 correct: **2 pts**, 1 correct: **1 pt**, 0 correct: **0 pt**

__/3

LANGUAGE Repeat : I only know that John is the one to help today. [ ]
The cat always hid under the couch when dogs were in the room. [ ]

__/2

Fluency / Name maximum number of words in one minute that begin with the letter F [ ] ____ (N ≥ 11 words)

__/1

ABSTRACTION Similarity between e.g. banana - orange = fruit [ ] train – bicycle [ ] watch – ruler

__/2

DELAYED RECALL

	Has to recall words WITH NO CUE	FACE [ ]	VELVET [ ]	CHURCH [ ]	DAISY [ ]	RED [ ]	Points for UNCUED recall only
Optional	Category cue						
	Multiple choice cue						

__/5

ORIENTATION [ ] Date [ ] Month [ ] Year [ ] Day [ ] Place [ ] City

__/6

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TOTAL __/30

Add 1 point if ≤ 12 yr edu

Administered by: _____

Montreal Cognitive Assessment (MoCA)

13 items

10-15 minutes to administer

Tests:

- Orientation
- Attention and concentration
- Memory
- Executive function
- Language
- Visuospatial skills
- Conceptual thinking
- Calculations

Normal > 26 points

Montreal Cognitive Assessment (MoCA)

Advantages:

- MoCA has been shown to be the most sensitive cognitive screen for mild cognitive impairment
- MoCA is more sensitive tool for patients with brain metastases, Parkinson's, TIA or stroke, and cardiovascular disease when compared to the MMSE

(Berstein et. al, 2011; Dalrymple-Alford et. al, 2010; Dong et. al, 2010; McLennan et. al, 2011; Olson et. al, 2010; Pendelbury et. al, 2010)

Montreal Cognitive Assessment (MoCA)

Limitations:

- MoCA has some issues with specificity, including false positives, especially in non-clinical environments (Bernstein et. al, 2011)

Allen Cognitive Level Screen (ACLS-5)

Allen Cognitive Level Screen (ACLS-5)

- Dynamic, activity-based screen
- Comprised of 3 visual-motor tasks (leather lacing stitches) with increasingly complex activity demands
- Scores obtained are interpreted using the Allen Cognitive Scale of levels and modes of performance
- Requires competency training

Cognition Interventions & Recommendations

External Aids

- Carry small notebook to jot down reminders, notes, directions, etc.
- Leave messages on your answering machine
- Use a calendar to track your scheduled appointments
- Write reminders with a dry erase marker on the bathroom mirror

Bonder, B.R., & Bello-Haas, V.D. (2009)

Internal Aids

- Pay attention and really focus on material you want to remember
- Rehearse information and test yourself
- Use relaxation techniques before trying to remember things
- Create a visible image image or personally meaningful association when trying to remember names and face
- Put easily misplaced items in a visible "memory spot" every time
- Organize lists you want to remember
- Break lists into smaller chunks or groupings

Bonder, B.R., & Bello-Haas, V.D. (2009)

Treatment Recommendations

- Normalize the use of aids
- Emphasize new knowledge that will be consistent with previous learning
- Concentrate on one task at a time
- Reduce distractions
- Allow self-pacing if possible
- Organize information and treatment sequences
- Use supportive versus neutral instruction
- Provide as much feedback as possible

Bonder, B.R., & Bello-Haas, V.D. (2009)

References

Bernstein, I., Lacritz, L., Barlow, C., Weiner, M., DeFina, L. (2011). Psychometric evaluation of the montreal cognitive assessment (MoCA) in three diverse samples. The Clinical Neuropsychologist, 25(1), 119-126.

Bhat, R. & Rockwood, K. (2002). The prognosis of delirium. Psychogeriatrics, 2, 165-179.

Bonder, B.R., & Bello-Haas, V.D. (2009). *Functional performance in older adults* (3rd ed.). Philadelphia: F.A. Davis.

Cassel, C., Leipzig, R., Cohen, H., Larson, E., Meier, D., & Capello, C. (2003). *Geriatric medicine* (4th ed.). New York: Springer.

Dalrymple-Alford, J., MacAskill, M., Nakas, C., Livingston, L., Graham, C., Crucian, G., Melzer, T., Kirwan, J., Keenan, R., Wells, S., Porter, R., Watts, R. & Anderson T. (2010). The MoCA: Well-suited screen for cognitive impairment in Parkinson disease. Neurology, 75(19), 1717-25.

Dong, Y., Sharma, V., Chan, B., Venketasubramanian, H., Seet, R., Tanicala, S., Chan, Y. & Chen, C. (2010). The Montreal cognitive assessment (MoCA) is superior to the mini-mental state examination (MMSE) for the detection of vascular cognitive impairment after acute stroke. Journal of the Neurological Sciences, 299, 15-18.

References

Lewis, C. & Bottomley, J. (2008). *Geriatric rehabilitation: A clinical approach* (3rd ed.). Upper Saddle River: Prentice Hall.

McLennan, S., Mathias, J., Brennan, L., & Stewart, S. (2011). Validity of the Montreal cognitive assessment (MoCA) as a screening test for mild cognitive impairment (MCI) in a cardiovascular population. Journal of Geriatric Psychiatry and Neurology, 24(1), 33-38.

Milisen, K., Lemiengre, J., Braes, T., & Foreman, M. (2005). Multicomponent intervention strategies for managing delirium in hospitalized older people: systematic review. Journal of Advanced Nursing, 52(1), 79-90.

Olson, R., Tyldesley, S., Carolan, H., Parkinson, M., Chhanabhai, T.& McKenzie, M. (2010). Prospective comparison of the prognostic utility of the mini mental state examination and the Montreal cognitive assessment in patients with brain metastases. Support Care Cancer.

Pendlebury, S., Cuthbertson, F., Welch, S., Mehta, Z., & Rothwell, P. (2010). Underestimation of cognitive impairment by mini-mental state examination versus the Montreal cognitive assessment in patients with transient ischemic attack and stroke: a population-based study. Stroke, 41, 1290-1293.