Reviews

Brief Assessment of Cognitive Mental Status in Hebrew: Addenbrooke's Cognitive Examination

J.P. Newman PhD

Department of Neurology and Agnes Ginges Center for Human Neurogenetics, Hadassah-Hebrew University Medical Center, Jerusalem, Israel

Key words: cognition, mental status, Mini-Mental State Examination, Hebrew, Addenbrooke

Abstract

We describe a new brief neurocognitive assessment instrument, Addenbrooke's Cognitive Examination, which is built around the shell of the Mini-Mental State Examination but which assesses a wider range of cognitive functions specific to various dementing diseases such as Alzheimer's disease and frontotemporal dementia. A Hebrew-language adaptation of the instrument is also provided.

IMAJ 2005;7:451–457

Since its introduction in 1975, Folstein and Folstein's Mini-Mental Status Examination [1] has earned a time-honored place in medical practice. It met the need for a very brief screening instrument assessing neurocognitive mental status. It was simple to administer, could be completed in 5–10 minutes, and was repeatable. According to a recent Medline search, over 1,200 articles have appeared in the medical literature just in the last decade in which the MMSE was employed to measure mental status.

However, the deficiencies of the MMSE as a measure of mental status have been equally clear since its initial publication:

- It is composed of only 30 items, a full 10 of which are in the domains of orientation for time and place

- The sole item measuring short-term memory, the one essential component in any diagnosis of dementia [2], requires only the recall of three words after a brief interval

- Object naming, a critical deficit in Alzheimer's disease and other disorders that impair semantic access, is inadequately measured by two very easy items

- It does not at all measure some cognitive functions that are known in the behavioral neurology literature to be sensitive to specific to dementing processes, such as word generation (the ability to categorize words by, for example, first letter or abstract class such as animals) in Alzheimer's disease

- One of two items intended to measure attention and concentration deficits, the serial subtraction of 7 from 100, more appropriately measures dyscalculia and is in any case often too difficult for elderly patients or patients with little formal education

- The MMSE is relatively insensitive to the cognitive sequelae of sub-cortical dementias, such as psychomotor slowing and impaired concentration.

Recently, an additional impediment came in the form of the copyrighting of the MMSE, meaning that it must now be purchased at no small expense from a test publisher, even for research purposes.

A number of alternative screening instruments have been developed over the years, none of which have gained the wide acceptance and common usage of the MMSE. A major reason for this has been the cumbersome nature of some of them: namely, they may require specialized knowledge or training to administer; they may take the average physician too long to administer in an office or research setting; they may provide a variety of sub-scores that are difficult to interpret; and they lack comparability to the familiar 30 point maximum MMSE score.

In 2000, Hodges and his colleagues at Addenbrooke's Hospital of the University of Cambridge, UK, published Addenbrooke's Cognitive Examination [3]. This instrument was intended to meet the needs heretofore met by the MMSE while at the same time addressing its many deficiencies. As such,

- It requires approximately 15–20 minutes to complete and is easily administered, scored and interpreted by the non-specialist

- It comprises a total of six subtests measuring almost the full range of major cognitive functions and yielding a total score of 100 points

- Even so, it incorporates all 30 items of the original MMSE and thus yields an additional, entirely comparable score

---

MMSE = Mini-Mental Status Examination

- It contains a much more adequate measure of verbal short-term memory composed of seven items administered over three trials, in addition to a delayed-recall trial

- An additional 10 object-naming items are included

- It contains two word-generation tasks

- Wider assessment of other basic language functions, such as comprehension, reading and repetition are included.

In addition, the test itself, while copyrighted, is freely available for downloading from the WorldWide Web site of the journal in which it was published.

In the original norming study conducted at Addenbrooke's Hospital, cutoff scores of 88 and 83 were set for the diagnosis of dementia, depending on the base-rate levels of dementia prevailing in the population to which the patient being examined belonged (population at large versus general medical practice patients versus neurologic patients). For specialist usage, an additional score can be computed that aids in the differential diagnosis of Alzheimer's disease versus frontotemporal dementia with a high degree of confidence in individual patients. The original article may be consulted for further explanation of this score. In addition, extensive norms are provided for other diagnostic categories with components of dementia or cognitive decline, such as Parkinson's disease, progressive supranuclear palsy and corticobasal ganglionic degeneration.

Addenbrooke's Cognitive Examination is easily adapted for use in other languages. With the consent of the copyright holder, we undertook to translate and adapt the entire instrument for use in Hebrew, which we publish here. The process of doing so required several clinical trials to determine near-equivalents for the language components. All other test elements were preserved in their original forms.

At present, we are conducting an extensive norming study of the Hebrew-language version of Addenbrooke's Cognitive Examination, which we anticipate will be completed within one year. For now, our extensive clinical experience with the instrument over the last 3 years permits us to recommend it for the generalist as well as the specialist as a brief, easily administered, valid and reliable repeatable measure of neurocognitive impairment. Even so, the instrument is not without flaws. For example, more adequate measures of attention and concentration were not added. For this purpose, we recommend the addition of several automatic-speech tasks, such as counting backward from 20 to 1; naming the letters of the Hebrew alphabet (for patients who previously knew them and in their proper order), and a task such as serial threes, in which the patient must add 3 to 1, then add 3 to that sum and each succeeding sum, up to 40. Impaired concentration often manifests in difficulty performing these tasks rapidly and without errors.

In addition, the examination does not provide adequate assessment of executive, or so-called frontal-lobe, functions per se. However, the Frontal Assessment Battery, a brief instrument for assessment of executive functions, also published in *Neurology*, meets that need [4]. It requires no further translation of language items, and so is readily available for clinical use. For the convenience of the clinician, the item names of the Frontal Assessment Battery have been appended to the scoring sheet of Addenbrooke's Cognitive Examination in the present article.

The entire test protocol may be downloaded from the World Wide Web at the following URL:
http://www.angelfire.com/il/neuropsy/ACE-Hebrew.pdf

References

1. Lezak MD. Neuropsychological Assessment. 4th edn.. New York: Oxford University Press, 2004.
2. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th edn. Washington, DC: American Psychiatric Association, 1994.
3. Mathuranath PS, Nestor PJ, Berrios GE, Rakowicz W, Hodges JR. A brief cognitive test battery to differentiate Alzheimer's disease and frontotemporal dementia. *Neurology* 2000;55:1613–20.
4. Dubois B, Slachevsky A, Litvan I, Pillon B. The FAB: a frontal assessment battery at bedside. *Neurology* 2000;55:1621–6.

Correspondence: Dr. J.P. Newman, Dept. of Neurology, Hadassah-Hebrew University Medical Center, P.O. Box 1200, Jerusalem, 91120 Israel.
Phone: (972-2) 643-5582
Fax: (972-2) 643-7782
email: jpnewman@yahoo.com

> By all means, marry. If you get a good wife, you'll become happy; if you get a bad one, you'll become a philosopher.
>
> Socrates

> I was married by a judge. I should have asked for a jury.
>
> Groucho Marx (1890-1996), madcap American comedian and one of the three Marx Brothers

ADDENBROOKE'S COGNITIVE EXAMINATION

Name:	Years of education: _____ Hand: L R B
Date & place of birth:	Occupation:
I.D. No.:	Date of testing: _____ / _____ / _____

All instructions to the tester are in italics. **All instructions to be said aloud to the patient are in bold non-italic print.**

ORIENTATION

Ask the subject the following questions and score a point for each correct answer. Record all errors.

Q1a) **What is the Year** _____   Q1b) **Where are we Country** _____
    Month _____   **Area of Country** _____
    Date* _____   **Town** _____
    Day _____   **Hospital/building** _____
    Season _____   **Floor/Level*** _____

Allow an error of ± 2

Total score for orientation   [0 - 10] ☐ **O**

ATTENTION/CONCENTRATION

Q2) *Tell the subject* **I am going to ask you to recall the names of three things.**
    Say aloud: עץ **,דגל ,כדור**   *Then ask the subject to repeat them. Give one point for each correct answer at first attempt only.*
    If score<3 repeat all three items until the subject learns them all

[0 - 3] ☐

    Maximum trials allowed = 5.

Q3) *Ask the subject to* **take away 7 from 100.**
    1.   Give one point only for the right answer (93).
    2.   If the subject's answer is wrong then tell the correct answer.
    3.   Ask the subject to **now take away 7 from** *the correct answer* **(93).**
    Repeat steps 1 to 3 for a total of 5 subtractions (93, 86, 79, 72, 65). Score the total number of correct subtractions.
    If score<5 then ask the subject to **Spell שולחן backwards.** *Score the number of letters in the correct order, e.g* ןחולש = 4.
    Take score of better of the two tasks. Record errors:

_____   [0 - 5] ☐

MEMORY

Q4) *Ask the subject to* **recall the names of the 3 things learned earlier** *in question 2.*
Score one point for each correct answer. [0 - 3] ▭

Q5) *Anterograde Memory: Tell the subject* **I will read a name and address and ask you to repeat it when I have finished.** *Now read aloud the following name and address. Score one point for each element recalled correctly. Regardless of the score after the first trial, repeat the instruction and the task twice in exactly the same way. Record scores for each of the three trials.*

	1st trial	2nd	3rd	5 min delay	20 min delay			
משה אברהמי	__ __	__ __	__ __	__ __	__ __			
רח' אלון 53	__ __ __	__ __ __	__ __ __	__ __ __	__ __ __			
סינסינאטי	__	__	__	__	__			
אוהיו	__	__	__	__	*Trial 1-3*	[0 - 21]	▭	
	/7	/7	/7	/7	*5 min delay*	[0 - 7]	▭	**M**

Q6) *Retrograde Memory: Score one point for each correct answer and record errors.* **Tell me the full name of**
  the prime minister _____
  the last prime minister _____
  the President of Israel _____
  the President of the United States _____ [0 - 4] ▭

VERBAL FLUENCY

Q7) *Letter: Ask the subject to:* **tell me all the words you can think of, but not people and places, beginning with the letter** מ . *Time the subject for 1 minute and record all answers in the space provided below. Error types: perseverations and intrusions.*

Q8) *Category: Say:* **Now tell me the names of as many animals as you can, beginning with any letter of the alphabet.** *Time the subject for 1 minute and record all responses in the space provided below. Error types: perseverations and intrusions.*

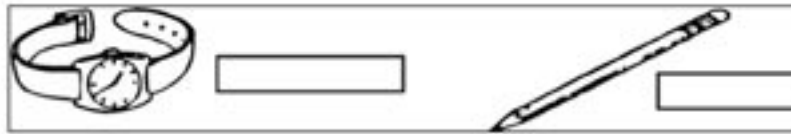| מ		**Animals**			Raw Score		Scaled Score
(continue)	*(start here)*	*(continue)*	*(start here)*		מ	Animal	
					> 17	> 21	7
					14-17	17-21	6
					11-13	14-16	5
					8-10	11-13	4
					6-7	9-10	3
					4-5	7-8	2
					< 4	< 7	1

Record the total number of responses. To calculate the raw score give one point for each correct response and exclude all repetitions. Enter the scaled scores using the table shown above.

מ Total response_____ Raw score _____ Scaled Score [0 - 7] = _____
Animals: Total response_____ Raw score _____ Scaled Score [0 - 7] = _____
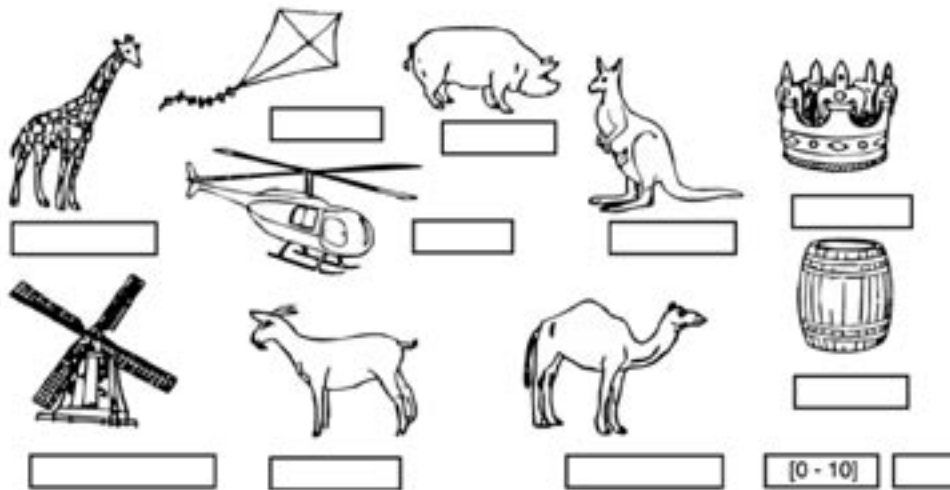Total Scaled Score [0 - 14] ▭ **V**

Q9) *Now to check delayed recall ask the subject* **Can you tell me the name and address that I told you and that you practised at the beginning of the test.** *Record points, scores and errors as for question 5 in the space provided in question 5 on page 1.*

LANGUAGE

Q10) *Naming: Show the subject the following two line drawings and ask him/her to name each of them. Record responses and errors. Give one point for each correct response.*

[0 -2]

Q11) *Naming: Show the subject the following ten line drawings and ask him/her to name each of them. Record responses and errors. Give one point for each correct response. Allow close synonyms (e.g. tub for barrel; coronet for crown; dromedary for camel, etc)*

[0 -10]

[0 - 10]

Q12) *Comprehension (one-stage): Ask the subject to* **please obey the following simple commands.**

- **point to the door**
- **point to the ceiling**

[0 - 2]

Show the subject the following instruction and ask him/her to **read this aloud and obey it.**

עצום את עיניך

Score one point if performed correctly.

[0 - 1]

Q13) *Comprehension (3 stages): Give the subject a piece of paper and tell him to* **take this paper in your right hand. Fold it in half. Then put the paper on the floor.**
Score one point for each correctly performed step.

[0 - 3]

Q14) *Comprehension (complex grammar): Ask the subject to* **please obey the following commands.**

- **point to the ceiling, then the door**
- **point to the door after touching the bed/desk**

Score one point for each correctly performed command.

[0 - 2]

Q15) *Repetition (single words):* Ask the subject to **repeat each of these words after me.** *Score one point for each correct repetition. Allow only one repetition.*

- חום
- הבעה
- אולטימטום

[0-3] ☐

Q16) *Repetition (phrases):* Ask the subject to **repeat each of these phrases after me.** *Allow only one repetition.*

- לא כל הנוצץ זהב הוא.
- התזמורת ניגנה והקהל נהנה.

[0 - 1] ▨
[0 - 1] ☐

Q17) *Reading (regular):* Ask the subject to **read each of these words aloud** *and show him/her the following five words.*

- רץ   • להבות
- כתב   • גשרים
- קרש

Score one point only if all five words are read correct.

[0 - 1] ☐

Q18) *Reading (irregular):* Ask the subject to **read each of these words aloud** *and show him/her the following five words.*

- נתפר   • תקופתית
- פגום   • הגבהה
- משכיל

Score one point only if all five words are read correct.

[0 – 1] ☐

Q19) *Writing:* Ask the subject to **make up a sentence and write it down in the space below.** *If stuck suggest a topic, e.g. weather, journey. Score one point if the sentence has a correct subject and verb and is meaningful.*

_____

_____

[0- 1] ▨

VISUOSPATIAL ABILITIES

Q20) *Overlapping pentagons:* Show the subject the following figure and ask him/her to **copy this diagram in the space provided next to it.**

Score one point if copied correct.

[0 -1] ▨

Q21) *Wire cube:* Show the subject the following figure and ask him/her to **copy this diagram in the space provided next to it.**

Score one point if copied correct.

[0 -1] ☐

Q22) *Clock: Ask the subject to* **draw a clock-face with all the numbers and the hands at ten past five.**

Score 1 pt. each, for correct circle, numbering of clock-face and position of the hands. [0 - 3]

<u>CHECK:</u> **Have you tested & recorded the delayed recall for name & address in Question 5 on page 1?**

OVERALL SCORES					MMSE*** =	/30
					ACE** =	/100
VL/OM RATIO :		V	+	L*		
If < 2.2: FTD					=	=
If > 3.2: AD		O	+	M		

***Sum of scores entered in the shaded boxes.
** Sum of scores entered in all boxes.
* Sum of scores entered in all boxes from Question 10 to Question 19

Source:

Mathuranath PS, Nestor PJ, Berrios GE, Rakowicz W & Hodges JR. A brief cognitive test battery to differentiate Alzheimer's disease and frontotemporal dementia. *Neurology* 2000;55:1613-20.

גרסה עברית ע"י ד"ר יהושע נאמן, פברואר 2001

FRONTAL ASSESSMENT BATTERY

Similarities	/3
1.	
2	
3.	
Lexical Fluency	/3
Motor Series	/3
Conflicting Instructions	/3
Go-No Go	/3
Prehension	/3

/18

Source:

Dubois B, Slachevsky A, Litvan I & Pillon B. The FAB: A frontal assessment battery at bedside. *Neurology* 2000;55:1621-26.

ATTENTION & CONCENTRATION

20-1:

ABC:

Serial Threes: