

MINI-MENTAL STATE EXAMINATION (MMSE)

General Information:

- The MMSE is a screening test for dementia
- It quantifies cognitive impairment yielding a single composite score that reflects disease severity
- It can be followed reliably to reflect disease progression over time
- It has excellent intra-rater, inter-rater, and test-retest reliability
- It has 80% sensitivity and 60-80% specificity for dementia with a cutoff of 24/30

Caveats:

- It is heavily reliant on recent memory and language, and therefore, better designed for Alzheimer's Disease (16/30 points), less so for other dementias such as frontal, or subcortical types of dementias.
- It was developed for use with patients having at least Grade 8 education – note unlike the MoCA there is no adjustment for education
- There are no validated non-English versions commonly in use, or valid norms for non-English users.
- As such using the MMSE on non-English speakers or those with a low educational history must be taken in context
- ALL cognitive testing will show low results if the subject has poor attention e.g. delirium therefore caution must be used in using or interpreting the test in all these cases.

Subtask Assessment:

- In addition to the composite score, each subtask may be interpreted individually based on the cognitive domain that it tests i.e. Pentagons – visuospatial/constructional praxis
- The subcategory of test and related cognitive domain can also usually be localized to neuroanatomy i.e. – Pentagons – visuospatial/constructional praxis – right parietal lobe

The Clock:

- The clock drawing test is **not** a part of the MMSE, but is an excellent addition to further test executive function – planning the numbers, constructional praxis – contour and shapes, visuospatial function with placement of digits and abstraction of concept – placing the hands to ten past eleven.

Scoring:

- Scores 25 and greater are considered within normal limits
- 21-24 indicates mild impairment
- 10-20 indicates moderate impairment
- <10 indicates severe impairment

- Patients with Alzheimer's Dementia may expect a decline by 1-3 points per year
- Any progression faster than this should beg the question of a rapidly progressive dementia or other medical issues that may need to be addressed.
- The MMSE can be performed in standardized (s-MMSE) and non-standardized format. To ensure diagnostic accuracy, it should be performed in a standardized format for the questions asked, and the time allotted to complete the task.
- Technically, the MMSE is a copyrighted neuropsychological test, and the user should pay a fee when it is used. At the present time the Province of BC has paid the copyright for the s-MMSE to be used for diagnostic and educational purposes.

THE TEST

Introduction – Most subjects are not bothered by being tested, but some may be quite resistant to being asked questions. Preface the test by saying it is a standard part of the assessment, that it tests memory or thinking. It does NOT test intelligence. If the subject is still resistant the most high value parts of the test are orientation, recall and reversal. Even doing part of the test can be useful for diagnostic purposes.

ORIENTATION – 10 POINTS

- Patient has been presented with information, encoded that information, and can recall the information, all from the recent past
- Localizes very well to the hippocampus and medial temporal lobes

IMMEDIATE RECALL

- Repeat three words (ball, man, car)
- A test of working memory
- "Working Memory" is the ability to store bits of information in a temporary fashion, and might involve manipulation of those bits
- A diffuse cortical process (frontal lobes heavily involved), but more to dorsolateral prefrontal cortex (DLPFC) and posterior parietal lobes.
- Does not involve encoding for retrieval later
- A similar test to digit span

WORLD/SERIAL SEVENS

- This is a test of attention and working memory
- Localizes to DLPFC and Posterior Parietal Lobes
- Much more difficult for people with subcortical dementias
- Subjects that have difficulties with English may perform better on serial sevens
- Tests of calculation are highly dependent on the left parietal lobe. The attention component of performing them in a serial fashion is more what is being tested.

DELAYED RECALL

- *Prompting or giving cues if they are not able to immediately recall is not a formal part of the s-MMSE but can be added in for more information*
- This is testing your ability to both encode and retrieve stored memories.
- This test has two patterns for interpretation:
 1. The patient cannot remember the words both with and without prompting. They were unable to actually encode the words in their brain. This is predominantly a problem with the hippocampus.
 2. The patient cannot remember the words immediately, but they are able to recall the words when given a categorical clue (ball - toy) or a multiple-choice clue (was the word ball, doll or top). If they recognize the word, that means that some encoding took place, but they are having difficulties with retrieval
- This approach to memory deficit identification is also employed on the MoCA with 5 words, with cueing to categorical (semantic) cue and multiple-choice. Attempting to remember 5 words is more sensitive at picking up memory deficits than 3 words.

NAMING

- Language is complex. Naming involves recognizing what an object is, being able to understand what its significance or function is, and being able to formulate the word.
- Language is dependent on both Broca's and Wernicke's area, but also the anterior temporal lobes (semantic word knowledge), arcuate fasciculus, and left insular cortex (fluency, speech production, grammar).
- Naming watch and pen are very rudimentary tasks, because they are words that are frequently encountered in day to day activities ("high frequency words")
- More difficult tasks of language involve naming high and low frequency words

READING

- Involves the primary visual cortex and language centers noted above.

WRITING A SENTENCE

- Language systems and writing as a motor skill. Executive function in terms of word generation and the conception of a sentence is also involved.

INTERSECTING PENTAGONS

- Dependent on visuospatial cognition and construction praxis
- Localizes to the right parietal lobe
- This is a deceptively difficult test
- People often perform much better on seemingly more complicated diagrams. Making all ten angles correct is also very difficult.

THREE STEP COMMAND

- When giving the instructions one should say all three items, then hand the subject the paper. If they ask for clarification, take the paper back, repeat ALL the instructions again and then hand the paper over.
- Working memory and executive function
- Localizes well to the DLPFC
- The subject needs to hear the commands, understand them, plan and sequence appropriate action, and utilize complex motor patterns