Assessment of Mild Cognitive Impairment in Primary Care Settings

Ricardo Salazar, M.D.
Associate Professor
Director, Memory Disorder and Geriatric Neuropsychiatry Clinic
Department of Psychiatry
Paul L Foster School of Medicine
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Disclosure of Commercial Relationships
Conflict of Interest

I have no personal financial relationship with a commercial interest

No Conflict of interest to Disclose
Objectives

• Identify the signs and symptoms of mild cognitive impairment within its cognitive continuum conceptual framework.

• Distinguish the difference between mild cognitive impairment and mild clinical Alzheimer`s disease.

• Screen objectively for memory impairment with current validated psychometric instruments.

• Understand the importance of early detection and timely referral to a specialist
Practice Essentials

• In mild cognitive impairment (MCI), the changes in cognition exceeds the normal expected changes related to age.

• In one classification of MCI, the amnestic form is distinguished from the nonamnestic form.

• The amnestic form often precedes Alzheimer`s disease.
Signs and Symptoms of MCI

Symptoms of mild cognitive impairment (MCI) are often vague and include the following:

• Memory loss

• Language disturbance (e.g., difficulty in finding words)

• Attention deficit (e.g., difficulty in following or focusing on conversations)

• Deterioration in visuospatial skills (e.g., disorientation in familiar surroundings in the absence of motor and sensory conditions that would account for the complaint)
Defining Element

“The defining element of MCI is a single sphere of slowly progressive cognitive impairment that is not attributable to motor or sensory deficits and to which other areas of involvement (e.g., other cognitive domains like executive functions, reasoning, language, orientation...), may eventually be added, before social or occupational impairment supervenes (because this occurrence marks the onset of dementia)”

Ronald C. Petersen, M.D.
Diagnosis

Although no single feature of the general physical examination characterizes MCI, the following should be included in the overall assessment of the patient:

• Evaluation of mental status
• Examination for the presence of potential causative comorbid conditions
• Examination for the presence of sensory and/or motor deficits as potential causes or exacerbating factors
Diagnosis continue...

• Brain imaging with magnetic resonance imaging (MRI)
• Computed tomography (CT)
• FDG-PET
• There are not stipulated neuropsychological tests for patients with MCI, nor are there predetermined cutoff points (e.g., 1.0, 1.5, or 2.0 standard deviations below the mean). However, clinicians use the results from standardized memory and cognitive tests to determine whether these data represent significant changes from a patient`s presumed baseline.

• In general, serial testing is required to establish whether the patient`s cognitive function is improving, staying stable, or progressing to full-blown clinical dementia
AA recommendations

The Alzheimer`s association guidelines, including an algorithm, helps clinicians in the primary care setting detect cognitive impairment and determine whether referral or further testing is need it. The algorithm include the following components:

• Review of patient health risk assessment (HRA) information
• Patient observation
• Use of unstructured queries
• Use of structured cognitive assessments tools for patients and informants

The following 3 cognitive assessment tools are recommended for routine use by primary care physicians:

• General Practitioner Assessment of Cognition (GPCOG)
• Mini-Cog
• Memory Impairment Screen (MIS)
GPCOG/informant-GPCOG

**GPCOG Screening Test**

**Step 1: Patient Examination**

Unless queried, each question should only be asked once.

**Name and Address for subsequent recall test**

1. "I am giving you a name and address. After I have said it, I want you to repeat it to me again in a few minutes. John Brown, 42 West Street, Kensington." (Deliberate a minimum of 5 attempts)

**Time Orientation**

2. What is the date? (most only)

**Check Drawing** — no blank pages

3. Please mark in all the numbers to indicate the hours of a clock (current opening required).

4. Please mark in hands to show 10 minutes past eleven o'clock (11:10).

**Information**

5. Can you tell me something that happened in the news recently? (recently) • in the last week. If a general answer is given, e.g., "war," "lot of rain," ask for details. Only specific answer scores.

**Replay**

6. What was the name and address I asked you to remember?

- John
- Brown
- 42
- West
- Street
- Kensington

(To get a total score, add the number of items answered correctly)

**Total correct (score out of 6)**

- [ ]

If patient scores 5, no significant cognitive impairment and further testing not necessary.

If patient scores 4, re-administer test. Proceed with Step 2, informant interview.

If patient scores 4-3, cognitive impairment is indicated. Conduct standard investigations.

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**Informant Interview**

**Date:**********

**Informant's relationship to patient, i.e., informant is the patient's:**********

These six questions ask how the patient is compared to when she was well, say 5-10 years ago:

- [ ] Yes
- [ ] No
- [ ] Don't know
- [ ] Not applicable

- Does the patient have more trouble remembering things that happened recently than she usually?
- Does she or he have more trouble recalling conversations a few days later?
- When speaking, does the patient have more difficulty finding the right word or tend to use the wrong words more often?
- Is the patient less able to manage money and financial affairs (e.g., paying bills, budgeting)?
- Is the patient less able to manage his or her medication independently?
- Does the patient need more assistance with transportation (own private or public) or help with general activities?

(To get a total score, add the number of items answered "Yes", "Don't know" or "Not apply")

**Total score (out of 8)**

- [ ]

If patient scores 5-8, significant cognitive impairment and further investigation necessary.

If patient scores 0-4, no significant cognitive impairment. Conduct standard investigations.
Mini-Cog

Borson S et al. (2000) International J Geriatr Psychiatry
Memory Impairment Screen (MIS)

### MEMORY IMPAIRMENT SCREEN (MIS)

**Instructions for Administration**

1. Show patient a sheet of paper with the 6 items to be recalled in 24-point or greater appearance letters (or other visual), and ask patient to read the items aloud.
2. Tell patient that each item belongs to a different category. Give a category name and ask patient to indicate which of the items belongs in the stated category (e.g., "What was the game?"). Allow up to 5 attempts. Failure to complete this task indicates possible cognitive impairment.
3. When patient identifies all 6 words, review the sheet of paper. Tell patient he or she will be asked to remember the words in 45 minutes.
4. Engage patient in distracting activity for 3 to 5 minutes, such as counting to 19 and back, counting back from 184, spelling "TOPS" or numerous.
5. **PRE-RECALL:** 2 points per word. Ask patient to state as many of the 6 words or one per word as possible. Allow at least 3 seconds per second for recall. Continue to step 4 if no more words have been recalled for 15 seconds.
6. **COLD RECALL:** 1 point per word. Read the appropriate category for each word recalled during test recall, saying "What was the game?"

<table>
<thead>
<tr>
<th>Word</th>
<th>Category</th>
<th>Free Recall (2 pts.)</th>
<th>Cold Recall (1 pt.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Checkers</td>
<td>Game</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saucer</td>
<td>Dish</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telegram</td>
<td>Message</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red Cross</td>
<td>Organization</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Scoring**

The maximum score for the MIS is 8.

- 8-6: No cognitive impairment
- 5-4: Possible cognitive impairment

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AA recommendations continue.

The Alzheimer`s association guidelines, including an algorithm, helps clinicians in the primary care setting detect cognitive impairment and determine whether referral or further testing is need it. The algorithm include the following components:

Additionally, the AA recommends the following 3 cognitive assessment tools for use with the patient`s spouse, family, or friends:

- Informant General Practitioner Assessment of Cognition (informant GPCOG)
- AD 8-Question Screen (AD8)
- Short Informant Questionnaire on Cognitive Decline in the Elderly (short-IQCODE)
Case presentation I

A 72-year-old male patient complains to his PCP about having worsening memory loss for the previous 2 years. As part of the Montreal Cognitive Assessment, the physician reads the digits 1, 4, and 7 to the patient and asks him to immediately recite them backwards. Which one of the following anatomical structures is likely the most critical for the patient to successfully complete this task?
Brain’s high order cognitive function domains

Which one of the following anatomical structures is likely the most critical for the patient to successfully complete this task?

A. Occipital cortex  
B. Parietal cortex  
C. Orbitofrontal cortex  
D. Dorsolateral frontal lobes (DLPFC)  
E. Temporal cortex
Brain's high order cognitive function domains

A. Occipital cortex
B. Parietal cortex
C. Orbitofrontal cortex
D. Dorsolateral frontal lobes (DLPFC)
E. Temporal cortex
Case presentation II

A 79-year-old female has progressive cognitive decline characterized by forgetting recent events (such as her friends’ birthday parties along with word-finding difficulties. Her son states that he now helps her with the bill paying and grocery shopping because she started to have trouble paying her bills and often forgets what to purchase in the grocery store (even with a list). Her primary care physician prescribes her donepezil.
# Activities of Daily Living

## Katz Index of Independence in Activities of Daily Living

<table>
<thead>
<tr>
<th>Activities</th>
<th>Independence Points (0 or 1)</th>
<th>Dependence Points (0)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bathing</strong></td>
<td>(1 POINT) Bathes self completely or needs help in bathing only a single part of the body such as the back, genital area or disabled extremity.</td>
<td>0 POINTS Need help with bathing more than one part of the body, getting in or out of the tub or shower. Requires total bathing.</td>
</tr>
<tr>
<td>Points</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dressing</strong></td>
<td>(1 POINT) Get clothes from closets and drawers and puts on clothes and outer garments complete with fasteners. May have help tying shoes.</td>
<td>0 POINTS Needs help with dressing self or needs to be completely dressed.</td>
</tr>
<tr>
<td>Points</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Toileting</strong></td>
<td>(1 POINT) Goes to toilet, gets on and off, arranges clothes, cleans genital area without help.</td>
<td>0 POINTS Needs help transferring to the toilet, cleaning self or uses bedpan or commode.</td>
</tr>
<tr>
<td>Points</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Transferring</strong></td>
<td>(1 POINT) Moves in and out of bed or chair unassisted. Mechanical transfer aids are acceptable.</td>
<td>0 POINTS Needs help in moving from bed to chair or requires a complete transfer.</td>
</tr>
<tr>
<td>Points</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Continence</strong></td>
<td>(1 POINT) Exercises complete self control over urination and defecation.</td>
<td>0 POINTS Partially or totally incontinent of bowel or bladder.</td>
</tr>
<tr>
<td>Points</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Feeding</strong></td>
<td>(1 POINT) Gets food from plate onto mouth without help. Preparation of food may be done by another person.</td>
<td>0 POINTS Needs partial or total help with feeding or requires parental feeding.</td>
</tr>
<tr>
<td>Points</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL POINTS</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SCORING:**
- 1 = Low (patient very dependent)
- 6 = High (patient independent)

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## Lawton-Brody Instrumental Activities of Daily Living Scale (I.A.D.L)

<table>
<thead>
<tr>
<th>A. Ability to Use Telephone</th>
<th>H. Laundry</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Operates telephone on own initiative—looks up and dials numbers, etc.</td>
<td>1. Does personal laundry completely</td>
</tr>
<tr>
<td>2. Dials a few well-known numbers</td>
<td>2. Launders small items—shirts, stockings, etc.</td>
</tr>
<tr>
<td>3. Answers telephone but does not dial</td>
<td>3. All laundry must be done by others</td>
</tr>
<tr>
<td>4. Does not use telephone at all</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Shopping</th>
<th>I. Mode of Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Takes care of all shopping needs independently</td>
<td>1. Travels independently on public transportation or drives own car</td>
</tr>
<tr>
<td>2. Shops independently for small purchases</td>
<td>1. Arranges own travel via tax, but does not otherwise use public transportation</td>
</tr>
<tr>
<td>3. Needs to be accompanied on any shopping trip</td>
<td>0</td>
</tr>
<tr>
<td>4. Completely unable to shop</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. Food Preparation</th>
<th>J. Responsibility for Own Medications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Plans, prepares and serves adequate meals independently</td>
<td>1. Is responsible for taking medication in correct dosages at correct time</td>
</tr>
<tr>
<td>2. Prepares adequate meals if supplied with ingredients</td>
<td>2. Takes responsibility for ensuring medication is prepared in advance in separate dosage</td>
</tr>
<tr>
<td>3. Heat, serves and prepares meals, or prepares meals, or prepares foods but does not maintain adequate diet</td>
<td>3. Is not capable of dispensing own medication</td>
</tr>
<tr>
<td>4. Needs to have meals prepared and served</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D. Housekeeping</th>
<th>K. Ability to Handle Finances</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Maintains home alone or with occasional assistance (e.g. heavy work domestic help)</td>
<td>1. Manages financial affairs independently (budgets, writes checks, pays rent, bills, goes to bank)</td>
</tr>
<tr>
<td>2. Performs light daily tasks such as dish washing, bed making</td>
<td>2. Collects and keeps track of income</td>
</tr>
<tr>
<td>3. Performs light daily tasks but cannot maintain acceptable level of cleanliness</td>
<td>3. Manages day-to-day purchases, but needs help with banking, major purchases, etc.</td>
</tr>
<tr>
<td>4. Needs help with all home maintenance tasks</td>
<td>3. Incapable of handling money</td>
</tr>
<tr>
<td>5. Does not participate in any housekeeping tasks</td>
<td>0</td>
</tr>
</tbody>
</table>

**Score:**
- 0 = Low function, dependent
- 8 = High function, independent

A summary score ranges from 0 (low function, dependent) to 8 (high function, independent) for women and 0 through 5 for men to avoid potential gender bias.
Mild Cognitive Impairment: Definition Criteria

Research Criteria
• **Memory complaints** (confirmed by informant)
• **Memory impaired for age** (1.5 SD below the mean) on formal neuropsychological testing
• General cognitive function: normal for age (MMSE ≥ 24/30)
• Normal activities of daily living (IADL)
• Not meeting dementia criteria
• Clinical Dementia Rating score of 0.5

Clinical Criteria to look for by PCPs
• Ask about memory complaints (symptoms evolution)
• Test for memory (Use any memory test familiar to you)
• Do full MMSE (optional) as screening tool
• Obtain a good longitudinal history, other cognitive symptoms and how affects pt. in daily function

Petersen RC et al. Arch Neurol. 56(33):303-308. 1999
Anatomical and Clinical Correlation

Spatio-Temporal Distribution of NFT Pathology in AD

**Tauoism:** High clinical correlation with NFT distribution

Space

Low Limbic (Normal/AAMI)

High Limbic (MCI)

Low Neocortical (variable AD)

High Neocortical (severe AD)

Time

Entorhinal Limbic III-II

Paralimbic III-IV

Prefrontal STS, IPL V

Unimodal Ass Primary S-M VI

Braak-Braak, NeurAging 1995
Model of Continuum of Cognition with Aging
Case presentation I

A 72-year-old male patient complains to his PCP about having worsening memory loss for the previous 2 years. As part of the Montreal Cognitive Assessment, the physician reads the digits 1, 4, and 7 to the patient and asks him to immediately recite them backwards. Which one of the following anatomical structures is likely the most critical for the patient to successfully complete this task?

What is his MoCA score?
# MOCA Scores

<table>
<thead>
<tr>
<th></th>
<th>Normal Controls (NC)</th>
<th>Mild Cognitive Impairment (MCI)</th>
<th>Alzheimer's Disease (AD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of subjects</strong></td>
<td>90</td>
<td>94</td>
<td>93</td>
</tr>
<tr>
<td><strong>MoCA average score</strong></td>
<td>27.4</td>
<td>22.1</td>
<td>16.2</td>
</tr>
<tr>
<td><strong>MoCA standard deviation</strong></td>
<td>2.2</td>
<td>3.1</td>
<td>4.8</td>
</tr>
<tr>
<td><strong>MoCA score range</strong></td>
<td>25.2 – 29.6</td>
<td>19.0 – 25.2</td>
<td>21.0 – 11.4</td>
</tr>
<tr>
<td><strong>Suggested cut-off score</strong></td>
<td>≥26</td>
<td>&lt;26</td>
<td>&lt;26ψ</td>
</tr>
</tbody>
</table>

ψ Although the average MoCA score for the AD group is much lower than the MCI group, there is overlap between them. The suggested MoCA cut-off score is thus the same for both. The distinction between AD and MCI is mostly dependent on the presence of associated functional impairment and not on a specific score on the MoCA test.
Mild Cognitive impairment: Definition Criteria

Research Criteria
• **Memory complaints** (confirmed by informant)
• **Memory impaired for age** (1.5 SD below the mean) on formal neuropsychological testing
• General cognitive function: normal for age (MMSE ≥ 24/30)
• Normal activities of daily living (IADL)
• Not meeting dementia criteria
• Clinical Dementia Rating score of 0.5

Clinical Criteria to look for by PCPs
• Ask about memory complaints (symptoms evolution)
• Test for memory (Use any memory test familiar to you)
• Do full MMSE (optional) as screening tool
• Obtain a good longitudinal history, other cognitive symptoms and how affects pt. in daily function

Key questions to ask by PCP

**Subjective Memory Decline Scale** *(Quantitative)*: self-experienced increasing difficulties in everyday memories

- Do you have more trouble remembering things that have happened recently?
- Are you worse at remembering where belongings are kept?
- Do you believe your memory has decline in the past two years?
- Have you had a significant change in your memory?

*Scoring:* 0= ’no, no more difficult than in the past”; 1= yes, a bit worse than in the past; and 2= “yes, much more difficult than in the past.” Sum item ratings to obtain score from 0-8

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**Do you feel like your memory has become worse?** *(Qualitative)*

**Possible answers:**

- 1. “no” (MC -)
- 2. “sometimes but this does not worry me” (MC -)
- 3. “yes, that worries me” (MC +)
- 4. “yes, that worries me seriously” (MC +)

---

MC -: MCI without memory concerns; MC +: MCI with memory concerns

Wolfsgruber S et al. Neurology 2015;84:1261-1268
MCI Subtypes

**Mild Neurocognitive Disorders**

**Alzheimer`s disease**

- **Amnestic**
  - Single Domain
  - Multiple Domains
- ***Non-Amnestic**
  - Single Domain
  - Multiple Domains

*Non-Amnestic MCI: more likely to represent or evolve into mixed dementias, VaD, FTD, LBD, PDD (subcortical component)
Mild Cognitive impairment: Definition Criteria

Research Criteria
• **Memory complaints** (confirmed by informant)
• **Memory impaired for age** (1.5 SD below the mean) on formal neuropsychological testing
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• Ask about memory complaints (symptoms evolution)
• Test for memory (Use any memory test familiar to you)
• Do full MMSE (optional) as screening tool
• Obtain a good longitudinal history, other cognitive symptoms and how affects pt. in daily function

Popular screening test for memory

• MMSE ($$$, copyright protected), not validated for MCI
• MOCA (free download) many languages from website
• SLUMS (free download)
• Rapid Cognitive Screen (free download)
• CLOX (targets executive functions, praxis and construction ability) very sensitive in frontal lobe dysfunction and vascular dementia
SLUMS

- The Saint Louis University Mental Status Examination is a brief oral/written exam that are given to people suspected to have dementia or Alzheimer`s disease.
- The exam serves as a tool to indicate whether a doctor should consider further testing to diagnose dementia.
SLUMS

1. What is the year?
2. What state are we in?
3. Please remember these five objects. I will ask you what they are later.
   - Apple
   - Pen
   - Tie
   - House
   - Car
4. How much did you spend?
5. How much do you have left?
6. How many animals can you name in one minute?
   - 0-4 animals
   - 5-9 animals
   - 10-14 animals
   - 15+ animals
7. What were the five objects I asked you to remember? I 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.
9. This is a clock face. Please put in the hour markers and the time at ten minutes to eleven o'clock.
10. Please place an X in the triangle.
11. I am going to tell you a story. Please listen carefully because afterwards, I am 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.
   - What was the female's name?
   - What work did she do?
   - What state did she live in?

TOTAL SCORE

SCORING

<table>
<thead>
<tr>
<th>High School Education</th>
<th>Less than High School Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>27-30</td>
<td>Normal</td>
</tr>
<tr>
<td>21-26</td>
<td>MNCD*</td>
</tr>
<tr>
<td>1-20</td>
<td>Dementia</td>
</tr>
</tbody>
</table>

* Mild Neurocognitive Disorder

Rapid Cognitive Screen (RCS)

1. Please remember these five objects. I will ask you what they are later.
   [Read each object to patient using approx. 1 second intervals.]
   Apple  Pen  Tie  House  Car

2. [Give patient pencil and the blank sheet with clock face.] This is a clock face. Please put in the hour markers and the time at ten minutes to eleven o’clock
   [2 pts/hr markers ok; 2 pts/time correct]

3. What were the five objects I asked you to remember?
   [1 pt/ea]

4. I’m going to tell you a story. Please listen carefully because afterwards, I’m going to ask you 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. What state did she live in? [1 pt]

SCORING
8-10......... Normal
6-7......... Mild Cognitive Impairment
0-5......... Dementia

Representative illustration of common types of clock-drawing errors.

CDT Errors

- **Apathetic Errors: A1**
- **Normal Elements**
- **Disinhibited Errors: D1**
fMRI Durante la actividad cerebral cuando se dibuja un reloj y se ponen las manecillas.
CLOX: An Executive Clock-drawing Task

- Divided into two parts
  - CLOX1 tests ECF in an “UNPROMPTED” Condition
  - CLOX2 tests constructions in a “COPY” Condition

CLOX: An Executive Clock Drawing Task

STEP 1: Turn this form over on a light colored surface so that the circle below is visible. Have the subject draw a clock on the back. Instruct him or her to “Draw me a clock that says 1:45. Set the hands and numbers on the face so that a child could read them.” Repeat the instructions until they are clearly understood. Once the subject begins to draw no further assistance is allowed. Rate this clock (CLOX 1).

STEP 2: Return to this side and let the subject observe you draw a clock in the circle below. Place 12, 6, 3, & 9 first. Fill in the rest of the numbers. Set the hands again to “1:45.” Make the hands into arrows. Make the hour hand shorter. Invite the subject to copy your clock in the lower right corner. Score this clock (CLOX 2).

RATING:

<table>
<thead>
<tr>
<th>Organizational Elements</th>
<th>Point Value</th>
<th>CLOX 1</th>
<th>CLOX 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does figure resemble a clock?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Circular face present?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions &gt;1 inch?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All numbers inside the perimeter?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No sectoring or tic marks?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12, 6, 3, &amp; 9 placed first?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spacing Hand? (Symmetry on either side of 12 and 6 o’clock)?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Only Arabic numerals?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Only numbers 1-12 among the numerals present?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Only two hands present? (Ignore sectoring or tic marks)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All hands represented in proper?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hour hand between 1 and 2 o’clock?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minute hand shorter than hour?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None of the following:</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1) hand pointing to 4 or 5 o’clock?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) “1:45” present?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) Any other notation (e.g. “3:40”)?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) Any arrows point inward?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) Any letters, words or pictures?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6) Any intrusion from “hand” or “face” present?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7) Any intrusion from circle below?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTAL
CLOX: An Executive CDT

UNPROMPTED

COPY

PENTAGONS

82 yo Well Elderly Retiree; EXIT25 08/50; MMSE 29/30
AD Affects *Both*
ECF and Constructions

61 yo w/ AD: EXIT25 =31/50; MMSE = 06/30
Type 2 Dementia Affects the Executive Control of Clock-drawing

74 yo w/ Type 2 VAD: EXIT25 =22/50; MMSE =28/30

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Mild Cognitive Impairment: Definition Criteria

Research Criteria
- **Memory complaints** (confirmed by informant)
- **Memory impaired for age** (1.5 SD below the mean) on formal neuropsychological testing
- General cognitive function: normal for age (MMSE ≥ 24/30)
- Normal activities of daily living (IADL)
- Not meeting dementia criteria
- Clinical Dementia Rating score of 0.5

Clinical Criteria to look for by PCPs
- Ask about memory complaints (symptoms evolution)
- Test for memory (Use any memory test familiar to you)
- Do full MMSE (optional) as screening tool
- Obtain a good longitudinal history, other cognitive symptoms and how affects pt. in daily function

Petersen RC et al. Arch Neurol. 56(33):303-308. 1999
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The importance of what clinicians do when they screen for memory and other cognitive domains
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• FDG-PET scans and memory tests appear to be the best predictors of cognitive problems that may develop into Alzheimer's disease.

• Researchers at the University of California, Berkeley found that the study's 85 patients with mild cognitive impairment (MCI) converted to Alzheimer's disease at an annual rate of 17.2%.

• The patients with MCI who had abnormal results on both FDG-PET and episodic memory were 11.7 times more likely to convert to Alzheimer's than patients who had normal results on both measures.

Susan Landau et al. (2010). Neurology;
FDG PET Group Comparison

FDG-PET images show reduced glucose metabolism in temporal and parietal regions in patients with MCI and Alzheimer's disease. Images courtesy of Suzanne Baker, PhD; William Jagust, MD; and Susan Landau, PhD.
Contact Information

Memory Disorder Specialty Clinic
Department of Psychiatry
Paul L. Foster School of Medicine

Paulina Rodriguez, Unit Supervisor
(915)215-5850, select # 4
paulina.Rodriguez@ttuhsc.edu

Dr. Salazar
ricardo.salazar@ttuhsc.edu
Thank you!

Q&A