Mild Cognitive Impairment

An Interdisciplinary Approach to Identification and Intervention

Paul Cass, M.D., Medical Director
Sandy Christos, M.S., CCC-SLP, Clinical Specialist
Genesis Rehabilitation Services
NCSHLA, March, 2014

Objectives:

• Define Age Related Memory Loss and common signs and symptoms that impact function

• Define Mild Cognitive Impairment, incidence, prevalence, predication of progression, medical and rehab management approaches

• Discuss assessment options for identification of Mild Cognitive Impairment

• State the role of the physician, nursing, SLP, PT, and OT in managing individuals with MCI

Normal-Age Associated Memory Changes

• Processing of information slows down

• Retrieval of information slows down

• As demands change, decreased flexibility in thinking

• Difficulty paying attention to challenging tasks

• Experience more trouble recalling recent than past events
Other Factors Associated with Age Related Memory Changes

- Vision and hearing loss
- Medical complications
- Poor nutrition and diet
- Lack of exercise
- Social isolation
- Depression
- Alcohol and drugs
- Stress, anxiety and fatigue

Mild Cognitive Impairment (MCI)

Definition

- A syndrome defined as cognitive decline greater than expected for an individual’s age and education level but that does not interfere notably with activities of daily life.
  
  Gauthier, et al., 2006

- Intermediate state of cognitive function between the changes seen in aging and those fulfilling the criteria for dementia and Alzheimer’s disease.
  
  Petersen, 2011

Mild Cognitive Impairment Characteristics

- Concern about a change; either from a patient, family or known caregiver
- Evidence of lower cognitive performance than would be expected for age/education
  - Memory (specifically new learning)
  - Executive function
  - Attention
  - Language
  - Visual Spatial Skills
- Preservation of ADLs but decline in Instrumental ADLs—laundry, shopping, bill paying, travel, housekeeping
Examples of Normal Aging versus MCI

- **Normal Aging**
  - Occasional word finding difficulty
  - Client is more concerned with forgetfulness than is family
  - Recent memory for important events is lacking on occasion
  - Occasionally misplaces objects but is able to retrace steps and locate them within home environment
  - Loves to reminisce about one particular time of life

- **MCI**
  - Frequent wording finding problems
  - Family members are more concerned about forgetfulness than is the client
  - Recent memory for important events is lacking and needs prompting or need for use of other cue
  - Frequently misplaces objects and cannot locate them within home environment
  - Frequently repeats the same story about a particular time of life

Need for Early Identification

Mild cognitive impairment should be detected and diagnosed because people with this condition are at increased risk for Alzheimer's disease or other types of dementia compared with similarly aged individuals in the general population.

Chertkow, et al., 2008

Algorithm

Cognitive Impairment

- Report of cognitive impairment by patient
  - Change in mood, sleep, behavior
  - Decrease in cognitive function or daily activities
    - Memory impairment
      - Yes
        - Memory clinic
      - No
        - Memory and other cognitive domains
          - Single memory domain
          - Multiple memory domain
        - Amnestic MCI
        - Non-amiestic MCI

Data regarding MCI

- Minority of people 1/100 age successfully with no cognitive impairment
- Most people undergo minor cognitive decline over life span, which is nuisance and does not compromise ability to function
- MCI goes beyond the usual aging trajectory and is recognized in their function

Classes of MCI

- MCI can be classified as:
  - Amnestic – clinically significant memory impairment that does not meet criteria for dementia.
  - Nonamnestic - subtle decline in function that affects attention, use of language and visuospatial skills

Concerns regarding MCI

- Amnestic - clinical trials have shown of those that progress 90% to have clinical signs of Alzheimer’s disease
- Nonamnestic- appears to be forerunner of dementias not related to Alzheimer’s disease, such as frontotemporal lobar or Lewy body dementia
Prevalence of MCI

- Ranges from 10-20% in population based studies of those 65 years or older
- Mayo Clinic Study of Aging- people 70-89 years of age without dementia, amnestic MCI was 11.1% and nonamnestic was 4.9%

Incidence of MCI

- Incidence of dementia in general population is 1-2% /year
- Incidence 5-10% in community among patients with MCI
- 15-20% among MCI patients that are evaluated in specialty clinic
- Reversion of MCI to normal can be 25-30%- however this does not preclude progression later

Medical Evaluation

- Clinical challenge differentiating subtle changes of aging with more prominent memory loss of amnestic MCI
- Neuropsychological testing may be necessary
- Of the commonly used cognitive screening tools, all have advantages and disadvantages as related to MCI
Medical Evaluation (cont.)

- Always look for depression or medication side effects in those whose testing is normal

- Differentiation of MCI from dementia is not quite as challenging

- Dementia affects function with loss of independence - thus family history is important and instruments such as Functional Activities Questionnaire is of value

Research Studies

- Areas of uncertainty exist with MCI as to predicting its progression

- Currently many studies going on in Canada and USA and the world with Alzheimer’s Disease Neuroimaging Initiative to better understand MRI, cerebrospinal fluid, amyloid markers in predicting MCI progression

Prediction of Progression

- Most patients who have MCI want to know the chance and rate of possible progression to dementia

- In general progression of MCI is estimated at 10% /year

- Some factors predict more rapid progression—the degree of impairment at presentation, the presence of (APOE) apolipoprotein e4 allele
Risk Factors for Progression

- MRI with abnormalities of hippocampal atrophy show higher risk for MCI patients to progress to dementia
- MRI in MCI with larger ventricular volumes showed higher risk of progression
- PET (positive emission tomography) on patients with MCI who had hypometabolic abnormalities detected in temporal and parietal regions had an 11 times greater risk for progression to dementia compared to those who did not have the abnormality detected

Risk of Progression (cont.)

- PET and use of Amyloid binding Carbon 11 labeled Pittsburgh Compound B showed that those with MCI who had amyloid detected had greater likelihood for progression to dementia.
- These are all research studies with some results highly variable so that more study is necessary before any of them are included in a guideline for appropriate work up

Guidelines

- National Institute on Aging and the Alzheimer’s Association—Likelihood That Mild Cognitive Impairment is Due To Alzheimer’s Disease
Medical Management

- MCI patient’s should not be labeled as early Alzheimer’s or prodromal Alzheimer’s or MCI of the Alzheimer’s type
- MCI is an abnormal condition but the precise outcome is not certain
- No medication is available for MCI
- Drugs used for Alzheimer’s disease have not shown any long term clinical effects

Medical Management

- Control of risk factors for cardiovascular disease is important. Subgroup of MCI with this as a risk factor needs modifications of their CV risk factors
- Some data has shown benefits of cognitive rehabilitation
- Physical exercise has shown improvement in cognition in those with MCI at 6mos

---

Table 1. Suggested Criteria for the Likelihood That Mild Cognitive Impairment Is Due to Alzheimer’s Disease.\(^a\)

<table>
<thead>
<tr>
<th>Likelihood of Alzheimer’s Disease</th>
<th>Evidence of Aβ42</th>
<th>Evidence of Neuronal Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown</td>
<td>Not tested</td>
<td>Not tested</td>
</tr>
<tr>
<td>Low</td>
<td>Negative</td>
<td>Negative</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Positive</td>
<td>Not tested</td>
</tr>
<tr>
<td>High</td>
<td>Positive</td>
<td>Positive</td>
</tr>
</tbody>
</table>

\(^a\) The presence of Aβ42 (β-amyloid peptide 42) can be detected with positron-emission tomography of the brain and analysis of cerebrospinal fluid. The presence of neuronal injury can be detected with MRI (e.g., hippocampal atrophy), with \(^{18}\)Fluorodeoxyglucose-PET in patterns of hypometabolism (e.g., in the parietotemporal or precuneus regions) or with analysis of cerebrospinal fluid. Low levels of Aβ42 and elevated levels of tau in the cerebrospinal fluid are associated with progression to Alzheimer’s disease, as is a low ratio of Aβ42 to tau in the cerebrospinal fluid. At present there is no consensus on the cutoff points that should be used to determine the values of low, intermediate, and high; the criteria are now being used only for research purposes. Adapted from Albert et al.\(^{140}\)
Role of Physician

- Treat vascular risk factors such as hypertension, high blood sugar and high cholesterol to reduce the risk for cognitive decline
- Determine if any medications would be beneficial to maintain function
- Screen for cognitive impairment and refer to therapy if appropriate

Chertkow, et al., 2008

Role of Nursing and Other Professionals

- Encourage independence and participation in care to maintain function and
- Avoid excess disability
- Promote use of compensatory strategies for short-term memory such as medication reminders and taking notes
- Identify changes in behavior and function and discuss with physician and rehab professionals

Rehab’s Role in Addressing MCI

- Reduce the risk of unsafe decisions, self medication errors, falls, or the onset of depression that can be associated with cognitive decline
- Provide compensatory techniques for safety and IADLs such as appointment reminders, medication management, and mobility within/around the community
- Establish cognitive stimulation opportunities which have been shown to reduce safety risks and in some cases slow the progression of cognitive decline
- Improve quality of life and ease the amount or level of care needed from others
Potential Rehab Screening Results for MCI

- Repeats questions or stories
- Trouble finding the words to say but verbose
- Makes irrelevant comments
- Difficulty following the conversation
- Misses appointments or favorite activities
- Having difficulty completing multi-step tasks
- Bills unpaid and mail unopened
- Increased clutter of papers and clothes

Potential Rehab Screening Results for MCI (cont.)

- Difficulty with shopping, cooking and safely storing food
- Eats the same food every day
- Laundry does not get done
- Misplaces or loses daily used items
- Buys too much or too little of needed items
- Unable to name, state reason for or forgets to take medicine
- Becomes agitated when challenged regarding above issues

Relationship Between Cognition and Mobility in the Aging Adult

- Dual-task issues
  - Studied by Montero-Odesso
  - Walking while counting backwards and while naming
- Adults with MCI have:
  - Decreased gait speed
  - Increased gait variability
  - Increased fall risk
### Role of Physical Therapist

- **Assessing**
  - Risk for falls
  - Dual task function
  - Balance
  - Gait
  - Ambulation
  - Strength
  - Range of Motion

### Role of Occupational Therapist

- **Assessing:**
  - Performance of activities of daily living
  - Safety and orientation during mobility
  - Organization of environment
  - Ability to sequence tasks
  - Need for establishment or change of routine
  - Effectiveness of visual and other cues
  - Wheelchair management

### Instrumental Activities of Daily Living (IADLs)

Current research indicates two types of IADLs may be clinically significant in identifying MCI:

1. Recall for appointments, family occasions, holidays, and medications
2. Managing home/business affairs such as paying bills, assembling tax records, or other papers

Brown, et al., 2011
THE LAWTON INSTRUMENTAL ACTIVITIES OF DAILY LIVING SCALE

- Ability to Use Telephone
- Shopping
- Food Preparation
- Housekeeping
- Laundry
- Mode of Transportation
- Responsibility for Own Medications
- Ability to Handle Finances

Role of Speech Language Pathologist

- Assess cognitive-linguistic decline
- Treat and manage cognitive-communicative impairments related to MCI
- Provide means to enhance communication ability and slow the progression of MCI
- Maintain independence and improve the individual’s outlook in terms of quality of life
- Educate the public about normal aging and memory loss to encourage early assessment

Core Cognitive Domains for Assessment of MCI

- Recent memory - ability to learn and recall new information
- Language – verbal fluency
- Visual Spatial and Construction ability - comprehension and effective manipulation of nonverbal, graphic or geographic information
- Executive Function - ability to plan, perform abstract reasoning, solve problems, focus attention despite distractions and shift focus when appropriate
Commonly Used Cognitive Screening Tools

- Mini-Mental State Examination (MMSE)
- Short Test of Mental Status (STMS)
- Montreal Cognitive Assessment (MoCA)
- Saint Louis University Mental Status Examination (SLUMS)
- Brief Cognitive Assessment Tool (BCAT) & BCAT-SF

Screening Tools (continued)

- MMSE is effective in identifying patients with moderate to severe dementia but is not sensitive to MCI, has cost to use
- STMS' verbal features are more complex than MMSE but has relatively poor sensitivity to MCI
- MoCA sensitive to cognitive spectrum but does not have a Story Recall or complex reasoning item
- The SLUMS sensitive to cognitive spectrum but Story Recall does not measure delayed or non-cued recall and there is no set-shifting item
- BCAT and BCAT-Short Form are sensitive to MCI but have a cost associated with training and licensure

Brief Cognitive Assessment Tool

- The BCAT is a cognitive testing system that can be utilized by PT, OT or SLPs
- Designed as a multi-domain cognitive screening tool that assesses orientation, verbal recall, visual recognition, visual recall, attention, abstraction, language, executive functions, and visuo-spatial processing
- Key benefits of the BCAT include:
  - Ability to differentiate Mild Cognitive Impairment (MCI) from dementia
  - Ability to predict functional (IADL) status
  - Can be administered in 10-15 minutes
  - BCAT-Short form can be used as a 5 minute screen
**Brief Cognitive Rating Scale (BCRS)**

- Barry Reisberg, MD and Steven H. Ferris, MD
- Assesses the “syndrome of cognitive decline”
- Five Clinical Axes
  - Axis I: Concentration
  - Axis II: Recent Memory
  - Axis III: Past Memory
  - Axis IV: Orientation
  - Axis V: Functioning and Self-Care
- Short Time Requirement
- Pre-treatment, Post-treatment and periodically throughout treatment
- Provides a GDS score

**Functional Assessment Staging (FAST)**

- Stage 1 Normal Adult
- Stage 2 Normal Older Adult
- Stage 3 Mild Cognitive Impairment
- Stage 4 Mild Alzheimer’s
- Stage 5 Moderate Alzheimer’s
- Stage 6 Moderately Severe Alzheimer’s
- Stage 7 Severe Alzheimer’s

**ST Assessments**

- Cognitive Linguistic Quick Test (CLQT)
  - Sensitive to MCI
- Arizona Battery for Communication Disorders of Dementia (ABCD)
  - Story Re-telling, immediate and delayed recall
- Functional Linguistic Communication Inventory (FLCI)
- Assessment of Language Functioning (ALFA)
- Ross Information Processing Assessment-Geriatric (RIPA-G2)
Intervention Strategies

- Identify residual strengths for utilization in approaches
- Pointing out or emphasizing weaknesses may increase agitation
- Train cognitive processes to learn and retain new information
- Implement memory retraining strategies
  - Note taking, calendar, memory books
- Teach self-cueing techniques to increase speed and accuracy of word retrieval

Intervention Strategies (cont.)

- Provide organizational skill training
- Emphasize safety awareness skills
- Address strategies to improve attention to task and alternating/divided attention for multi-task performance
- Recommend environmental adaptations
- Educate caregivers on how to improve safety and function


- N = 18 amnestic MCI and 16 healthy older adults
- Intervention: Taught to use a three-step process for object location based on a salient feature close to the object over 5 sessions within 2 weeks
- Results:
  - Both people with MCI and healthy controls benefitted significantly more from using memory strategies than from mere exposure.
  - MCI pts. in the memory strategy-training group showed increased activity in the hippocampus as they learned and remembered the location of the objects.
  - Participants in the training group showed increases in hippocampal activity, even when trying to remember the locations of new objects.
fMRI scans of study participants while they are trying to remember object locations. Activity in the hippocampus is stronger in healthy elderly controls (left) compared with people with mild cognitive impairment (right). (Hampstead, et. al., Feb. 2012)

Memory Intervention: Goal-Oriented Rehab (Londos et. al., 2008)

- N = 15 MCI
- Memory strategy group training program-learned problem-solving to overcome memory problems and mind-mapping strategies
- 2 days/week for 8 weeks
- Results: Improvement in cognitive processing speed, occupational performance, and quality of life domains

Medicare Documentation
Coding

- Refer to the Medicare Administrative Contractor’s Local Coverage Determination for allowed:
  - ICD-9 Medical and Treatment Diagnoses that:
    - define the resulting problems therapy is addressing
    - are determined based on results of evaluation and
    - relate to treatment plan and goals
  - CPT codes for evaluation (including the new ST evaluation codes for 2014) and treatment approaches

Objective Evaluation Results

- Note standardized tests or portions of tests utilized
- Document results of informal testing
- Comment on behavioral issues
- Describe which functional abilities are still intact and how safety and quality of life are affected
- Record types of cueing required and frequency
- Report need for skilled intervention for improved quality of life, to facilitate the patient’s preserved abilities and promote safe function at the patient’s highest level

Documentation Issues

- Lack of strong ICD-9 codes to support use of cpt codes
- Lack of objective measurements to support goals
- Billing for cognitive tx/cpt code with no expectation the patient’s function can be restored
- Goals do not match level of impairment
- Goals do not relate to cpt. code
- Lack of progress on goals
- Addressing areas not related to medical necessity as part of skilled tx. rather than developing a functional maintenance plan
Case Study-Angela

History

• New Admit to ALF with evolving memory problems

• Prior Level of Function:
  – She was an amateur but published writer of several short stories in magazines in past
  – Independent at home alone with ADLs, IADLs, and light housekeeping
  – Deceased spouse had managed finances, medication and household

Family Reports Incidents at Home Included:

• Leaving water running when answering the door resulting in hot water damage to her floor

• Took pills twice due to lack of recall of medication schedule

• Forgetful of weekly routine appointments, outings, and regular activities

• Argumentative with others re: forgetfulness
Nursing reports:

Angela is in hallway yelling for help when in need of assistance
– No recall of facility system to use phone to call for staff assistance
– Many clothing items and toiletries strewn around the room
– Residents continuously report she “can’t find anything” in her room

Rehab Screen Reveals:

– Angela writes in notebook for hours
– Large amounts of “her notes” at bedside table including:
  • Several lists started for needed items
  • Phone numbers of friends and family
  • Appointment cards
  • Favorite TV show reminders

Angela reports:

– She is “very intelligent”
– Does not have any problems, except some memory issues, but that’s “normal for someone my age”
Physical Therapy Evaluated and Recommended Treatment for:

- Strengthening of lower extremities
- Ambulation
- Overall conditioning as she needs frequent rest breaks when walking long distances

OT Evaluation Recommended:

- Wheelchair management for long distances T
- Participation in leisure activities
- Organization within living environment

ST Evaluation Results:

- ABCD assessment revealed deficits in:
  - Immediate recall
  - Delayed recall of stories
  - Auditory comprehension
  - Reading
  - Naming
ST Evaluation Results (cont.):
• Brief Cognitive Assessment Tool:
  – Contextual Memory Factor (CMF) score 14
  • Combined with total BCAT score = MCI range

ST Evaluation Results (cont.):
• Informal Assessment revealed:
  – Auditory comprehension was WFL for conversational speech with familiar topic
  – Pragmatic skills WFL for familiar conversations
  – Reading comprehension at single paragraph level (45 words) – 75% acc.

ST Evaluation Results (cont.):
• Informal Assessment revealed:
  – Graphic expression was intact at paragraph level
  – Memory deficit with poor recall of day to day events and impaired prospective memory for pending appointments.
Example of Goals

- Angela will:
  - Improve orientation to day and time with occasional visual cues to 90% acc. in order to participate in activities of choice.
  - Be oriented to place and find common locations w/100% acc. using visual and written cues in order to promote independence in ALF.
  - Improve short term memory recall to 90% acc. using compensatory strategies including mnemonics, spaced retrieval techniques and visual cues in order to safely participate with activities of choice.

Treatment Activities: Safety in Living Environment

**OT role: call bell system**
- OT will address ADL situations and scenarios when she should call for help / high risk situations (wet floors, dizziness, etc.)
- OT will provide real time feedback during tasks to practice using call bell for access from toilet, bedside, etc.

**ST role: call bell system**
- Angela will complete a written sequence of the steps needed to use the facility call system for assistance.
- ST will review this prompt with spaced retrieval techniques to increase recall
- Complete drilled practice to enhance carryover of steps
- Place written signage reminders near phone system as well as pull cord in bathroom

Treatment Activities: Managing Daily Schedule

**OT role**
- Reinforce use of daily schedule when setting OT tx. times
- Reinforce use of daily schedule when performing w/c mobility or path finding tasks during OT tx.
- Prompt pt. to record HEP/ follow up info on daily schedule.

**ST role**
- Drill practice with Angela to record prospective appts. on monthly calendar
- Drill practice to review written prompt on wall daily
- Drill practice to record all appts. and activities from the calendar on preprinted daily to do list
- Real time use of daily schedule to navigate from task to task
Status at Discharge.

- Participating in functional maintenance program
- Using compensatory strategies during every day activities
  - Note taking as a strategy for recall and organization skills in tasks
  - Written cues in living environment to improve recall and executive functioning skills, i.e., sequencing in order to complete tasks without requesting verbal assistance

Functional Maintenance Program

- Angela is receiving services delivered by the Activities Dept. Staff
- The goal is to prevent a decline and maintain function achieved with rehab
  - Participates in daily exercise class
  - Attends cognitive stimulation group 3/ week with focus on increase of general cognitive and social skills through discussion and leisure activities

Research Indicates:

Seniors who participated in cognitive stimulation activities and physical exercise maintained or improved skills longer than those who did not participate.

Chertkow, et al., 2008
As an interdisciplinary team, we can work together to support individuals who exhibit signs of cognitive decline to successfully age within their current community!

References


References, continued


