Objective

- Be able to demonstrate a basic understanding of evidence supporting the viability of cognitive rehabilitation as a treatment for cognitive dysfunction following acquired brain injury.

Continuum of Post-acute Care for Brain Injury Rehabilitation

- Outpatient Community Reentry
- Comprehensive Day Treatment
- Residential Community Integration
- Neurobehavioral

WHO International Classification of Functioning, Disability and Health (ICF)

Body Functions are physiological functions of body systems (including psychological functions).

Body Structures are anatomical parts of the body such as organs, limbs and their components.

Impairments are problems in body function or structure such as a significant deviation or loss.

Activity is the execution of a task or action by an individual.

Participation is involvement in a life situation.

Activity Limitations are difficulties an individual may have in executing activities.

Participation Restrictions are problems an individual may experience in involvement in life situations.

Environmental Factors make up the physical, social and attitudinal environment in which people live and conduct their lives.

Cognitive Rehabilitation

ACRM BI-ISIG Evidence based reviews:

• Cicerone et al. (2000, 2005, 2011)
• Laatsch et al. (2007)

Method

• Refinement of questions to be addressed
• Identification of the relevant literature
• Review, analysis, and classification of existing research
• Development of recommendations based on the strength of the available evidence
Definition of Cognitive Rehabilitation

Cognitive rehabilitation is a system of therapeutic activities, based on brain-behavior relationships, directed to achieve functional change by:

• Re-establishing or reinforcing previously learned patterns of behavior
• Establishing new patterns of cognitive activity through compensatory cognitive mechanisms
• Establishing new patterns of activity through external compensatory mechanisms
• Enabling persons to adapt to their cognitive disability to improve overall functioning

Identification of Relevant Literature

• MEDLINE search with key words: attention, awareness, cognition, communication, executive, language, memory, perception, problem-solving, reasoning, rehabilitation, remediation, training
• Articles identified by Committee members
• Articles referenced in identified literature

Definition of Levels of Evidence

Class I:
• Well designed, prospective, randomized controlled trials
• Well designed, prospective studies with ‘quasi-random’ assignment to treatment conditions (Ia)

Class II:
• Prospective, non-randomized cohort studies
• Retrospective, non-randomized case control studies
• Clinical series with well-designed controls allowing between-subject comparisons

Class III:
• Clinical series without concurrent controls
• Case studies with appropriate single-subject methodology and measurements
### Definition of Levels of Recommendations

**Practice Standards:**
- Based on at least one well-designed Class I study with an adequate sample, with support from Class II or Class III evidence, that directly addresses the effectiveness of the treatment in question, providing substantive evidence of effectiveness to support a recommendation that the treatment be specifically considered for people with acquired neurocognitive impairments and disability.

**Practice Guidelines:**
- Based on one or more Class I studies with methodological limitations, or well-designed Class II studies with adequate sample, that directly address the effectiveness of the treatment in question, providing evidence of probable effectiveness to support a recommendation that the treatment be specifically considered for people with acquired neurocognitive impairments and disability.

**Practice Options:**
- Based upon Class II or Class III studies, that directly address the effectiveness of the treatment in question, providing evidence of possible effectiveness to support a recommendation that the treatment be specifically considered for people with acquired neurocognitive impairments and disability.

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### Identification of Relevant Literature
- Abstracts/papers reviewed to exclude:
  - papers not addressing treatment
  - theoretical articles
  - treatment descriptions without outcome data
  - review papers
  - papers with inadequate specification of treatment

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*This paper isn’t even good enough to be wrong.*

-Wolfgang Pauli
Identification of Relevant Literature

- Exclusion criteria (continued)
  - studies with persons without TBI or stroke
  - pediatric subjects
  - single case reports without data
  - non-peer reviewed papers and book chapters
  - pharmacologic interventions
  - non-English papers

Identification of Relevant Literature

- Studies selected for inclusion in 7 areas of intervention
  - attention
  - visuoperception
  - language & communication
  - memory
  - problem solving and executive functioning
  - multi-modal interventions
  - comprehensive - holistic programs

Initial (prior to 1999) Identification of Relevant Literature

- 171 published reports of cognitive rehabilitation were fully evaluated and classified
  - 29 Class I studies
  - 35 Class II studies
  - 107 Class III studies
Updated (1999-2002) Identification of Relevant Literature

- 87 published reports of cognitive rehabilitation were fully evaluated and classified
  - 17 Class I studies
  - 8 Class II studies
  - 62 Class III studies

Updated (2003-2008) Identification of Relevant Literature

- 112 published reports of cognitive rehabilitation were fully evaluated and classified
  - 14 Class I studies
  - 5 Class Ia Studies
  - 11 Class II studies
  - 82 Class III studies

Total of all reviewed literature

- 370 published reports of cognitive rehabilitation were fully evaluated and classified, 60 of which are class I studies.
### Practice Standards

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Visuospatial rehabilitation</td>
<td>• Recommended for visual neglect after right hemisphere stroke.</td>
</tr>
<tr>
<td>• Cognitive-linguistic therapies</td>
<td>• Recommended during acute and post-acute rehabilitation for language deficits secondary to left hemisphere stroke.</td>
</tr>
<tr>
<td>• Specific interventions for functional communication deficits, including pragmatic conversational skills</td>
<td>• Recommended for social communication skills after TBI.</td>
</tr>
<tr>
<td>• Specific gestural or strategy training for apraxia</td>
<td>• Recommended for apraxia after left hemisphere stroke during acute rehabilitation.</td>
</tr>
<tr>
<td>• Strategy training for attention deficits</td>
<td>• Recommended during post-acute rehabilitation after TBI. Insufficient evidence exists to distinguish the effects of specific attention training during acute recovery and rehabilitation from spontaneous recovery or from more general cognitive interventions.</td>
</tr>
</tbody>
</table>

### Practice Standards

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<tr>
<td>• Memory strategy training</td>
<td>• Recommended for mild memory impairments from TBI, including the use of internalized strategies (e.g., visual imagery) and external memory compensations (e.g., notebooks).</td>
</tr>
<tr>
<td>• Meta-cognitive strategy training (self-monitoring and self-regulation)</td>
<td>• Recommended for deficits in executive functioning after TBI, including impairments of emotional self-regulation, and as a component of interventions for deficits in attention, neglect and memory.</td>
</tr>
<tr>
<td>• Comprehensive-holistic neuropsychological rehabilitation</td>
<td>• Recommended during post-acute rehabilitation to reduce cognitive and functional disability for persons with moderate to severe TBI.</td>
</tr>
</tbody>
</table>

### Practice Guidelines

<table>
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<tr>
<th>Intervention</th>
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<tr>
<td>• Scanning training</td>
<td>• Recommended as an important, even critical, element for persons with severe visuoperceptual impairment that includes visual neglect after right hemisphere stroke.</td>
</tr>
<tr>
<td>• Cognitive interventions for specific language impairments such as reading comprehension and language formulation</td>
<td>• Recommended after left hemisphere stroke or TBI.</td>
</tr>
<tr>
<td>• Treatment intensity</td>
<td>• Should be considered as a key factor in the rehabilitation of language skills after left hemisphere stroke.</td>
</tr>
</tbody>
</table>
## Practice Guidelines

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<tr>
<td>• Use of external compensations with direct application to functional activities</td>
<td>• Recommended for persons with severe memory impairment after TBI or stroke</td>
</tr>
<tr>
<td>• Training in formal problem-solving strategies and their application to everyday situations and functional activities</td>
<td>• Recommended during post-acute rehabilitation for persons with stroke or TBI</td>
</tr>
<tr>
<td>• Comprehensive holistic neuropsychological rehabilitation</td>
<td>• Recommended during post-acute rehabilitation to reduce cognitive and functional disability from stroke</td>
</tr>
<tr>
<td>• Isolated microcomputer exercises to treat unilateral left neglect</td>
<td>• NOT recommended; does not appear effective</td>
</tr>
</tbody>
</table>

## Practice Options

<table>
<thead>
<tr>
<th>Intervention</th>
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</tr>
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<tbody>
<tr>
<td>• Systematic training of visuospatial and organizational skills</td>
<td>• May be considered for persons with visual perceptual deficits, without visual neglect, after right hemisphere stroke as part of acute rehabilitation. Not recommended for persons with left hemisphere stroke or TBI who do not exhibit unilateral spatial inattention.</td>
</tr>
<tr>
<td>• Inclusion of limb activation or electronic technologies for visual scanning training</td>
<td>• May be included in treatment of visual neglect after right hemisphere stroke</td>
</tr>
<tr>
<td>• Computer-based interventions intended to produce extension of damaged visual fields</td>
<td>• May be considered for persons with TBI or stroke</td>
</tr>
</tbody>
</table>

## Practice Options

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<th>Recommendations</th>
</tr>
</thead>
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<td>• Computer-based interventions as an adjunct to clinician-guided treatment</td>
<td>• May be considered for cognitive and linguistic impairments</td>
</tr>
<tr>
<td>• Sole reliance on repeated exposure and practice on computer-based tasks without some involvement and intervention by a therapist</td>
<td>• <strong>NOT recommended</strong></td>
</tr>
<tr>
<td>• Integrated treatment of individualized cognitive and interpersonal therapies</td>
<td>• May improve functioning within the context of a comprehensive neuropsychological rehabilitation program, and facilitate effectiveness of specific interventions.</td>
</tr>
<tr>
<td>• Group-based interventions</td>
<td>• May be considered for cognitive and communication deficits after TBI and stroke</td>
</tr>
</tbody>
</table>


Putting evidence based reviews into clinical practice

Whom Do We See?

Common Cognitive Problems of Persons with ABI:

- Memory
- Multi-tasking
- Distractibility
- Unable to finish things I've started
- Problems getting started on tasks
- Get angry easily, feel irritable
- Trouble being in large groups or noisy places
What Does Cognitive Rehab Involve?
- Education on common symptoms of TBI, stroke, cognitive complaints
- Education on basic cognitive functions, e.g. memory process, attention, problem solving, fatigue.
- Develop awareness of their difficulties and how it is impacting their daily activities
- Develop individualized strategies to compensate for their difficulties
- Practice of strategies and application to daily activities (home, work, school, volunteer, etc)

Strategies to help improve Memory
- Fact Sheets
- Cue cards for routines, processes, strategies
- Calendars, either paper and pencil or electronic device
  - Record daily plans
  - Take notes on phone calls, conversations
  - Track headaches, fatigue, mood levels

Things to Keep Track of in my Calendar
- Medication times (check off after I take them)
- Short notes what phone conversations are about
- Things that get me upset
- Chores I do at home
- Appointments
- Anything else I want to remember
Fact Sheet Cue Card

• I was in a car accident on 1/2/2012
• I was in the hospital until 2/3/2012
• I went to a rehab center until 3/4/2012
• I used to work in construction. I am not working right now because of my vision and balance problems.
• I am in therapy to help with my memory, mood, and balance problems.
• The doctors told me I should not drive right now.

Laundry Cue Card:
1. Check dryer for clean/dry clothes:
   - If dry, fold and bring to everyone's room

1. Check washer for clean/wet clothes:
   - If done washing, transfer to dryer and start the dryer

1. Put a new load of dirty clothes in washer and start the washer

Strategies to help improve Memory

• Read and follow directions
• Double check
• Ask for clarification
• Take notes on verbal direction
• Check off completed tasks
• Draw on my strengths
• Ask questions
• Pay attention to details
• Slow down
• Ask for repetition if needed
Strategies to help improve Attention

• Increase awareness of their difficulties
• Eliminate/reduce distractions
• Do one thing at a time
• Do cognitive challenging activities when most alert
• Take frequent rest breaks
• Rehearsal
• Self-Pacing
• Anticipation of task demands
• Positive self statements for managing emotional reactions
• Managing potential side-effects of impaired attention (fatigue, irritability, overwhelmed)

Strategies to help improve Awareness

• Plan-Predict-Do-Review
• Have patient complete tasks they previously were good at and see how they do.
• Let patient participate in life tasks-life experience
• Feedback from family, patient and therapist

Task: 
I am working on this task to improve my:
□ Awareness □ Memory □ Organization □ Distractibility □ Attention/Concentration □ Problem solving □ Following directions □ Initiation & completion □ Visual perception □ Other ________

Predicted Performance:
□ I am certain I will not have difficulties □ I don’t think I will have difficulties □ I think I may have difficulties □ I’m certain I will have difficulties

Before we start, let’s think of the best way to go about doing this. Are there any techniques you can use?

The task was:
□ Very easy □ Easy □ Difficult □ Somewhat difficult □ Very difficult

How do I feel I did?
□ Perfect □ Better than I expected □ Just as I expected □ Less than I expected □ Most unfavorable outcome

How efficiently did I complete this task?
□ Very efficiently □ Somewhat efficiently □ Not efficiently

How satisfied am I with my performance?
□ Very satisfied □ Satisfied □ Not satisfied

Did I complete everything I set out to do?
□ Yes □ No

Did I keep track of time?
□ Yes □ No

Could I have done things in a more organized or efficient way?
□ Yes □ No

What strategies could I use next time? What could be done differently?

What I learned about my performance:
Strategies to help improve Organization

• Use a device that has built in structure
• Create structure for the patient
• Cue cards
**Things to Plan in Calendar:**
- Morning medications
- Brush teeth
- Make bed
- Shower
- Clean shower (Tuesday)
- Breakfast
- Shower (Tuesday/Saturday)
- Clean up bathroom after shower
- TV shows or movies
- Laundry & change sheets (Tuesday)
- Bedtime medications

**Things that can be planned in calendar:**
- Empty e-pap water (morning)
- Water hanging and potted plants (daily)
- Fill e-pap with water (evening)
- Senior Citizen Center (Wednesday)
- Vacuum room (daily)

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**Strategies to help improve Problem Solving**

- Plan-Predict-Do-Review
- Problem solving format
- Stop and think

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**Problem Solving Format**

Identify the Problem:

<table>
<thead>
<tr>
<th>Possible Solutions</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I will try solution number ______
Strategies to help improve Initiation

• Calendar
• Routine
• Cuing
• Alarms
• Cue cards
• Lists (What to make for supper, What activities I can do in my free time)
• Chore charts

Strategies to help manage Fatigue

• Frequent rest breaks
• Adequate/more sleep than normal
• Alternate easy/hard tasks
• Finding new tolerance level

Case Study

• 27-year-old female with severe bipolar disorder
• 29 ECT treatments over the course of 4 months
• Lived alone in apartment
• Family supportive and in her community
• Previously was a teacher, resigned
• Very slow processing, talking, VERY flat affect
She Identified Difficulties:

- Memory (even long term memories)
- Attention/concentration
- Irritable
- Slow processing (understanding what people say and then figuring out what to say)

She Identified Strategies:

- I write lots of notes
- I obsessively keep repeating things in my head
- I have a calendar on the table that I look at all the time
- I have a difficult time figuring out cooking
- I get lost all the time driving (even though she has lived in the same city and is going to the same places she has always gone)

Treatment:

- Education on:
  - Brain injury
  - Memory process
  - Fatigue and need for brain breaks
- Calendar:
  - Daily plans
  - Track energy and mood levels
  - Journal events/conversations
Challenges:

- It took her 2 hours to get ready in the morning
  - She got sidetracked (distracted)
  - Took her a long time to pick out her clothes (too many choices, figure out what went together, trying to remember what she had already worn that week)

Solutions:

- She initiated getting rid of clothes so she didn't have so many choices
- Take pictures of outfits so she didn't have to re-invent an outfit everyday
- Pick out outfits night before
- Tape up pictures of what wore that week to keep track

Treatment:

- Cognitive assessment—came up with 11 thinking strategies (Put on a cue card)
- Morning routine cue card
- 4 Basic Needs—Identified need for exercise and joined the YMCA
- Practice strategy use
- Attention tasks/tapes—Developed/practiced strategies
- Reading comprehension
- 5 W's
Treatment:

- Babysat for sister—Had to ask her sister to get things set up for her before she came to babysit, e.g. bottles, clothes, diapers, etc. - Decided she should only watch 1 kid rather than both.
- Started to drive herself to appointments again—wrote down where she parked.
- Emotions—“If I can’t watch two kids, I will never.”
- Volunteer work—worked with our Vocational Case Coordinator.
- Looking into school—Nurses Aid.
- Study strategies.

Current Status

- In school to become a Clinical Research Coordinator.
- Has accommodations for classes.
- Isn’t volunteering while going to school.
- Is taking fewer credits each semester to go at her pace.

In the big picture, what do our patients, their families and even insurance providers really want?
How to you know if you are delivering it?

- **Good**: Improvement across therapy sessions.
- **Better**: Improvement on some independent measure of functioning
- **Best**: Improvement in real world outcomes which patient values.

Gordon (1987)

Contact information

- Please contact me at e-mail address or phone number below
  bergquist.thomas@mayo.edu
  (507) 255-4058