

# The Rehabilitation of Perceptual & Cognitive Deficits Post Stroke

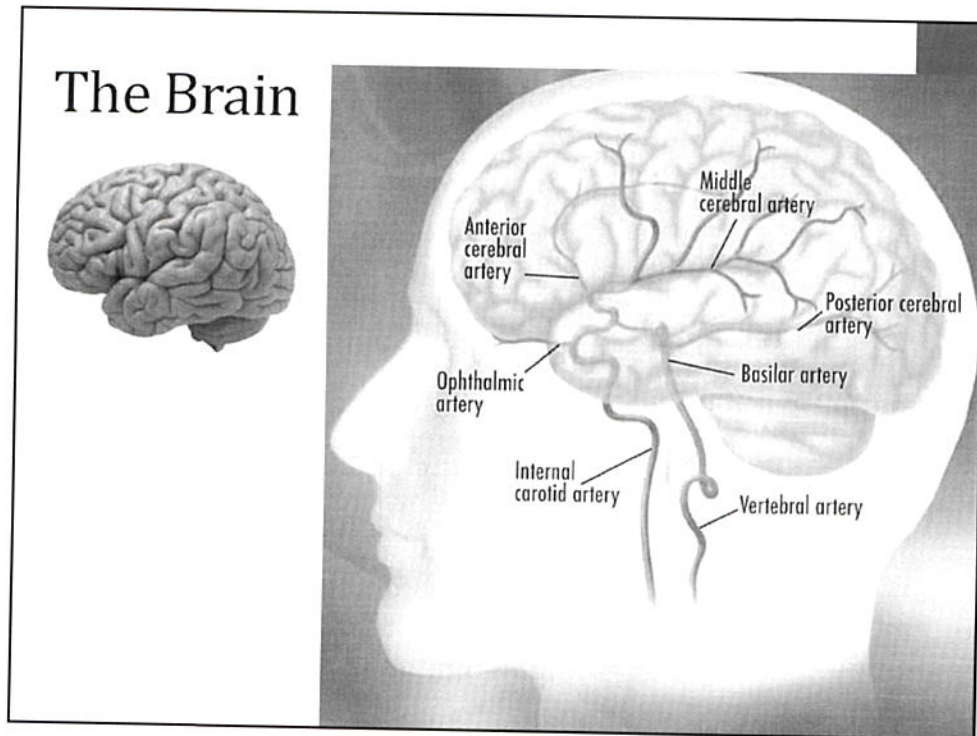
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## Objectives:

At the end of this session you will be able to:

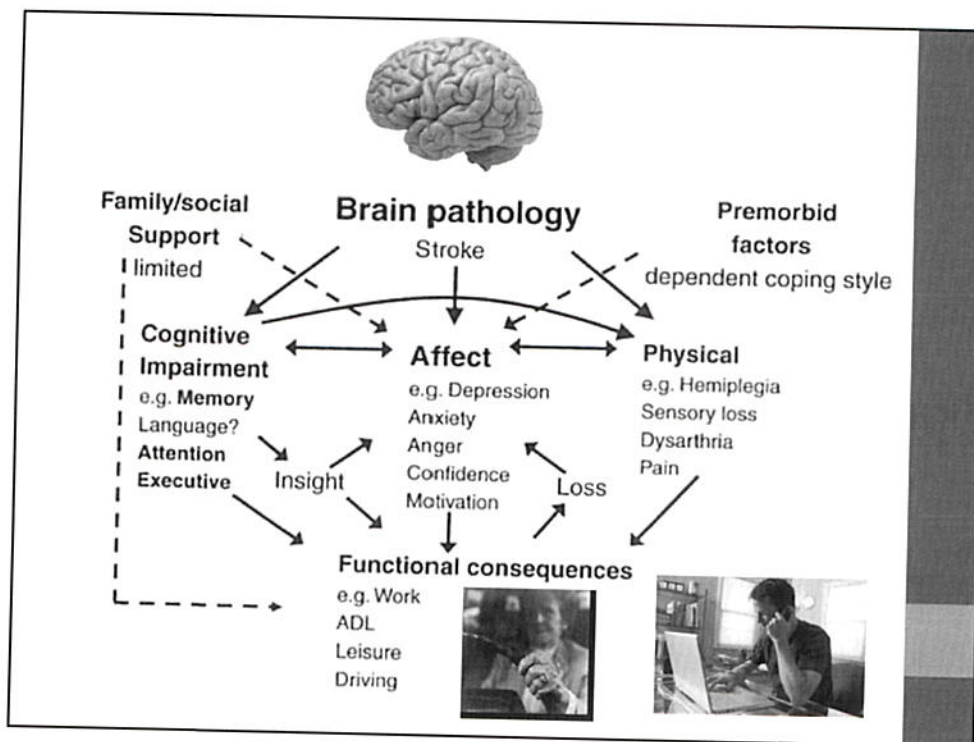
- Describe common cognitive and perceptual deficits following a stroke
- Predict potential functional impact related to these deficits
- Add best practice rehabilitation exercises to use with your stroke patients



## A Stroke affects the Brain Potentially Causing Deficits in

- Physical
- Cognitive/Perceptual
- Communication
- Mood
- Personality
- Behaviour





## Why do we care???

- 66% of stroke patients experience cognitive impairment
- Cognitive impairment is an important predictor of functional outcome
- **Cognitive impairment is associated with**
  - 1) ↓ ADLs
  - 2) ↓ IADLs
  - 3) ↑ length of hospital stay
  - 4) ↓ number of patients returning home

## Why Cognitive Rehab with Stroke Patients?

### **Most Prevalent Cognitive Deficits with Stroke Patients**

- Global
  - Attention
  - Executive functioning
  - Speed of thinking
- Focal stroke-related deficits
  - Unilateral inattention
  - Language/communication – aphasia

## Stroke and Cognitive Rehab

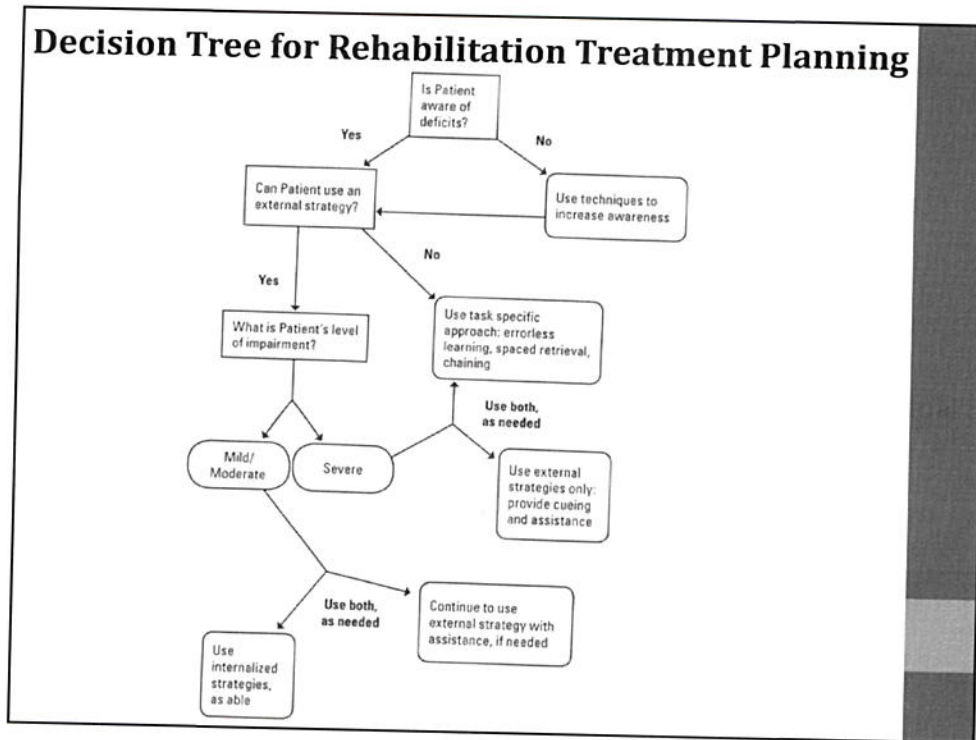
- 16% - 20% of stroke patients with cognitive impairment improve
- Cognitive rehabilitation interventions are associated with small but significant treatment effects
- Biggest improvements found with attention
- Least improvements found with memory

**Cognitive Rehabilitation Matters**

## Rehabilitation Approaches

- **the remedial or restorative approach:**  
remedial strategies are designed to repair processes and restructure or rebuild damaged neural networks e.g., unilateral inattention
- **the adaptive or compensatory approach:**  
compensatory strategies focus on adaptive behaviours e.g., attention, memory

The toughest challenge  
in rehabilitation is the  
issue of generalizability



## Rehabilitation Treatment Stages

**Table 1-1** Treatment Goals and Strategies Associated with Each Stage of Cognitive Rehabilitation

| STAGE OF TREATMENT | GOALS   | TYPE OF STRATEGIES USED                              |
|--------------------|---|--|
| Acquisition        | 1) Teach purpose and procedures of treatment model.<br>2) Help patient recognize and accept deficits and benefits of treatment.   | External   |
| Application        | 1) Improve effectiveness and independence in compensating for deficits.<br>2) Promote internalization of strategies.  | 1) External<br>2) Internal                           |
| Adaptation         | 1) Promote transfer of training to tasks including those that are less structured, more novel, complex, and/or distracting.<br>2) Promote generalization of skills from the structured therapy setting to less structured environments such as home, community, and work. | 1) External and Internal<br>2) External and Internal |

## Acute, Rehabilitation, Community

- **Acute** - Screening & general identification of possible cognitive impairments
- **Rehabilitation** – Multidisciplinary assessment and treatment development and implementation
  - Facilitating recovery
  - Individual and family education
  - Shift to determining the longer term problems
- **Community** – Treatment shifts from facilitating recovery from impairment to use of compensatory strategies to minimize negative effects of stroke-related deficits

## Cognition

**Cognition** is defined as the process of knowing and refers to how we think and how we know things

- **Attention**
- **Memory**
- **Perception** (visual spatial processing, unilateral inattention, praxis)
- **Communication/Speech/Language**
- **Executive functioning** (Insight, Problem solving, Judgment, Planning)

## Attention

- Attention is a basic cognitive ability required for all other cognitive processes
- Attention is the gateway for information to flow into the brain

## Different Aspects of Attention

### Sohlberg & Mateer's Model (1987)

- **Focused attention** – the ability to register/recognize sensory info
- **Sustained attention** – the ability to maintain attention over time during a continuous and repetitive activity
- **Selective attention** – the ability to process target info selectively and inhibit responding to non-target info
- **Alternating attention** – the ability to shift one's focus between tasks that demand different skills
- **Divided attention** – the ability to respond to two or more events or stimuli simultaneously



## What you may see....

- Making careless errors
- Easily distractible
- Trouble attending to a single task over time
- Unable to walk and talk at the same time
- Miss details – in conversation, when reading
- May appear impulsive
- Occasionally may present with agitation
- Difficulties focusing in a busy environment
- Problems focusing throughout the therapy session

## Attention Strategies Compensatory Approaches

- Reduce environmental distractions – turn off the tv or radio; reduce interruptions; move to quieter room
- Use short, simple, step-by-step instructions
- Use prompts - people's names, make eye contact, touch
- Slow down – leave more time between instructions & response, between turn-taking in conversation

## Attention Strategies Compensatory Approaches

- Use shorter therapy sessions
- Prompt the person to be aware for the need to pay attention
- Address fatigue/be well rested

## Attention Compensatory Approach Time Pressure Management

Winkens et al (2009)

- Targets mental slowness
- People are trained to apply a structured problem-solving strategy to assist them in controlling info input
- Trains people to make effective decisions before and during a task

### Steps

- Initially target easy tasks
- Start with modeling then person uses overt self-talk
- Remind people importance of using the strategy to avoid problems
- Use brief learning trials spread over a long period

## Attention Compensatory Approach *n*-back Working Memory Task

Cicerone (2002)

- Uses a deck of playing cards
- Consists of the presentation of a sequence of cards with the requirement that the person continuously report the stimulus occurring *n* number of cards previously
- Done in 1 hour individual sessions with 20-30 minutes devoted to feedback, review factors which influenced performance, development of helpful strategies, bridging with examples of daily life attentional problems

## The evidence says

- Training is most effective when using complex tasks requiring selective or divided attention
- Training is least effective for reaction time or vigilance abilities
- Training should involve different stimulus modalities and response demands
- Therapist activities should include monitoring patients' performance, providing feedback and teaching strategies

## The evidence says

- Attention training during acute recovery is **not** recommended
- Compensatory strategies are best for attention problems
- Limited evidence for computer-assisted attention training
- Limited evidence of improvement in everyday functional activities after attention training

## Unilateral Inattention

A **perceptual and attention** impairment involving decreased awareness of the body and environment on the side affected by the stroke. Often visual fields are intact

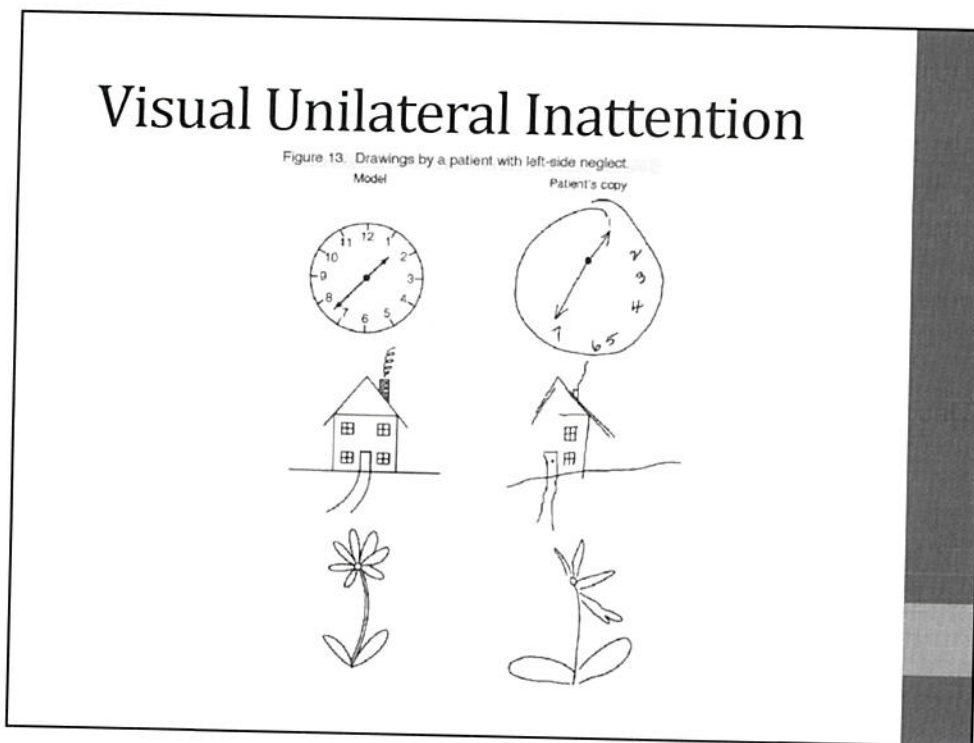
(hemi-neglect, hemi-inattention, unilateral neglect, hemi-spatial neglect, visuo-spatial neglect, hemi-imperception)

## Unilateral Inattention

- **Major factor interfering with rehabilitation outcomes** The presence beyond the acute stage is associated with poor independence outcomes and thus rehabilitation is greatly focused on this deficit
- Most common with right hemisphere lesion
- May exist with or without hemi-anopsia
- Varies in severity and symptom type
- Patients are frequently unaware of and indifferent to their inattention

## What you may see...

- Bumping into/walking too close to things on the affected side
- Not responding when you talk to them on the affected side
- Become startled when you approach from the affected side
- Head always positioned away from affected side
- Awkward positioning of the limbs on the affected side
- Missing items on the affected side (food on tray)
- Only performing ADLs on unaffected side
- Can't make sense of what they are reading or tell time
- **alien limb syndrome** a person talks about their affected limb as if it doesn't belong to them and push it away from their body



## Unilateral Inattention Strategies

### Remedial Approach

- Awareness training
- a) Visual scanning
- b) Limb activation
- c) Visuo-spatio-motor cueing
- d) Mental imagery
- Visual, auditory, tactile cueing

### Compensatory Approach

- Body positioning
- Task positioning
- Environmental adaptation

## a) Visual Scanning Training Remedial Approach

- Use of anchoring
- Training people to look to the left
- With or without real motor activity of the left arm or hand
- Primarily uses visual cancellation tasks, can also rely on line crossing and line bisection tasks

## a) Visual Scanning Training Remedial Approach

### Cancellation Tasks Diller et al (1980)

- **Anchoring** Verbal or visual cues to begin each line at the extreme left side of the page works
- **Pacing** To prevent drift & ↓ performance, recite the targets aloud. This slows and evens out the speed of doing the task
- ↓ errors by ↑ distance between targets

## Reading & Visual Inattention

| Levels  | Sequence of Cuing  | Stimulus Material  | Task Demand   |
|---------|--|--|---|
| Level 1 | a) A vertical anchoring line on left side.<br>b) Sequential numbering on left and right margins. | 1- The Treasury Secretary is not now a<br>2- member of the National Security Council<br>3- but is occasionally invited to participate<br>4- in its deliberations.                  | -1<br>-2<br>-3<br>-4<br>Patient is asked to look at the anchoring line, and the number at beginning and end of lines. S/He uses vertical line to find beginning of paragraph, and uses numbers not to skip lines. |
| Level 2 | a) A vertical anchoring line on left side.<br>b) Sequential numbering on left margin only.       | 1- A growth of 6 percent in the nation's<br>2- output of goods and services next year<br>3- would be higher than what is now being<br>4- forecast by most economists. In the third | Patient uses only anchoring line and number at the beginning of paragraph.  |
| Level 3 | A vertical anchoring line on the left side.  | Among the subjects discussed in the series of meetings, most of them an hour long, were foreign policy, international economics, government reorganization,                        | Patient uses only the anchoring line.   |
| Level 4 | No cues provided.  | At meetings with the Senate Foreign Relations and House International Relations Committees, Mr. Obama said that he would cooperate and consult closely                             | Patient reads and/or copies without any cuing provided.   |

## b) Limb Activation Remedial Approach

- People are taught to move or simply attend to the affected limb prior to or during a spatial activity
- Based on research that neglect/inattention is a lateralized attention deficit
- Motor responses on the opposite side to the lesion ↑ activation of the damaged hemisphere, causing a change in lateralized attention



### c) Visuo-spatio-motor Cueing Remedial Approach

- Combines visual scanning and limb activation strategies
- The most helpful movements are those that visually cue the person to the left side while activating the left limb at the same time
- People can be trained to move their left arm and to look at it when they are unable to find the target of an exercise

### d) Visual Imagery Training Remedial Approach

Lighthouse Strategy Neimeier (1998),  
Neimeier et al (2001)

- Teaches people to use the imagery of being a lighthouse, turning from side to side in order to illuminate their surroundings
- Moves from paper-and-pencil tasks to real world functional tasks

## Visual Spatial Processing

The ability to appreciate the spatial relationships of objects in relation to oneself and the relationships between objects in space

Includes:

- Spatial Relations
- Visual Discrimination
- Figure Ground
- Visual closure

## What you may see...

- Misjudging movements (over-or under-reaching or stepping)
- Difficulty finding objects (items on their meal tray, ADL equipment, specific clothes in closet)
- Difficulty applying brakes on wheelchair or walker

## Visual Spatial Processing Strategies

- Practice of a particular skill improves performance of similar perceptual tasks
- Treatment should involve both table-top and functional tasks
- Reduce the amount of “visual noise”
- Increase contrast between items

## Executive Functioning

Are abilities that enable a person to successfully engage in independent, goal-directed, purposeful behaviour

Are abilities that help people transfer past success to present and future situations

## Executive Functioning

- reasoning/decision making
- self-regulation (behaviour, emotions)
- switching tasks
- planning
- organizing
- judgment
- initiating or getting started with doing things
  
- **Meta-cognition**
  - one's awareness of oneself/insight
  - self-monitoring
  - error awareness and corrections
  - anticipating consequences of one's actions

## Insight - Executive Functioning

- **Insight:** the degree to which you can realistically evaluate your situation. Someone with damaged insight will often be unaware of the mistakes they make or be indifferent because they are unable to understand their importance
  
- **Anosognosia:** a loss of ability to recognize or to acknowledge an illness, bodily defect or functional problem

## What you may see....

- Risky behaviours - Unsafe transfers, not using ambulation aids, walking in sock feet, eating too fast
- Impulsivity
- Social disinhibition, interpersonal conflict
- Poor initiation
- ↓ ability to problem solve or generate solutions
- Impaired judgment
- Unrealistic judgment of present abilities
- Poor engagement in one's rehabilitation

## Executive Functioning Strategies

### **Metacognitive Strategy Training**

- Deals with training of strategies to improve a person's awareness of their own thinking processes
- Focuses on self-monitoring and self-regulation tasks including verbal self-instruction, self-questioning, formal problems solving & predict-perform strategies
- Therapist activities should include monitoring a person's performance, providing feedback and teaching strategies

## Executive Functioning Strategies

### Goal Management Training

- Following written directions, think about the end goal, go step-by-step, check off each completed step
- People learn to be better at being clear what it is they are trying to achieve, keeping in mind the steps needed to achieve the goal, and then regularly checking to make sure important tasks are attended to

## The evidence says

- There is little evidence regarding remediation of executive functioning and problem-solving post-stroke
- Evidence for effectiveness with ABI

## Memory

- The ability to retain and recall new information
- **Episodic Memory:** remembering past events and activities
- **Prospective Memory:** remembering to do things in the future
- **Procedural Memory:** learned motor, cognitive and language processes

## What you may see...

- People repeating themselves in conversation
- Forgetting what someone has said
- Not remembering what they did yesterday
- Forgetting appointments
- Misplacing commonly needed objects like one's keys, wallet or glasses
- Forgetting people's names
- Forgetting to eat
- Forgetting to shut off water/turn off stove

## Memory Strategies Compensatory Approaches

- Follow a set routine
- Use external aids such as an agenda book, bulletin or white board, calendar
- Use note-taking and list making
- Keep regularly used items in a set place
- Use labels, sticky notes
- Use alarm clocks, timers
- Blister packed medications or dosettes
- Electronic organizers e.g., Smart phones

## The evidence says

- Strong evidence that compensatory strategies are effective in improving memory functioning (for ABI, little research for stroke)



## Apraxia

Inability to plan and perform familiar purposeful movements in the presence of intact motor control, coordination, sensation, & comprehension

- **Ideomotor:** difficulty carrying out a movement or task to command or imitation but can perform the movement/task spontaneously (Constructional disorder)
- **Ideational:** difficulty carrying out the steps of a task in the correct sequence or at all AND inability to manipulate common objects correctly (Conceptual disorder)

## What you may see...

- Unable to follow instructions or seems to be ignoring directions (especially complex or multi-step verbal directions)
- Difficulty performing ADLs (may be unable to initiate, follow correct sequence, terminate movement, or use appropriate tools)
- Repetition of movements (motor perseveration)
- Difficulty moving lips/tongue/mouth to form words

## Apraxia Strategies

### Ideomotor:

- Keep instructions simple
- Use familiar routine & environment
- Hand-over-hand guidance
- Chaining techniques (YOU begin movement and person continues and follows through)
- Visualize the task/movement before performing
- Ask the person to verbalize steps
- Break the activity into smaller parts and try each part separately

## Apraxia Strategies

### Ideational:

- Use familiar routine & environment
- Frequent practice using objects appropriately relying on errorless learning
- Break the activity down into smaller parts and guide through each step
- Make a simple checklist or picture set to demonstrate the sequence of the task so the person can refer to when performing the task
- Avoid giving the person complex adaptive devices (such as a reacher)

## Take Home Messages

- ✓ Cognitive & perceptual deficits are common and disabling post stroke
- ✓ Stroke recovery is a variable process
- ✓ Screening helps track impairment & recovery
- ✓ Assessment helps define in more detail
- ✓ Stroke rehabilitation should take into account the entire person and their context for the most effectiveness
- ✓ The issue of generalizability is a tough challenge for rehabilitation

## Questions?

### Contact Info

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## Resources

- [www.strokebestpractices.ca](http://www.strokebestpractices.ca)
- [www.canadianstrokenetwork.ca](http://www.canadianstrokenetwork.ca)
- [www.heartandstroke.ca](http://www.heartandstroke.ca)
- [www.ontariostrokenetwork.ca](http://www.ontariostrokenetwork.ca)
- [www.strokingengine.ca](http://www.strokingengine.ca)
- [www.stroke.org](http://www.stroke.org) (National Stroke Association [American])
- [www.ebrsr.com](http://www.ebrsr.com) (Evidence Based Review of Stroke Rehabilitation [Canadian])
- Cognitive Rehabilitation Manual – Translating Evidenced-Based Recommendations into Practice (2012)  
Edmund C Haskins, American Congress of Rehabilitation  
Medicine Publishing