What is cognitive rehabilitation?

Life consists in what a person is thinking of all day.

Ralph Waldo Emerson

Keith D. Cicerone, Ph.D.

Panel II. Development of Cognitive Rehabilitation Therapy for TBI
Institute of Medicine
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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
Models of Cognitive Rehabilitation

- Process-specific (direct) training
- Functional skills training
- Metacognitive training
Process-Specific Training

Focus: Internal
Emphasis: Neurocognitive components
Mechanism: Restitution
Approach: Bottom-up
Functional Skills Training

Focus: External
Emphasis: Functional-ecological tasks
Mechanism: External compensation
Approach: Bottom-up
Metacognitive Training

Focus: Internal
Emphasis: Self-regulation
Mechanism: Internal compensation
Approach: Top - down
Treatment Structure

- Individual interventions
- Co – Interventions
- Group Interventions
- Treatment Intensity
- Treatment Accommodation
- Complex Interventions
Individual vs. Group Treatment

Ownsworth et al, 2008

Greater Goal Attainment and Satisfaction on meaningful tasks after Individual and Combined Interventions

Greater Self-rated Competence and Psychological Well-being after Group Intervention
Treatment Intensity

Process and skill specific training may benefit from massed practice.

Metacognitive strategy training may benefit from distributed training.

Optimal treatment intensity is “Enough but not too much.”

Benefit of sessions to ensure “relapse prevention.”
Treatment Accommodation

Manual based treatment
Evidence-based treatment
Patient characteristics
  1. Awareness
  1. Compliance
  1. Motivation and Initiative
Patient – therapist collaboration
Complex Interventions
Holistic Neuropsychological Rehabilitation
(Ben-Yishay & Gold, 1990)

Interventions directed at the remediation of cognitive deficits, emotional mastery, interpersonal communication and social competencies, and acceptance of the consequences of brain injury within the context of a therapeutic community. Improvements in functioning are typically accomplished by an improvement in the effective functional application of residual cognitive abilities, rather than restoration of the underlying cognitive deficits, per se.
Methodological Quality of TBI Research

Evaluated 38 RCTs on 16 criteria for internal validity, treatment description and statistical analysis

8 “high quality” studies
30 “medium quality” studies
0 “low quality” studies
Remediation of Attention: Attention process training during post-acute rehabilitation

Sohlberg et al., 2000 (Class I)

N = 14 (3 with LOC < 1 hour)
Randomized crossover (Class I) design
Attention Process Training (APT) versus
Brain injury education “placebo”
Remediation of Attention:  
Attention process training during post-acute rehabilitation

Sohlberg et al., 2000

Greater self-reported improvement in attention & memory after APT
Greater improvement on attention-executive (but not vigilance) tasks after APT.
Psychosocial improvements greater after education and support
Remediation of Attention:

*Attention process training during post-acute rehabilitation*

*Tiersky et al., 2005 (Class I)*

N = 20 (19 LOC < 29 minutes)

APT-II (with memory and problem solving component) and CBT vs. Waitlist control

Improvement on NP measures of attention and memory, less anxiety and depression

No improvement in community integration
Remediation of Attention:

Post-acute Treatment

Fasotti et al., 2000 (Class I)

Time Pressure Management (TPM)

versus

“Concentration” Training (generic instructions to “focus” and “don’t get distracted”)
Remediation of Attention: *Post-acute Treatment*

*Time Pressure Management*

Increase awareness of errors and relation to slow processing

Compensation for slowed information processing through anticipation and self-management

Reduce experience of ‘information overload’ in daily tasks
Remediation of Attention: 

*Post-acute Treatment*

*Fasotti et al., 2000*

Increased use of self-management strategies (interrupting, repeating essential information) after TPM

Improvements apparent on more complex tasks, but not basic reaction time
Remediation of Social-Communication Deficits after TBI

*Dahlberg et al., 2007 (Class I)*

Social Communication Skills Training after TBI vs. Deferred Treatment

1. Pragmatic language skills
2. Social behaviors
3. Cognitive abilities
Remediation of Social-Communication Deficits after TBI

*Dahlberg et al., 2007 (Class I)*

Significant benefits apparent on

1. 7 of 10 aspects of Functional Communication (blind objective ratings)
2. Social Communication Skills (self-report)

Gains maintained at 6 month follow-up

Improved life satisfaction at 6 month follow-up
Remediation of Social-Communication Deficits after TBI

Bornhofen & McDonald, 2008 (Class I)

Strategies for treating emotion perception deficits after TBI

Improved judgment of emotional demeanor and social inferences after self-instructional training life satisfaction at 6 month follow-up
Cognitive Rehabilitation during Acute Rehabilitation

Vanderploeg et al., 2008

N = 360 moderate-severe TBI at 4 VAMC
Mean 50 days post injury
66% MVA
13% LOC < 1 hour
51% PTA > 30 days

“most still in posttraumatic confusional state when protocol intervention began”
Cognitive Rehabilitation during Acute Rehabilitation

Vanderploeg et al., 2008

Cognitive vs. functional protocols embedded within acute rehabilitation
Better FIM cognitive after cognitive tx arm
Less severe memory complaints at 1 year
No difference in functional outcomes at 1 year
Comprehensive-Holistic Cognitive Rehabilitation

*Salazar et al., 2000 (Class I)*

In-hospital, “therapeutic milieu” program of cognitive remediation

*versus*

Weekly telephone education and encouragement from an R.N.
Comprehensive-Holistic Cognitive Rehabilitation

Salazar et al., 2000 (Class I)

N = 120 moderate to severe TBI recruited from 273 military hospital admissions
63% LOC < 1 hour
Participants averaged 38 days post-injury
Comprehensive-Holistic Cognitive Rehabilitation

Salazar et al., 2000 (Class I)

No difference in return to work for CR (90%) or home-based (94%) treatments

Authors noted “extraordinarily high return-to-work rates” at 1 year

Restricted subject selection threatens external validity

Greater benefits of CR among 75 patients with more severe injuries (> 1 hour LOC)
Comprehensive-Holistic Cognitive Rehabilitation

*Cicerone et al., 2008*

N = 68 (12% MTBI)

Over half (57%) ≥ 1 year post injury

Intensive Cognitive Rehabilitation (ICRP)

1. Integrative, group-based therapies
2. Individual & Group Cognitive Remediation
3. Interpersonal / Communication Training

vs. ‘Standard’ Neurorehabilitation

1. Individual, one-to-one therapies
2. Physical, Occupational & Speech Therapies
3. Individual Cognitive Remediation
Significant benefits of holistic neuropsychological rehabilitation:

- Community integration & productivity
- Self-efficacy for management of symptoms
- Quality of life

Benefits apparent beyond the effects on discrete neuropsychological abilities
6 Month Follow Up
Life Satisfaction

ICRP gains maintained 6 months after treatment
No improvement after STD

Perceived QOL
Pre-TX  Post-TX  6 mo. FU

ICRP
STD
ICRP gains maintained 6 months after treatment
STD show improvement with continued treatment
6 Month Follow-up

Cicerone et al., 2008

ICRP benefits maintained at 6 months
STD participants more likely to receive additional treatment
70% received comprehensive treatment versus 25% of ICRP participants
What is cognitive rehabilitation?

Cognitive rehabilitation is treatment to help someone with a cognitive disability (from acquired brain injury) live a *thoughtful* and *fulfilling* life.
### Differential Treatment Effects

Percent of studies showing benefit of Cognitive Rehabilitation compared with Alternative:

<table>
<thead>
<tr>
<th>Treatment Type</th>
<th>Studies</th>
<th>Patients</th>
<th>% Favoring CR</th>
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<tbody>
<tr>
<td>Cog/Psych</td>
<td>10</td>
<td>290</td>
<td>60.0%</td>
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<tr>
<td>Pseudotreatment</td>
<td>15</td>
<td>582</td>
<td>66.7 %</td>
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<tr>
<td>Conventional</td>
<td>14</td>
<td>587</td>
<td>92.9 %</td>
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<tr>
<td>No Treatment</td>
<td>8</td>
<td>342</td>
<td>100.0%</td>
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