



ACRM BI - ISIG

Evidence-Based Recommendations for Cognitive Rehabilitation

Rehabilitation of Attention after Brain Injury

The Brain Injury-Interdisciplinary Special Interest Group (BI-ISIG) of the American Congress of Rehabilitation Medicine has conducted evidence-based reviews of the literature regarding cognitive rehabilitation for persons with traumatic brain injury (TBI) or stroke. Based upon these reviews, the BI-ISIG has made recommendations for clinical practice. Following is a summary of these recommendations and examples of how they can be used in clinical practice. The full recommendations are available at www.acrm.org and in the following publications:

Cicerone, K.D., Dahlberg, C., Kalmar, K., Langenbahn, D.M., Malec, J.F., Bergquist, T.F., Felicetti, T., Giacino, J.T., Harley, J.P., Harrington, D.E., Herzog, J., Kneipp, S., Laatsch, L., & Morse, P.A. (2000). Evidence-based cognitive rehabilitation: Recommendations for clinical practice. *Archives of Physical Medicine and Rehabilitation*, 81, pp. 1596-1615.

Cicerone, K.D., Dahlberg, C., Malec, J.F., Langenbahn, D.M., Felicetti, T., Kneipp, S., Ellmo, W., Kalmar, K., Giacino, J.T., Harley, J.P., Laatsch, L., Morse, P.A., & Catanese, J.(2005). Evidence-based cognitive rehabilitation: Updated review of the literature from 1998 through 2002. *Archives of Physical Medicine and Rehabilitation*, 86, pp. 1681-1692.

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Practice Recommendations:

- Existing evidence supports the effectiveness of training on attention tasks during the post-acute period.
- Training in strategies to improve attention is more effective than repetitive drills/practice aimed at restoring function.



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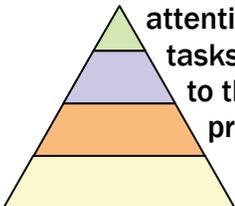
Practice Recommendations (continued):

- Strategies that promote internalization of self-regulation strategies through self-instruction and self-monitoring are recommended. This may be accomplished by therapists monitoring clients' performance, providing feedback about performance, and providing education regarding the potential impact of attention deficits on daily functioning.
- Interventions should include training in different stimulus modalities (e.g., visual and auditory), at different levels of stimulus complexity and response demands (e.g., detecting targets alone versus in the presence of background noise; distinguishing between two stimuli versus distinguishing between three or more).
- Training of attention appears to be more effective when directed at improving performance on more complex, functional tasks (e.g., attending to a voice in the presence of background noise) than when directed at more basic attention abilities, such as reaction time or vigilance.
- While attention training results in improved performance on tasks of attention, there is limited evidence regarding generalization to activities of daily living. Clinicians should attempt to relate attention training to specific areas of functioning or, when possible, to provide training on tasks or in situations that are related to real-life demands.



How To Carry Out Attention Interventions in Clinical Practice:

- Computer-based attention training programs:¹⁻⁴** Many of the tasks used for attention training are computerized. There are formal attention training programs that can be purchased. Video games that address certain components of attention could also be used (e.g., shooting at targets among distracters). Also, training tasks can be created that simulate cognitive tasks of attention (e.g., a Stroop-like interference task where clients are required to attend to one dimension of a stimulus that has more than one dimension, such as color and size).
- Focusing training on specific aspects of attention:¹⁻²** Attention training tasks should address a specific type of attention. Some of the types of attention are described below, along with tasks that could address these areas.
 - Focused Attention:** basic ability to respond to stimuli sequentially presented in a certain modality (e.g., visual, auditory); tasks include watching for targets (e.g., arrows pointing up) interspersed with distracters (e.g., letters); complexity of task can be varied by increasing similarity of distracter to targets (e.g., arrows pointing down as opposed to letter distracters).
 - Sustained Attention:** ability to maintain a consistent response in the face of continuous, repetitive activity; tasks include listening for ascending or descending sequences of numbers among numbers that are presented verbally, or alphabetizing words in an orally presented sentence.
 - Selective Attention:** ability to maintain response set in spite of distractions or the ability to inhibit responses to competing information; tasks include listening for a certain tone or word with competing background noise or watching for a visual cue (arrow) on a screen that also includes other distracter items.
 - Alternating Attention:** ability to switch attention back and forth between activities that require different response or cognitive sets; tasks include pressing a computer key when a certain color arrow appears some times, but when the arrow points in a certain direction at other times; the number of responses required or interval before the target dimension changes can be varied in order to increase complexity.
 - Divided Attention:** ability to respond to more than one task at the same time or to attend to more than one task demand at the same time; tasks include performing a simple sorting task while also monitoring time to determine when a certain interval has elapsed.
- Hierarchical Training:¹⁻²** Attention training is typically administered in a hierarchical fashion. Training should begin at the simplest level of attention at which a client has difficulty. Training sessions are typically offered for 1 to 2 hours, 3 to 4 times per week. Within each type of attention, training should occur in auditory and visual modalities and the complexity of tasks should be gradually increased. Moving to a different level of complexity, or moving to the next level of attention, should be undertaken only when clients have reached a predetermined level of accuracy (e.g., 80%) on a given task.



How To Carry Out Attention Interventions (continued):

- **Use of Feedback:**¹⁻⁶ Training on specific tasks should be accompanied by education and feedback from a therapist. Education should address the impact of brain injury on different types of attention, as well as the impact of attention deficits on tasks and daily functioning. The relationship between slowed speed of processing and attention deficits should be addressed. Also, the relationship between impaired attention and other changes, such as fatigue and frustration should be discussed. Feedback should include monitoring of a client's task performance, with indications of errors and why they likely occurred (e.g., couldn't screen out distracting noise).
- **Self-talk and self-pacing:**⁵⁻⁶ Training should include specific strategies designed to help clients compensate for attention deficits and improve performance. Examples of strategies include:
 - **Verbal mediation:** whereby clients talk themselves through tasks (e.g., verbalize the stimulus dimension to which they are responding on an alternating attention task)
 - **Rehearsal of specific strategies:** such as repeating what they are looking for (e.g., descending number sequences on a sustained attention task)
 - **Self-pacing:** to reduce the impact of information overload caused by decreased processing speed, teach clients to slow down on tasks and to pause between tasks.
 - **The use of positive self-statements:** to reduce frustration and fatigue
- **Generalization:**¹⁻⁶ Generalization of training from attention tasks to daily functional tasks is not automatic. Therapists should promote generalization by also training in the use of strategies on functional tasks. For example, having clients take down a telephone message while the television is playing loudly and using verbal rehearsal to ensure accuracy can be used as an example of selective attention. Switching from performing alphabetical filing to answering the telephone and greeting customers is an example of alternating attention.



References:

- ¹ Sohlberg MM, Mateer CA. (1987). Effectiveness of an attentional training program. *Journal of Clinical and Experimental Neuropsychology*, 9, 117-130.
- ² Sohlberg MM, McLaughlin KA, Pavese A, Heidrich A, Posner MI. (2000). Evaluation of attention process training and brain injury education in persons with acquired brain injury. *Journal of Clinical and Experimental Neuropsychology*, 22, 656-676.
- ³ Strache W. (1987). Effectiveness of two modes of training to overcome deficits of concentration. *International Journal of Rehabilitation Research*, 10 Supp 5, 141S-145S.
- ⁴ Gray JM, Robertson I, Pentland B, Anderson S. (1992). Microcomputer-based attentional retraining after brain damage: A randomized group controlled trial. *Neuropsychological Rehabilitation*, 2, 97-115.
- ⁵ Cicerone KD. (2002). Remediation of "working memory" in mild traumatic brain injury. *Brain Injury*, 16, 185-195.
- ⁶ Fasotti L, Kovacs F, Eling PA, Brouwer WH. (2000). Time pressure management as a compensatory strategy training after closed head injury. *Neuropsychological Rehabilitation*, 10, 47-65.

Disclaimer: This paper is an educational service provided by the Brain Injury-Interdisciplinary Special Interest Group (BI-ISIG) of the American Congress of Rehabilitation Medicine (ACRM). It is designed to assist with client treatment. It is based on a systematic review of the literature through 2002 and is not intended to exclude the use of any reasonable alternative treatments. Specific treatment decisions should be made by the client, their family, the physician and the rest of the treatment team, dependent on the particular circumstances involved. Rehabilitation professionals should review the full ACRM BI-ISIG recommendations for a more complete understanding of the available evidence.