



**ACRM BI - ISIG**

**Evidence-Based Recommendations for Cognitive Rehabilitation**

# Rehabilitation of Memory 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](http://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:

- Training in the use of compensatory memory strategies has been shown to be effective for improving memory in persons with mild to moderate memory impairment from traumatic brain injury. The types of strategies that have shown effectiveness include internal strategies (e.g., visual imagery) and external compensatory strategies (e.g., use of a memory notebook and use of electronic paging systems, such as Neupage).
- Training in the use of internal and external memory strategies is most effective for persons who have mild to moderate memory impairment, are motivated to use the strategies, and have awareness of their memory difficulties and of when the strategies would be helpful.



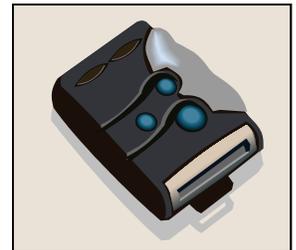
## Rehabilitation of Memory after Brain Injury

### **Practice Recommendations** (continued):

- Training in self-regulatory strategies, such as self-instruction and self-monitoring, can complement training in the use of memory strategies. For example, training persons to cue themselves regularly to refer to a memory notebook can improve consistency in the use of the notebook.
- Training in the use of memory strategies does not work as well for persons with severe memory impairment. These persons usually have difficulty learning to use strategies and often forget to use them when needed.
  - Instead, these persons may benefit from very specific training in domain-specific skills, such as using computer software to enter data. The skills should be taught using repetition and fading methods, where persons are provided with all the help/information they need to have at first, and the information is gradually withdrawn as the skill becomes habitual and they are able to perform it without reminders. Skills taught in this way are usually not generalizable to other settings. For example, a person who learns to enter data using one computer with a specific type of software may not be able to transfer these skills to another type of computer and software.
  - Training in the use of external memory aids, such as memory notebooks, can be effective for persons with moderate to severe memory impairment from traumatic brain injury and stroke, but requires much repetition and should be directly applied to functional activities rather than aimed at improving overall memory function. For example, the memory notebook could be used to track medical appointments if the person is directly trained to use it in this way, but it cannot be assumed that the person will generalize that use to track other activities.

## How To Carry Out Memory Interventions in Clinical Practice:

- **Training in use of visual imagery:**<sup>1</sup> There is evidence that persons with brain injury can learn to associate visual images with objects and actions to be remembered. Since people are often unaccustomed to using imagery as a memory aid, it is helpful to begin training by having them practice viewing objects and then holding the image of these objects in their minds after the object has been withdrawn. As a next step, they can draw the object that they have been visualizing. Once they have mastered this phase of imagery, they can be taught to generate images to represent simple actions (e.g., changing a light bulb). The actions can be first shown on videotape, with encouragement for the client to hold the image in their minds and then verbalize or write down the steps involved in the action. As they become more adept at visualizing simple actions, they can progress to visualizing more complex actions (e.g., going to the grocery store and progressing down all aisles, stopping when getting to needed items). During training, it can often help for them to observe a model verbalizing the use of imagery for objects or actions. Gradually, real life action sequences can be visualized to aid recall.
- **Use of paging systems:** Electronic devices, such as palm pilots and pagers, can be used to remind persons with injury to perform certain activities, such as taking medications at a certain time. Persons with injury, or their caregivers, must program the device with the appropriate times and messages. This can often be difficult for persons with injury to do. An alternative is the use of the Yahoo calendar website. This is a free service that can be accessed at [www.calendar.yahoo.com](http://www.calendar.yahoo.com). Someone can type in activities on the calendar and program the calendar to send a message to their cell phones or electronic pagers to remind them of certain activities. Therapists should assist the person with injury to determine the activities and other information that are included in the reminders. For persons with severe cognitive impairment, the therapist should involve a caregiver in determining the activities and reminders to be included.
- **Training in self-regulatory or self-instructional strategies to improve memory:** The use of self-regulatory strategies can help persons with injury to improve memory functioning. These strategies usually involve self-cueing systems. A frequently used strategy is called the WSTC strategy.<sup>2</sup>
  - **W:** What are you going to do?
  - **S:** Select a strategy for the text.
  - **T:** Try out the strategy.
  - **C:** Check out how the strategy is working.



With regard to using a memory notebook, this strategy could be used to teach patients to cue themselves to refer to the notebook before they begin tasks, in order to ensure that they are beginning the correct task at the correct time. The strategy can also be used to help patients prepare to hear material that they need to remember. For example, if they are to be given instructions on how to use an electronic device, they can select a strategy of writing the instructions down, or of asking for repetition and paraphrasing until they understand the instructions. The use of self-instruction strategies should be practiced repeatedly with clients in different situations. Cueing by therapists and/or caregivers to use self-instructional strategies is often necessary, but this cueing can be gradually faded as the skills becomes habitual for the person with injury.

## How To Carry Out Memory Interventions (continued) :

- **Training in use of memory notebooks:** Use of memory notebooks is often problematic for persons with brain injury because they forget to refer to the notebook when needed. Training in the use of memory notebooks should include caregivers as well as the person with injury. Training can work best when conducted in 4 phases.<sup>3,4</sup>
  - **Anticipation:** Raise awareness of memory problems and their implications for daily functioning. Increase interest in possible solutions to memory problems, including demonstrating need for external aids.
  - **Acquisition:** Familiarize the client and family with the contents of the memory notebook and with typical situations in which the memory notebook may prove helpful (e.g., to find lists of tasks to be accomplished on a certain day or to find the date for an upcoming memory appointment). Other external aids, such as alarms, can be used to cue the person to refer to the memory notebook. The cues can be faded over time as use of the notebook becomes habitual. Self-instruction strategies may also be used to train clients to cue themselves to regularly refer to the notebook.
  - **Application:** This phase involves engaging the client in role-playing the use of the notebook in daily situations. For example, use of the notebook to determine what therapies to attend at what times of day can be practiced, first within role-play and then within the actual therapy sessions. To maximize success, all therapy staff should be consistent in cueing the client to refer to their books to find information, such as using the notebook to determine the location of their next treatment session.
  - **Adaptation:** After clients have mastered use of the memory notebook in the therapy setting, the next step is to practice using it in community settings, such as at home or the grocery store. A therapist should initially accompany the client, observe their use of the notebook, and later provide feedback regarding their performance. As the client masters use of the notebook within the community, the therapist can gradually fade their involvement in community outings. Assigning homework on use of the notebook provides an opportunity for regular review to evaluate, provide feedback, and encourage skill development. The homework assignments can be used as a means of modifying the notebook for personal use. In many cases, family members should also be trained in use of the notebook and in how to provide feedback, in order to help further generalize the skill outside of the rehabilitation setting.

### References:

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4. Schmitter-Edgecombe M, Fahy JF, Whelan JP, Long CJ. (1995). Memory remediation after severe closed head injury: Notebook training versus supportive therapy. *Journal of Consulting and Clinical Psychology*, 63(3), 484-489.

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.