

MEMORY - A COMPREHENSIVE APPROACH

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INTRODUCTION

Memory is not a unitary process, and it may be conceptualized in a number of ways depending on the type of information being consolidated or recalled. Regardless of the type of information stored in memory, we find that the memory process involves four sequential, interrelated processes or stages, including:

1. Attending to the information.

2. Encoding, organizing, and maintaining the information in working (short-term) memory.
3. Consolidating or storing information into long-term memory.
4. Retrieval of consolidated information as needed.

When an individual says, "I don't remember," it can reflect impairment in any of these four stages, or a combination of them. For most individuals with mild to moderate brain injury, the disruption is typically at either the attention level, the retrieval level, or both. Individuals with severe brain injury are likely to also suffer consolidation deficits.

HOW IMPORTANT IS MEMORY FOLLOWING BRAIN INJURY?

After a brain injury of any severity, forgetfulness is the most common area of cognitive concern. Many studies report patients' subjective complaints of memory difficulty after brain injury, and these deficits appear to persist. In studies of subjects with severe brain injury, memory deficits were reported in 73% of cases at 3 months post-injury (McKinlay, Brooks, Bond, Martinage & Marshall, 1981); 69% at 12 months (Brooks, Campsie, Symington, Beattie, & McKinley, 1986); 80% at 2.5 years (Thomsen, 1987); 67% at 5 years post-injury; 79% at 7 years (Oddy, Coughlan, Tyerman, & Jenkins, 1985); and 75% at 10-15 years post-injury (Thomsen, 1987).

TREATMENT AND REHABILITATION OF MEMORY DEFICITS

The treatment of memory deficits may be remediation oriented or compensatory in nature. The rehabilitation of memory deficits provided in the *Memory Module*, which is one of several components of the BRAINWAVE-R Rehabilitation Program (Malia, Bewick, Raymond and Bennett, 1997), incorporates an educational and compensatory strategies approach, rather than a pure remediation approach. Memory cannot be directly rehabilitated if it is the result of injury to the diencephalic-hippocampal system critical for consolidation of declarative memory (Bennett, 1991). Memory can, however, be indirectly remediated by improving an individual's pacing, fatigue management, organizational skills, speed and efficiency of information processing, cognitive processing capacity, and attention. The exercises of the *Memory Module* are designed to achieve the following goals:

- To educate the patient about memory processes and memory deficits.
- To provide a comprehensive guide to using compensatory memory strategies and aids.
- To encourage the patient to use memory aids on a daily basis if memory problems persist.

The 51 exercises in the module are divided into 4 sections: Memory strategies, Learning about your memory, Memory practice exercises, and Functional memory exercises.

Weber (1990) stresses the importance of feedback to help patients understand the nature of their problems, learn strategies to overcome the problems and generalize their learning to meaningful everyday life situations. Metacognitive functions (Flavell, 1985) are increasingly recognized as essential components in the study of cognitive processes (Ben-Yishay & Diller, 1993; Bewick, Raymond, Malia & Bennett, 1995). The Memory Module has been designed to incorporate a strong metacognitive component, including the following: An educational component teaching the patient about how memory works and how to use strategies to improve memory functioning; study questions to test acquisition of knowledge; rating charts on which the patient predicts performance and rates actual performance; a performance summary sheet which allows therapist and patient to compare ratings to improve accuracy of prediction and self-evaluation; and ideas to stimulate the patient to determine the relevance and purpose behind each exercise.

The following sequence reflects the structure of tasks in the first two sections of the *Memory Module*, and serves to illustrate how some of the metacognitive components have been included: (*Examples are provided on pages 20 and 21 to further illustrate these components*):

- * The patient predicts how well they will complete the exercise (RATING CHART).
- * The patient reads a written page of information (WORKSHEET).
- * The patient answers written questions about the information on the worksheet (QUESTION SHEET).
- * The patient rates how well they actually did on the exercise (RATING CHART).
- * The patient is given a graphic sheet to take home, which illustrates the main messages from the text (SUMMARY SHEET).
- * The patient completes a cloze procedure task (a fill-in-the-blank format) to reinforce text information during the following session (TEST SHEET).

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EFFICACY OF TREATMENT AND REHABILITATION FOR MEMORY DEFICITS.

A recent well designed study (Berg, Deelman & Koning-Haanstra, 1995), suggests that it is possible to improve functional memory using training aimed at daily life situations, which includes:

- individualized treatment goals
- strategy training
- educational components
- teaching of strategies in real-life situations

It would appear that one of the keys to success is a thorough analysis of the cause and type of memory problems experi-

enced by each patient, so that appropriate training methods can be utilized.

The *Memory Module* from the BRAINWAVE-R Rehabilitation Program provides the therapist with the resources upon which individualized programs can be based. Berg et al (1995) propose 4 phases in the treatment of memory problems following brain injury. The *Memory Module* takes this further and recommends 6 phases:

- Phase 1. Gather and review all pertinent medical records regarding the patient's memory problems.
- Phase 2. Complete a detailed interview with the patient to determine when, how and why the specific memory problems occur.
- Phase 3. Complete a formal neuropsychological evaluation to determine the specific strengths and weaknesses (i.e. memory deficits).
- Phase 4. Select the most applicable memory strategies from the patient workbook, and the most applicable exercises from the second section (Learning about your memory). These should include metacognitive components (i.e. self-monitoring and self-evaluation).
- Phase 5. Demonstrate the use of the strategies. It may be appropriate to use some of the exercises contained in the third section of the *Memory Module* (Memory Practice Exercises).
- Phase 6. Encourage the patient to use the strategies in real-life situations. It may be appropriate to use some of the exercises contained in the fourth section of the *Memory Module* (Functional Memory Exercises).

It is also important to involve family members in all phases of this treatment model, in order to promote use of strategies in real-life situations. The involvement of the family should include education about the memory deficits, prognosis, implications of deficits, and what can be done to ensure adequate use of the recommended strategies.

A treatment program that encompasses all of the area described, can play a significant role in enhancing the learning/memory process for the brain injured individual.

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