



## From coma to courtroom: a lawyer's journey to recovery from severe TBI after a snowboard accident

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Conor's journey began February 7, 2009. He had been snowboarding with a friend when he suffered a severe traumatic brain injury (TBI). This paper tells part of Conor's ongoing recovery story. It also discusses the use of Brainwave-R (Malia, Bewick, Raymond and Bennett, 2002), a comprehensive cognitive rehabilitation program that has facilitated Conor's recovery. The assessments, goals and therapy described here formed part of his broader multidisciplinary outpatient rehabilitation. For the purpose of this paper, other aspects have had to be omitted.

### Background about Conor

Conor, a middle-aged lawyer, sustained a severe TBI while snowboarding. His Glasgow Coma Scale was three at the scene. He lost consciousness for two weeks and suffered significant post-traumatic amnesia for seven weeks. Conor's CT and MRI revealed diffuse, mostly microtrauma to the brain, subdural hematoma and some bleeding into ventricles. Conor initially presented with significant language and cognitive impairments.

The following section focuses on Conor's cognitive rehabilitation four months post injury. Cognitive deficits identified included moderate impairment across the following areas: attention (sustained, alternating, selective and divided), memory (short-term, verbal and prospective), and executive skills (planning, organization and higher-level problem solving). At that time, Conor was not spontaneously using any compensatory strategies.

### Brainwave-R Cognitive Rehabilitation Program

Brainwave-R is a comprehensive cognitive rehabilitation program that is divided into five hierarchically graded modules: attention, memory, visual processing, information processing, and executive functions. It comprises four critical components that are integrated during therapy:

1. Education
2. Process Training
3. Compensatory Strategy Training
4. Functional Activity Training

The overall aim is to maximize the development of functional skills through combination of the aforementioned components.

### Use of Brainwave-R with Conor

In line with Brainwave-R principles, impairment-based long-term and functional short-term goals were generated based on prior assessment, diagnostic therapy and detailed self-rating questionnaires (reference) completed separately by Conor and his father. The following section discusses a selection of Conor's goals followed by discussion of part of Conor's cognitive rehabilitation.

### Impairment-based long-term goals:

1. Conor will demonstrate improved cognitive abilities in the context of functional day-to-day activities and for the purpose of returning to work. Following cognitive rehabilitation, Conor will have mild impairment across the following areas.

- Sustained, alternating, selective and divided attention.
- Short-term memory (especially delayed recall).
- Verbal and prospective memory.
- Executive skills (i.e. planning, organization and higher-level problem solving) to manage home and work life.
- Visual processing (reading accuracy).

Time line: three months for attention and memory, and five months for executive skills.

2. Conor will demonstrate understanding and use of cognitive strategies during functional everyday activities and for the purpose of returning to work.

Time line: three months for attention and memory, and five months for executive skills.

### Selection of Conor's short-term goals:

1. Conor will successfully remember past day-to-day activities and events and future appointments. He will also remember to bring important items when leaving the house (keys, wallet, etc.).

2. Conor will successfully recall names of neighbours, his children's teachers and his colleagues.

3. Conor will return to work on a gradual basis; he will successfully incorporate cognitive and executive strategies into his work day (e.g. making notes, planning, prioritizing, and reviewing).

### Conor's Cognitive Rehabilitation

#### Education

In line with Brainwave-R principles, education was provided in a "drip-feed" manner throughout Conor's rehabilitation and was integrated with other Brainwave-R components. For example, memory education was followed by memory process training, which in turn formed the basis for discussion of memory and executive strategies. Effective strategies were then incorporated into functional activity training.

#### Process Training

Initially, attention and memory were targeted (in conjunction with some work on executive strategies). Rationale: 1) Work on underlying skills (attention) would help to improve other areas of function. 2) Memory was one of the most significantly affected areas. 3) Any functional benefit from this program and consideration of return to work would require Conor to remember information.

#### Visual Processing and Executive Strategy Process Training

Rationale: 1) Reading accuracy (i.e. decoding) and speed of visual processing are critical for ensuring reading comprehension (Conor is required to read long and complex legal documents at work and also enjoys reading for pleasure).

2) The ability to plan, organize and prioritize information is critical for organizing one's day to day activities and, even more so, for successful return to work.



### Cognitive Strategies

Convincing Conor of the value of cognitive strategies was challenging, as he reportedly easily remembered things prior to his accident. The convincing happened in several stages and was a gradual process. First challenge: Convince Conor that the use of strategies is normal. Second challenge: Encourage Conor to use memory strategies and integrate them into his life (see cognitive strategy generalization section below).

### Functional Activities

Ultimately, therapy can only be judged as successful if functional change is achieved. As noted above, Brainwave-R aims to effect functional change through integration of all four components. Conor's goal was to return to work. The biggest obstacles were his memory and compromised executive skills. Tasks were developed that would allow Conor to put his strategies to the test while working towards his functional goals (see above). The following section provides a selection of these tasks.

### Conclusion

Conor has been back at work on a gradual return to work program since October. Ongoing challenges at work include slowed reading speed, not taking on too much too quickly and fatigue. Conor has delayed his first professional court appearance until next year due to high-level expressive language issues that are currently being targeted. He will also benefit from further reinforcement of his memory strategies.

Why did Brainwave-R work? It provided hierarchically organized, concrete tasks with clear goals that could be introduced during the session and then given for homework (see Malia, et al., 2002). Grading was easy and provided an excellent outcome measure that facilitated Conor's sense of control. The feedback provided him a sense of control. Discussion of task performance helped Conor to develop self-awareness of his difficulties.

Some of the drawbacks included the significant amount of time required for photocopying materials (no CD included), the absence of a key and physical separation of therapist and client workbook in the attention module, which increased preparation time. A 'helper' was not always available to complete homework. Tasks were continuously modified to challenge Conor sufficiently (e.g. by presenting materials at faster rate, for longer periods of time or by adding background noise). Task adjustment based on the specific client's ability is an essential part of this program. An additional challenge was to continuously generate functional activities that would allow Conor to put his strategies to the test in a meaningful way, although this was also one of the most satisfying aspects of the therapy (e.g. friends' questionnaire).

Overall, Brainwave-R provided an excellent framework as a basis for Conor's therapy. It has been a true inspiration and a tremendous learning experience working with Conor and his highly supportive family: Conor's high motivation, perseverance and work ethic ("I cannot go to bed if I have homework outstanding") are unique and have driven his recovery to such a high level.

### REFERENCES

Malia, Bewick, Raymond and Bennett (2002). *Brainwave-R: Cognitive Strategies and Techniques for Brain Injury Rehabilitation*. Austin: Pro-ed.

Nebenzahl, D.: "Getting the most out of your workday means setting priorities and establishing routines." Vancouver Sun: October 3, 2009.

## FOCUS ON ACQUIRED BRAIN INJURY: ISSUES AND IMPACTS

### New Brunswick universal newborn and infant hearing screening program

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New Brunswick was one of the original Canadian jurisdictions to implement universal newborn infant hearing screenings. This program was the brain child of the late Margaret Christie who was a consultant in audiology for the New Brunswick's Department of Health at the time. It has been operational in all regional health authorities since December 2002. The drive and guidance for implementation and ongoing operation of the New Brunswick Universal Infant Hearing Screening Program (NBUNIHSP) has been provided by an advisory committee made up of front-line audiologists responsible for providing these services within each regional health authority. Since inception of the UNIHSP, there have been ongoing meetings, training and collaboration at both the provincial and professional levels to ensure uniformity. Recognizing the increased responsibilities associated with providing these services, the government increased human resources for each regional service in 2005 by funding support personnel dedicated to the provision of services associated with the NBUNIHSP. In New Brunswick, screening of infants for hearing loss is provided in hospitals. There are approximately 7,000 to 7,500 births every year in 12 birthing centers. The screening rate is approximately 96 per cent. Local passing rate data is collected as part of the general data collection process and submitted to the province's Department of Health for compilation and monitoring.

In the NBUNIHSP, the hearing screening component is a two-level automated distortion product otoacoustic emission (ADPOAE) and automated auditory brainstem response (AABR) procedure (compulsory dual for all neonatal intensive care unit infants). This two-level screening program is designed to achieve as low a false positive rate as possible, ideally less than 4 per cent, once the process is completed. Babies who receive a "refer" or a "no result" result from a Level 1 screening have a repeat ADPOAE or AABR screening whenever possible within 24 hours or before discharge from hospital. This reduces the rate of referrals to audiology. The initial screening (Level 1) is most frequently provided through nursing and support personnel. Level 2 screenings are conducted by support personnel and audiologists. Any newborn requiring further audiologic investigation is referred to an audiologist for follow-up services. The average age of identification of hearing loss and fitting, where appropriate, in young children in New Brunswick via the UNIHSP is less than 6 months of age.

The second part of this process includes the completion of a high risk monitoring registry. Newborns at risk for late onset hearing loss and progressive hearing loss are monitored on an ongoing basis through regular access to the nearest audiology department. Public health nurses, maternity nurses, or First Nations health program nurses complete questions pertaining to hearing screening risk factors for late onset of hearing loss and progressive hearing loss, as part of their