

# The Role of Physical Therapy in Patients with Disorders of Consciousness

Jennifer Fernandez PT, DPT, NCS, PCS and Hannah Foster PT, DPT, NCS

## FACT SHEET



Physical therapists have long been recognized as having a beneficial role in the recovery of patients following brain injuries, particularly in the areas of motor control, gait, and balance. Less recognized is the role physical therapy can play in patients with more severe brain injuries, particularly those with disorders of consciousness (DOC). These disorders of consciousness include coma (Rancho I), vegetative state (Rancho II), and minimally conscious state (Rancho III). The defining clinical feature of a coma is the absence of sleep-wake cycles and complete loss of arousal<sup>1</sup>. The eyes remain closed and there is no motor function other than primitive reflexes. Patients who are in a vegetative state are in a state of wakeful unconsciousness. The defining clinical feature of the vegetative state is intermittent periods of wakefulness with spontaneous eye-opening, despite the continued absence of any evidence of language comprehension, verbal or gestural communication, or purposeful responses to stimuli<sup>1</sup>. The emergence into a minimally conscious state is characterized by minimal but definite behavioral evidence of self or environmental awareness. The patient remains in a state of severely altered consciousness with intermittent periods of wakefulness with inconsistent following of one-step commands and the ability to localize noxious stimuli<sup>1</sup>. These patients also demonstrate (though inconsistently) automatic movement sequences, visual tracking, object recognition and object manipulation.

The purpose of this paper is to highlight the evidence to support the various roles physical therapy may have as part of the treatment team for a patient following severe brain injury who demonstrate a DOC.

### **Prevention**

Patients with prolonged intensive care unit (ICU) stays are known to be at risk for many secondary complications due to prolonged inactivity and new onset of neurologic deficits. Therapeutic intervention in the ICU has been shown to reduce total length of stay, overall time to recovery, and development of hospital complications, such as pneumonia and deep vein thrombosis<sup>2</sup>. Specific to patients with DOC, these secondary effects often continue to be a burden throughout rehabilitation, increasing rates of readmission and reducing the effectiveness of long term rehab due to physiologic changes that have occurred as a result of a period of immobility<sup>3</sup>. Moreover, several studies have examined the effects of early mobilization for patients with and without severe brain involvement and found that there were no adverse effects to mobilizing patients as soon as they were medically stable<sup>2,4-5</sup>. Therefore, physical therapy should be involved early and aggressively in patients following traumatic brain injury.



1111 North Fairfax Street  
Alexandria, VA 22314-1488

Phone: 800-999-2782,  
Ext 3237

Fax: 703-706-8578

Email: [neuropt@apta.org](mailto:neuropt@apta.org)  
[www.neuropt.org](http://www.neuropt.org)

## Physical Therapy in Disorders of Consciousness



### Assessment

Patients with DOC are misdiagnosed at rates often exceeding 40%<sup>6-7</sup>. One of the most commonly cited reasons for this error is the lack of prolonged, structured assessment. Following a severe traumatic brain injury, activity is often inconsistent or sleep wake cycles have been disrupted, and behaviors may be occurring at a time when everyone else is asleep. Motor control is another commonly recognized reason for misdiagnosis<sup>3</sup>. If motor planning or motor control is impaired, patients may not be able to form a recognizable response to the medical team. As physical therapists, we have long recognized the need to first focus on automaticity in tasks before working to refine the behavior with regard to motor recovery. Applying this principle to patients with DOC may allow patients to harness motor activity for purposeful tasks which can then be carried over to other areas of assessment.

### Recovery

Finally, in patients following severe TBI, exercise has been shown to induce neurocognitive function improvements and upregulation of cellular components responsible for brain function and recovery<sup>8</sup>. While little is known about the direct effects of exercise-induced changes in patients with DOC, there is substantial evidence that the factors upregulated by exercise have been shown to have a role in brain recovery post injury. Moreover, when introduced synthetically, these factors are not as valuable as when the body produces them directly.

### References

1. Giacino JT, et al. (2014). Disorders of consciousness after acquired brain injury: the state of the science. *Nature Reviews Neurology*; 10: 99-114.
2. Clark DE, et al. (2012). Effectiveness of an early mobilization protocol in trauma and burns intensive care unit: a retrospective cohort study. *Physical Therapy*; 93(2): 186-196.
3. Whyte J & R Nakase-Richardson. (2013). Disorders of consciousness: outcomes, comorbidities, and care needs. *Archives of Physical Medicine and Rehabilitation*; 94: 1851-1854.
4. Engels PT et al. (2013). Physical Rehabilitation of the critically ill trauma patient in the ICU. *Critical Care Medicine*; 41(7): 1790-1801.
5. Diserens K et al. (2011). Early mobilization out of bed after ischaemic stroke reduces severe complications but not cerebral blood flow: a randomized controlled pilot trial. *Clinical Rehabilitation*; 26(5): 451-459.
6. Schnakers, C et al. (2009). Diagnostic accuracy of the vegetative and minimally conscious state: clinical consensus versus standardized neurobehavioral assessment.
7. Whyte J et al. (2013). Functional outcomes in traumatic disorders of consciousness: 5-year outcomes from the national institute on disability and rehabilitation research traumatic brain injury model systems. *Archives of Physical Medicine and Rehabilitation*; 94: 1855-1860.
8. Fogelman D & R Zafonte. (2012). Exercise to enhance neurocognitive function after traumatic brain injury. *Physical Medicine and Rehabilitation*; 4: 908-913.



1111 North Fairfax Street  
 Alexandria, VA 22314-1488  
 Phone: 800-999-2782,  
 Ext 3237  
 Fax: 703-706-8578  
 Email: neuropt@apta.org  
 www.neuropt.org