

# Understanding TBI

## Part 3: The Recovery Process

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### Common stages

In the first few weeks after a brain injury, swelling, bleeding or changes in brain chemistry often affect the function of healthy brain tissue. The injured person's eyes may remain closed, and the person may not show signs of awareness. As swelling decreases and blood flow and brain chemistry improve, brain function usually improves. With time, the person's eyes may open, sleep-wake cycles may begin, and the injured person may follow commands, respond to family members, and speak. Some terms that might be used in these early stages of recovery are:

- **Coma:** The person is unconscious, does not respond to visual stimulation or sounds, and is unable to communicate or show emotional responses.
- **Vegetative State:** The person has sleep-wake cycles, and startles or briefly orients to visual stimulation and sounds.
- **Minimally Conscious State:** The person is partially conscious, knows where sounds and visual stimulation are coming from, reaches for objects, responds to commands now and then, can vocalize at times, and shows emotion<sup>1</sup>

A period of confusion and disorientation often follows a TBI. A person's ability to pay attention and learn stops, and agitation, nervousness, restlessness or frustration may appear. Sleeping patterns may be disrupted. The person may overreact to stimulation and become physically aggressive. This stage can be disturbing for family because the person behaves so uncharacteristically.

Inconsistent behavior is also common. Some days are better than others. For example, a person may begin to follow a command (lift your leg, squeeze my finger) and then not do so again for a time. This stage of recovery may last days or even weeks for some. In this stage of recovery, try not to become anxious about inconsistent signs of progress. Ups and downs are normal.

Later stages of recovery can bring increased brain and physical function. The person's ability to respond may improve gradually.

<sup>1</sup> Giacino, et al. The minimally conscious state: definition and diagnostic criteria. *Neurology*. 2002 Feb 12;58(3):349-53.

## Length of recovery

The fastest improvement happens in about the first six months after injury. During this time, the injured person will likely show many improvements and may seem to be steadily getting better. The person continues to improve between six months and two years after injury, but this varies for different people and may not happen as fast as the first six months. Improvements slow down substantially after two years but may still occur many years after injury. Most people continue to have some problems, although they may not be as bad as they were early after injury. Rate of improvement varies from person to person.

## Long-term impacts

It is common and understandable for family members to have many questions about the long-term effects of the brain injury on the injured person's ability to function in the future. Unfortunately, it is difficult to determine the long-term effects for many reasons.

- First, brain injury is a relatively new area of treatment and research. We have only begun to understand the long-term effects in patients one, five, and ten years after injury.
- Brain scans and other tests are not always able to show the extent of the injury, so it is sometimes difficult early on to fully understand how serious the injury is.
- The type of brain injury and extent of secondary problems such as brain swelling varies a great deal from person to person.
- Age and pre-injury abilities also affect how well a person will recover.

We do know that the more severe the injury the less likely the person will fully recover. The length of time a person remains in a coma and duration of loss of memory (amnesia) following the coma are useful in predicting how well a person will recover.

The Rancho Los Amigos Levels of Cognitive Functioning (RLCF) is one of the best and most widely used ways of describing recovery from

brain injury. The RLCF describes ten levels of cognitive (thinking) recovery. Research has shown that the speed at which a person progresses through the levels of the RLCF can predict how fully a person will recover.

## The Rancho Los Amigos Levels of Cognitive Functioning

Level 1 — No Response: Person appears to be in a deep sleep.

Level 2 — Generalized Response: Person reacts inconsistently and not directly in response to stimuli.

Level 3 — Localized Response: Person reacts inconsistently and directly to stimuli.

Level 4 — Confused/Agitated: Person is extremely agitated and confused.

Level 5 — Confused-Inappropriate/Non-agitated: Person is confused and responses to commands are inaccurate.

Level 6 — Confused-Appropriate: Person is confused and responds accurately to commands.

Level 7 — Automatic-Appropriate: Person can go through daily routine with minimal to no confusion.

Level 8 — Purposeful-Appropriate: Person has functioning memory, and is aware of and responsive to their environment.

Level 9 — Purposeful-Appropriate: Person can go through daily routine while aware of need for stand by assistance.

Level 10 — Purposeful-Appropriate/Modified Independent: Person can go through daily routine but may require more time or compensatory strategies.

## Recovery two years after brain injury

Based on information of people with moderate to severe TBI who received acute medical care and inpatient rehabilitation services at a TBI Model System, two years post-injury:

- Most people continue to show decreases in disability.
- 34% of people required some level of supervision during the day and/or night.
- 93% of people are living in a private residence.
- 34% are living with their spouse or significant other; 29% are living with their parents.
- 33% are employed; 29% are unemployed; 26% are retired due to any reason; and 3% are students.

## More in the Understanding TBI series

- Understanding TBI, Part 1: What happens to the brain during injury and in early stage of recovery from TBI?
- Understanding TBI, Part 2: Brain injury impact on individuals' functioning
- Understanding TBI, Part 4: The impact of a recent TBI on family members and what they can do to help with recovery

### Source

Our health information content is based on research evidence and/or professional consensus and has been reviewed and approved by an editorial team of experts from the TBI Model Systems.

### Authorship

*Understanding TBI* was developed by Thomas Novack, PhD and Tamara Bushnik, PhD in collaboration with the Model System Knowledge Translation Center. Portions of this document were adapted from materials developed by the Mayo Clinic TBIMS, Baylor Institute for Rehabilitation, and from *Picking up the pieces after TBI: A guide for Family Members*, by Angelle M. Sander, PhD, Baylor College of Medicine (2002).