

Traumatic Brain Injury

Early Care and Hospitalization Family Guide



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Introduction

The purpose of this booklet is to provide you with information to help you understand traumatic brain injury (TBI), how the brain works and some of the medical care that your loved one will receive. Use this booklet as a guide, but continue to ask questions of your loved one's treatment team. They are here to help both you and your loved one through this journey.

What Does It Mean That My Loved One Has a Traumatic Brain Injury?

A TBI is an injury to the brain that can cause a variety of physical and cognitive difficulties. The brain controls everything we do, including breathing, sensation, movement, emotions and thinking. Trauma from an external force, such as hitting the head against something, can result in bruising, bleeding, twisting or tearing of the brain, leading to damage.

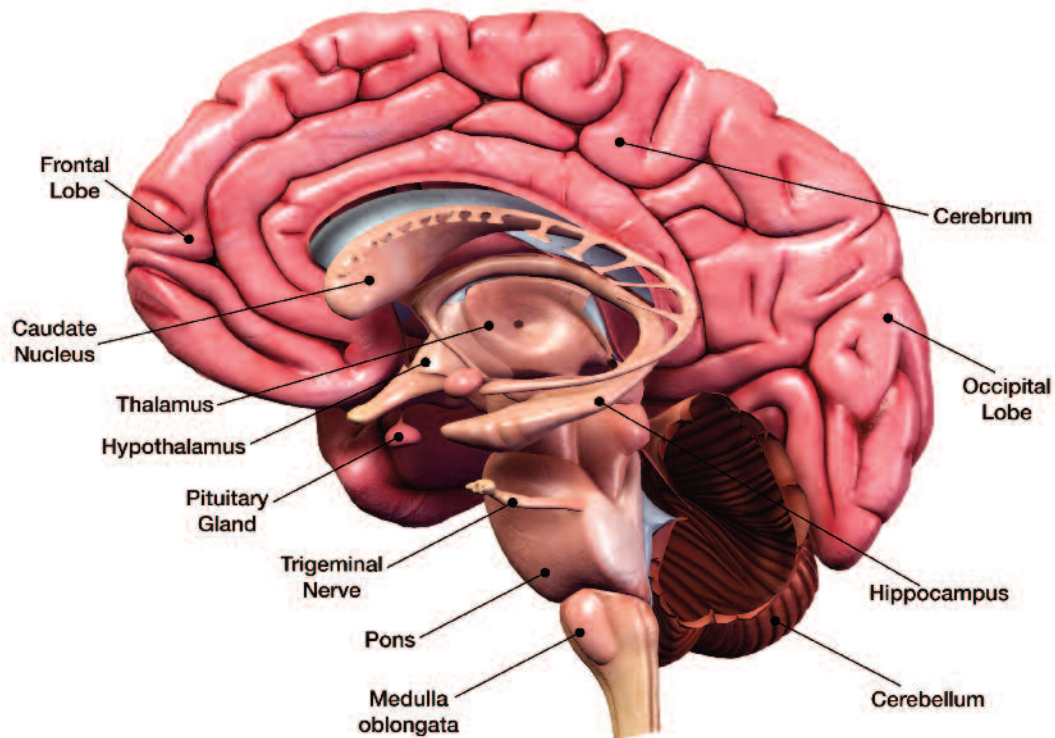
How Serious Is a Traumatic Brain Injury?

Every brain injury is different, and the severity of a TBI can vary from very mild to severe. Your treatment team will provide you with ongoing information during hospitalization. A mild traumatic brain injury usually means that a person will have a good recovery over time and may cause no or very minimal disruption to normal activities. A moderate to severe injury will likely result in some long-term change in functioning but the degree and type of difficulties cannot be predicted during the early stages of injury. They will become more apparent over time.

What Can I Do to Help My Loved One?

Follow the recommendation of the treatment team to remain hopeful and positive. Read this booklet and learn all you can about your loved one's needs so that you can help them improve over time. Please talk to your loved one's treatment team members about any questions or concerns you have.





Types of Brain Injuries

Traumatic brain injuries occur with accidents or physical assaults that result in a forceful blow, or trauma, to the head. Injury to the brain can occur in other ways, such as from a stroke, lack of oxygen, infections, brain tumors, overdose from medications and more. This booklet is for people with traumatic brain injuries: brain injuries occurring from a blow to the head.

The changes that occur after brain injury depend on the severity, type and location of the damage in the brain. The brain works as a system; no part of the brain operates independently. Therefore, injury to one area of the brain often affects functions in many areas. Communication across different parts of the brain is essential for all bodily functions. In general, when one part of the brain fails to work properly, other parts may slowly compensate for that loss. Recovery following a brain injury can take a long time and may be partial or complete. This section describes different types of TBIs.

Skull Fracture

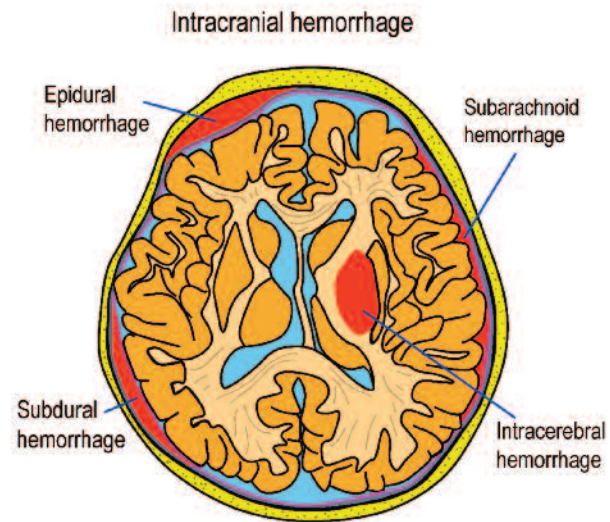
- A strong blow to the head can cause bones of the skull to break.
- Sometimes injury results in a crack in the skull without movement or displacement of the bone. This is referred to as a “nondisplaced” fracture of the skull. These fractures usually heal on their own.
- A more serious fracture results when pieces of skull are moved out of place and then press against brain tissue. This type of skull fracture usually requires corrective surgery.

Contusions

- A contusion is bruising of brain tissue.
- Tissue damage and bleeding associated with a contusion can be serious and multiple contusions may result in life-threatening brain swelling.
- Symptoms vary depending on the location of the brain contusions. They may include problems with weakness, numbness, coordination, balance, vision, cognition and emotional control.
- Contusions can occur under the skull fracture or because of a blow to the head that causes the brain to shift and bounce against the skull.

Hematomas

- A hematoma is an abnormal collection of blood outside of a blood vessel. Bleeding in the brain can be caused by a strong blow to the head that damaged or torn blood vessels surrounding the brain or within the brain itself. This may lead to heavier bleeding, or hemorrhage.
- The type of hematoma is typically defined by where it occurs in the brain.
 - > **Epidural hematoma:** Bleeding occurs between the skull and the outermost layer of the brain called the dura matter. Epidural hematomas occur most frequently at the same time as the skull fracture on the side of the head over the temporal lobe. Although the underlying brain may not have been damaged initially, the increased pressure on the brain from the bleeding can lead to further brain injury.
 - > **Subdural hematoma:** Bleeding occurs between the outermost layer (the dura matter) and the underlying membranes covering the brain itself. Subdural hematomas often occur with direct damage to the brain and may produce symptoms immediately (acute) or gradually (chronic) as blood seeps out of torn vessels.
 - > **Intercerebral hematoma:** Bleeding that occurs directly within the brain tissue and may lead to a blood clot within the brain itself. These are usually caused from penetrating wounds or from blood vessels rupturing.
- Typically the neurosurgeon can remove subdural and epidural hematomas and stop the bleeding. This may not be possible in all cases. A blood clot deep within the brain may not be treatable with surgery.



Hemorrhages

- A brain hemorrhage is bleeding that occurs within the brain when blood escapes from a torn blood vessel. Again, the location in the brain where the bleeding occurs helps define it.
 - > **Intracerebral hemorrhage:** Bleeding deep in the center of the brain, which may form a clot or intercerebral hematoma. Surgery may be needed to relieve intracranial pressure but only if the location in the brain is safe for surgery.
 - > **Subarachnoid hemorrhage:** Bleeding into one of the spaces covering the brain.

Cerebrospinal Fluid (CSF) Leak

- Injury that allows the liquid around the brain and spinal cord (known as cerebrospinal fluid) to leak from the nose or ears. This may make the patient more at risk for a brain infection.

Increased Intracranial Pressure

- The skull houses the brain, cerebrospinal fluid (CSF) and blood. After a brain injury, the skull may overfill with swollen brain tissue, blood or CSF. The skull does not stretch, so there is increased pressure on brain tissue. This is called increased intracranial pressure.

- To decrease intracranial pressure, surgeons may try to remove the hematomas. They may also carefully monitor the signs and symptoms of increased pressure in the brain, such as decreased alertness and drowsiness.
- In some cases, the physician may make the decision to insert a special device beneath the skull to monitor pressure. This helps them determine if there are abnormally high pressures early on and quickly treat these issues.
- Other methods may also be used to manage intracranial pressure, including certain medications or controlled fast breathing (hyperventilation), which involves the use of a respirator to increase breathing rate. This reduces carbon dioxide in the blood.

Seizures

- After a TBI, some patients experience a seizure or convulsions. This indicates irritation or injury to certain areas of the brain that interfere with normal communication patterns and transmission of information between brain cells. Prolonged uncontrolled seizures can further damage the brain. Medications are typically used to prevent, manage or control them.
- The most common type of seizure causes the patient to have jerking motions of the arms and legs, followed by a period of deep sleep. Other types of seizures may cause slight tremors of the face, or the patient may simply have a “staring spell.” Some patients may have a seizure immediately after their brain injury. Others may develop seizure activity several days or weeks after the initial injury.

Anoxia

- Lack of oxygen to the brain is referred to as anoxia. Because blood carries oxygen throughout the body, any interference in circulation can decrease the oxygen supply to vital organs. For example, if the heart stops, the oxygen supply to the brain also stops. Drowning, or other accidents that can cause severe blood loss, can also result in anoxia.

Diffuse Axonal Injury (Shearing)

- Damage in pathways that connect different areas of the brain is called diffuse axonal injury or shearing. This occurs when there is twisting and or tearing of brain tissue at the time of injury. Messages to the brain are slowed or lost.

Storming

- A disturbance of the autonomic nervous system, which may include changes in heart rate, blood pressure, or temperature, is called storming. The patient may sweat a lot and appear flushed. Abnormal stiffening of extremities (posturing) may be part of the storming.



Who Will Care for My Loved One and What Might I Expect to See in the Room?

A team of health care professionals will take care of your loved one. The team leader (either the trauma surgeon or the neurosurgeon) will follow your loved in the intensive care unit (ICU) and on the floor until the patient is ready for discharge home or to inpatient rehabilitation.

Neurosurgeons and trauma surgeons are experts in the brain. They are the best people to answer questions about what is happening with the brain, interpreting the results of pictures of the brain and the recovery process during the acute stages of brain injury.

Depending on the patient's injuries, other specialty physicians may be involved.

- An orthopedic surgeon if there are broken bones
- An ENT physician if there are facial injuries to the ear, nose or throat
- A plastic surgeon if skin is burned or reconstruction is needed



The trauma surgeon or the neurosurgeon will determine whether other physicians are needed to help care for your loved one.

While nurses will be at the bedside every day, the nurse may change from day to day. The nurses communicate with each other, both in writing and by talking, to report on the patient's progress. ICU nurses specialize in caring for critically injured patients and can answer most questions. If they cannot answer a question, they will know who to call. In the ICU setting, each nurse typically provides care for one or two patients. Once your loved one improves, they may move to the stepdown unit, where each nurse cares for three to four patients at a time. Nurses on the regular hospital floor each care for six to eight patients at a time.

Rehabilitation therapists, such as physical therapists, occupational therapists and speech-language pathologists, will begin to

see your loved one once they are medically stable and able to participate in therapy. Often, this will start in the ICU setting. Research has shown that the earlier the rehabilitation process begins, the better outcome for your loved one. An Admissions representative from WakeMed Rehabilitation Hospital will start following your loved one's progress to facilitate transfer to inpatient rehabilitation or the most appropriate level of care.

Neuropsychologists, doctors who specialize in working with people who have had an injury to their brain, are also involved early on in the care of patients with TBIs. They understand how the brain may function differently after an injury and assess whether thinking skills, behavior and emotions are impacted.

Chaplain services and case managers may be involved as well. A chaplain is available 24 hours a day to provide emotional support for you and your loved one. A case manager or social worker will help with financial issues and discharge plans.

How Are Brain Injuries Evaluated?

When your loved one enters the Emergency Department, a team of physicians, nurses and technicians quickly assess their condition. These assessments may include:

Neurologic Exam – The doctor performs a series of questions and simple commands to evaluate the patient’s speech, eye and body movements, as well as their awareness of place and time of day. Certain specialized scales and terminology describe a patient’s level of functioning. In the early phases, both in the Emergency Department and the intensive care unit (ICU); the staff will use the Glasgow Coma Scale (GCS). This rating ranges from 3 (the most severely impaired) to 15 (the most “intact”). This exam will be repeated frequently by physicians and nurses throughout the hospital stay. Some questions include: Do you know where you are? What day is it? Do you recognize

your loved one? For children, evaluation is based on where a child should be normally in their development. A very young child might be assessed for movements, cries or sounds that they normally make, while an older child might be able to answer questions. The patient’s parents and caregivers are important in helping the staff assess “normal” behavior for their child because each child develops differently.

CT Scan (CAT Scan) – A CT Scan is an X-ray that takes pictures of the brain and other body parts to determine the extent of internal injury. This captures “one picture in time” and often has to be repeated. The scan is painless and takes 5-10 minutes to complete.

MRI (Magnetic Resonance Imaging) Scan – During an MRI scan, a large magnet and radio waves are used to take pictures of body tissues when more detail is needed, or when a CT scan does not show the full extent of the injury. This scan is painless and may take up to 60 minutes.



Angiogram – a test that examines the blood vessels of the brain. Dye is put through a vein to show the structures that carry blood through tissues and organs to determine whether there is an injury or spasm. The test takes about one hour.

Electroencephalograph (EEG) – a test during which special patches, called electrodes, are applied to the head to measure electrical activity in the brain. The test is painless and can be performed at the bedside. The length of time to do the test varies.

How Are Brain Injuries Treated?

Early and thorough assessments help guide appropriate medical management of TBI. The initial goal is to prevent further damage by minimizing potential complications. For emergency staff, the primary goal is to maintain proper oxygen supply to the brain and other vital organs. The staff will also assess and treat other injuries that may cause loss of blood, which may lead to complications. The trauma team will try to obtain details about how the injury occurred either from emergency personnel, families or observers at the scene of the injury or in the emergency department.

Proper assessment of how an injury occurred helps doctors determine the extent and type of damage. It also helps them determine the best treatment for the patient. The first few minutes and hours after an injury is often difficult for families and close friends, but doctors and nurses must first stabilize and assess the patient and begin treatment before they can offer information and answer questions about the patient.

Rehabilitation starts from the first day of admission. Members of the hospital team (nurses, speech, physical and occupational therapists, dietitians, social workers, trauma physicians, neuropsychologists, child life specialists and chaplains) will work together with patients and their families during the hospital stay. Care will be centered on the individual needs of the patient. Family and friends are an integral part of this team.

Initial treatment goals for brain injury may be:

- Control intracranial bleeding.
- Prevent increases in intracranial pressure (ICP).
- Control the amount of pressure when it does increase.
- Remove any blood clots.

Common Treatments

Treatments will vary with the type of injury. The doctor will decide which treatment options are recommended and discuss them with you. These may include but are not limited to:

Positioning – the head of the bed usually is kept slightly elevated with the neck kept straight. This position is best for a head injury because it helps decrease intracranial pressure by using gravity to drain blood and cerebrospinal fluid (CSF) from the brain. We ask that you do not change the position of the bed without asking the nurse first. Following brain injury, the messages from the brain to the body sometimes do not result in “normal” body movement. There is a condition called posturing which is sometimes seen in brain-injured patients. This condition causes the arms to be drawn toward the chest or extended downward and stiff. The patient’s legs might also be extended and stiff. Positioning does not change the body’s posture in these cases. A patient’s brain has to recover to correct posturing.

Ventilator Support – a ventilator (also called a respirator) is used to help a patient breathe by moving oxygen into their lungs. A ventilator may do all of the breathing for the patient or may just give extra breaths when needed. This causes the blood vessels in the brain to constrict (become smaller), which may help control intracranial (inside the skull) pressure. The ventilator is connected to the patient by the endotracheal tube in the patient’s mouth or nose.

Cardiac Monitor – This machine tracks the patient’s heart rate, blood pressure and oxygen level.

Intracranial Pressure Monitor – the ICP monitor, or bolt, consists of a small tube placed through a hole in the skull to measure brain pressure. The placement takes 30 minutes to one hour at the bedside. This monitor may stay in place for two to five days or until the patient’s intracranial pressures are normal. Pressure readings can be obtained constantly by the staff.

Ventriculostomy – A procedure to place a small catheter in the ventricle (fluid-filled central area) of the brain. The catheter is connected to a drainage bag. It serves two purposes: 1) to measure intracranial pressure and 2) to drain cerebrospinal fluid (CSF). Brain pressure changes can be seen and treated quickly. Some CSF is drained out of the brain to help control the intracranial pressure. A ventriculostomy is done at the bedside and takes about one hour. The catheter stays in place for up to 5 days. The patient will be given pain medication and sedation prior to the procedure.

Endotracheal Tube – A tube is placed in the windpipe (or trachea) through the nose or mouth. Patients with severe brain injuries may not breathe deeply and may have trouble clearing their air passages. This may be due to injury or swelling in the area of the brain that controls breathing. In these cases, an endotracheal tube can keep the airway open. If breathing must be controlled or monitored for more than a few days the patient may need a tracheotomy, which is an opening directly to the windpipe. A tracheotomy can be easier to manage and prevents irritation to the nose and throat caused by an endotracheal tube.

Nasogastric Tube (NG) – A temporary tube that runs from the nose to the stomach to remove stomach contents. Later, this tube may be used to feed the patient. Initially, the patient will be fed a liquid diet, either through this tube or through special feedings in their vein. As patients recover, they are assessed to see if they can swallow and eat. They may be restricted to special diets with thick liquids to decrease the risk of aspiration – foods going into their lungs.

Intravenous Line (IV) – A temporary tube placed in a patient's vein, either in the arms, neck or chest area, to allow fluids, medications and/or blood to be administered.

Arterial Line – A tube placed in the patient's artery to constantly monitor blood pressure and allow frequent blood draws. This line prevents the need for frequent needle sticks.

Central Line – An intravenous (IV) line that goes into a large blood vessel near the center of the body. The central line is usually placed in the chest area and is used for giving medications, fluids, IV nutrition and drawing blood.

Cervical Collar – A device that helps keep the neck straight during patient care/movement until the patient is more stable.

Chest Tube – A catheter placed between the ribs into the space between the lung and the chest wall to remove air or fluid, allowing the lung to re-expand.

Foley Catheter – A tube placed into the patient's bladder to automatically drain urine and monitor body fluids.

Anti-Embolism Stockings and Compression Devices – Long white stockings used to reduce the risk of blood clots in the legs. Compression devices massage the legs, increasing blood flow and decreasing the risk of blood clots.

Suction catheter – A small tube about the size of a straw is used to clear the nose, mouth or tubes of mucus. Typically, staff will suction patients frequently depending on the accumulation of secretions.

Splints – Splints may be used to assist the patient's arms, hands and feet into more normal posture. Sometimes, following head injury, the brain sends the wrong messages for muscle tone and response. In order for patients to have good use of their arms and legs following recovery, the muscles should be kept in proper alignment, if possible.

Medication

There are several types of medications used for brain injury. Some of these may include:

- **Diuretics:** used to decrease the amount of fluid in a patient's body, making less fluid available to the brain for swelling.
- **Barbiturates:** if the patient's intracranial pressure is very high or hard to control, these medications put the patient into a deep "sleep" called a barbiturate coma, which may help prevent more swelling or damage.
- **Anticonvulsants:** used to prevent or treat seizures.
- **Pain Medication:** given to assist patients with pain control. For patients unable to speak, the nursing staff will base the need for pain medication on vital signs and injuries. There will be times that medications may be withheld to assess a patient's level of awakening.

Surgery

The four types of surgery for TBI:

- **Craniotomy:** The skull is opened to relieve increased intracranial pressure. Causes may include fractured bones, blood clots or swollen brain tissue.
- **Bone Flap Removal:** A piece of bone is removed from the skull to relieve pressure caused by swollen brain tissue.
- **Shunt:** A permanent tube is placed in the patient's abdomen from the spine or ventricles of the brain to act as a permanent drainage system for CSF. It takes the place of the ventriculostomy.
- **Burr Hole:** A small opening is made into the skull to remove blood clots. The patient receives sedation. This procedure may be done in the operating room or at the bedside.

Tracheostomy – A temporary tube placed through the neck into the trachea (windpipe). The procedure may be performed in the operating room or at the patient's bedside. The patient will be unable to talk while the tube is in place. A tracheostomy makes it easier for patients to cough up their own secretions and for nurses and respiratory therapists to suction the lungs. A tracheostomy may also facilitate the process of getting a patient off of a ventilator. The tube will be removed as the patient improves.

PEG – A temporary feeding tube placed in the patient's stomach through the abdomen. The procedure may be done in the operating room or at the patient's bedside. Frequently, patients with brain injury have to relearn how to swallow and eat, which may take time. The PEG is safer and not as irritating as a tube from the nose to the stomach. The PEG will be removed as the patient improves.

Levels of Care

Intensive Care

After being medically stabilized in the Emergency Department, most patients with a moderate to severe brain injury will then be transferred to an intensive care unit (ICU). The length of stay here can vary from several hours to several weeks, depending on the extent of the injury.

Acute Hospitalization

In most cases, patients will be transferred out of the ICU once their vital signs are stable for a period of time and no longer at risk for sudden medical or surgical complications. Typically, the transition starts with a stepdown unit where there is less intensive nursing and medical care but still close observation. Next, patients are transferred to a regular hospital floor, typically to a unit that specializes in working with trauma or surgical patients.

Transfer from the ICU to the stepdown unit and regular hospital floor is a step forward for your loved one. However it can cause some anxiety for family members leaving the security of the ICU and starting with a new group of caregivers. Our staff will do everything they can to help you get familiar with the new unit. Many patients with traumatic brain injuries are still in semi-comatose or confused/restless states when they are transferred from the ICU.

Rehabilitation Services

Once the patient is out of the ICU and more medically stable, we can start to understand the changes that may be present because of the brain injury. Physical problems are likely easier to see, while thinking or behavioral changes may be harder to identify early on. Neuropsychology and the rehabilitation team will be performing assessments to better understand any changes in cognitive (thinking), emotional, behavioral or physical functioning.

In the rehabilitation phase, the Rancho Los Amigos Scale of Cognitive Functioning is used to describe a patient's level of functioning. This scale has 10 levels ranging, using Roman numerals, from I-X. Level I (one), unresponsive, to Level X (ten) almost fully recovered. Patient's move through these stages as they recover, though not everyone starts at Level I (one) and not everyone progresses to Level X (ten).

Of course, families want to know how far and how fast their loved one will recover. The fact is, we don't usually know, especially initially. Recovery is not always predictable – only time will tell. As a patient continues to recover, they may begin to display post-traumatic agitation. Patients in this stage, Level IV (4) on the Rancho Scale, display a heightened state of activity. They are confused and their speech and behavior are frequently bizarre and non-purposeful. They may strike out at staff or family members, use inappropriate language and act in unsafe ways. This stage is often disturbing to families, but it is important to remember that it is a sign of recovery and will probably pass in a short time. This behavior is a result of the head injury; do not take it personally or be concerned that such behavior is new to the hospital care team.

As the agitation subsides, patients begin to act and communicate more appropriately. However, they may remain in a state of post-traumatic amnesia. This means that they have difficulty remembering things from moment to moment and day to day. They are disoriented; they may not understand where they are, what time it is or what has happened to them. They usually recognize family members and remember things about their lives before the accident but have difficulty remembering things that happened after the accident. Typically, they will only remember what has been explained to them and will not remember the accident or injury itself. As they recover, patients may carry over information from day to day but still display milder thinking difficulties in attention, memory, learning and organization. They can usually complete basic self-care and activities of daily living (bathing, dressing and simple household activities) but often they need assistance in remembering how to organize their activities and when to complete them. They are not yet able to return to their pre-injury activities such as work or school. In the higher stages of recovery, the amnesia resolves and patients become continuously oriented (they know where they are, what time it is and what has happened to them).

Family members may notice that the patient is “not his/her old self.” Changes in personality may be noticed and the survivor may be more irritable, less considerate of others, or more prone to depression. These, too, are lingering effects of the brain injury. In the best possible outcomes, a patient eventually may be able to return to a near-pre-injury level of activity and lifestyle. This is not true for everyone. This often takes a long time. The fastest rate of recovery usually occurs in the first three to six months following the injury, with slower recovery continuing to 12 to 18 months, or longer.

One term used to help understand recovery over time, is using the Revised Rancho Los Amigo’s Scale of Cognitive Functioning. Referring to a patient’s Rancho Level is a shorthand way for the treatment team to communicate to each other about the patient’s level of response. It also helps them monitor the patient’s recovery progress. The Rancho Levels include:

Rancho I	Does not respond to external stimuli when IV sedation paused.
Rancho II (Total Assistance)	Generalized responses to external stimuli.
Rancho III (Total Assistance)	Localized response to stimuli. Increased periods of being awake.
Rancho IV (Maximal Assistance)	Confused/Agitated. Short attention span. Highly distractible.
Rancho V (Maximal Assistance)	Confused/Inappropriate/Non-Agitated. Short-term memory is poor; may fill in gaps with inaccurate information. Agitated when over stimulated. May be impulsive and/or overestimate independence.
Rancho VI (Moderate Assistance)	Confused/Appropriate. May remain impulsive. Easily confused by changes in routine. May require help to perform ADLs. May have trouble organizing thoughts or remembering new information.
Rancho VII (Minimal Assistance for Daily Living Skills)	Automatic/Appropriate. Cognitive function intact for simple activities, but memory or other cognitive issues likely persist. Learns information at a slower rate.
Rancho VIII (Stand-by Assistance)	Purposeful/Appropriate. Oriented, able to recall/integrate past and present events. May overestimate or underestimate abilities. Needs some assistance to recognize need for and implementing strategies to compensate for their deficits.
Rancho IX (Stand-by assistance by request)	Purposeful/Appropriate. Asks for help as needed. Aware of deficits and able to correct/compensate, but needs assistance to anticipate problems.
Rancho X (Modified Independent)	Purposeful, Appropriate. Can multitask, but needs periodic breaks. Recognizes impact of areas of impairment and can independently use strategies to compensate for their deficits or ask for more time. Estimates abilities accurately.

Recovery from brain injury is different in every patient. Some patients may move from one Rancho Level to the next but can demonstrate signs of more than one level at a time. Depending on the extent and severity of injury, they may remain at one level for an extended period of time or never move past a certain level.

How Do Patients Respond After Severe Brain Injury?

Unless they have known someone with a traumatic brain injury, most people would not know what to expect from a person with a moderate to severe brain injury. Initially, survivors of a serious brain injury often have impaired consciousness. There are a number of terms used to describe reduced levels of consciousness, which are referred to as:

Disorders of Consciousness (DoC)

- **Coma** is the most severe level of impaired consciousness. Patients in a coma do not open their eyes or follow commands, do not communicate and do not display purposeful movement or behavior. This is typically considered a Rancho Level I.
- **Vegetative State** – do open their eyes, either spontaneously or to stimulation, but do not follow commands, communicate or display purposeful movement or behavior. They may show reflexive movements such as posturing or withdrawal. This is generally consistent with Rancho Level II. However, the term persistent vegetative state is not used unless it persists for several weeks.
- **Minimally Conscious State** – begin to display meaningful and purposeful responses. This is often observed first as a response to a command, which can be clearly repeated. These patients are still limited in their ability to communicate or move. This is generally considered to be consistent with Rancho Level III.

Survivors of more severe brain injuries can move through Rancho stages as they recover. Of course family members want to know how quickly their loved one will recover. The fact is, we really don't know. The patient's progress over time will give us the answer.

Physical Care

Physical care is often less complex once the patient leaves the ICU, but it is still the focus of rehabilitation. Physical and occupational therapists will do an assessment to get a better sense of balance, walking and movement skills, as well as the patient's ability to participate in self-care activities such as toileting, dressing and bathing.

Maintaining Nutrition and Fluid Balance

Certain types of injuries to the brain may impact a person's ability to eat by mouth. Some patients may be unable to coordinate taking food into the mouth and then swallowing and sometimes the gag reflex, which prevents us from choking, is poor. We try to get patients back to eating as soon as possible but some patients may require tube feedings for a period of time.

Promoting Normal Elimination Patterns

Another goal of recovery is to help the patient regain bladder and bowel function. Scheduling regular, well-tolerated feedings and administering stool softeners or other medications can help patients return to regular bowel habits.

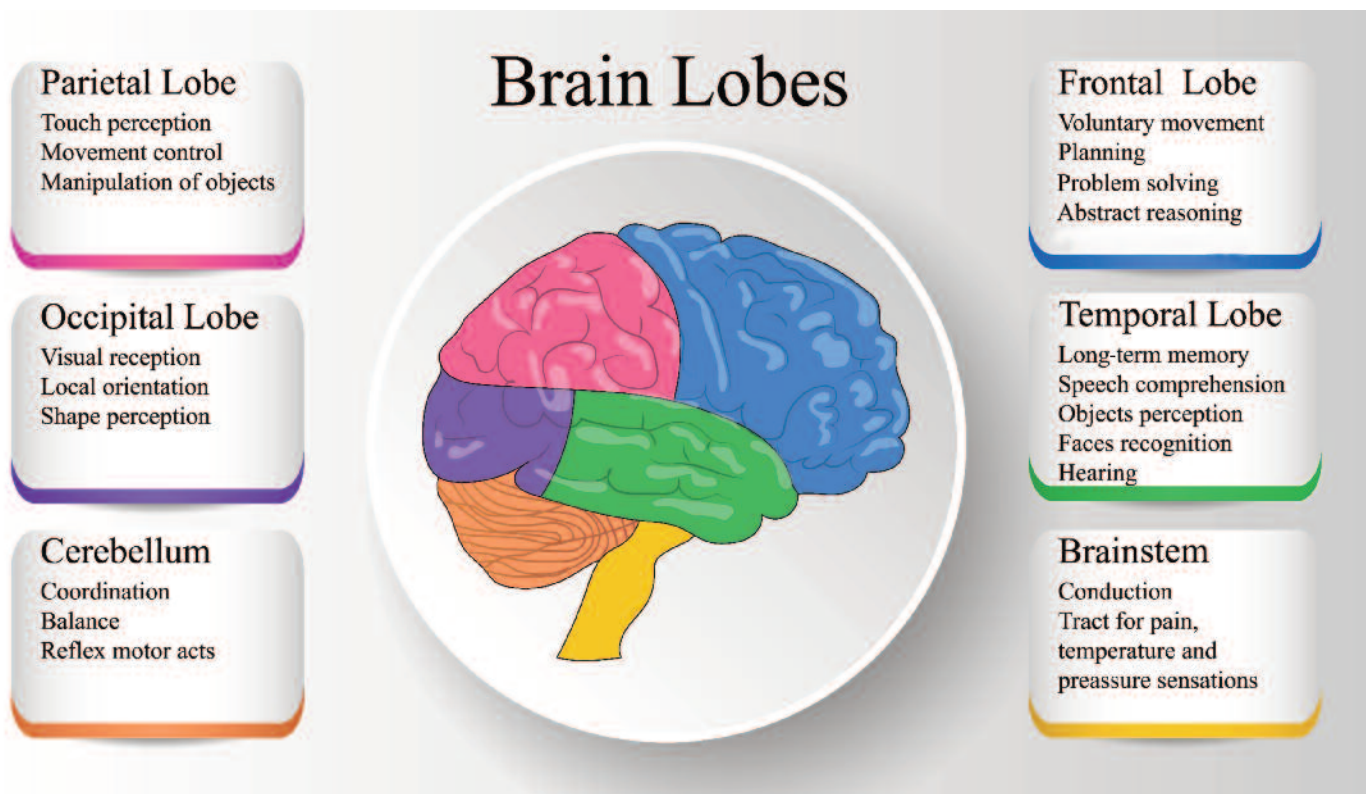
Positioning and Exercise

To prevent future dysfunction and loss of mobility, nurses and therapists may help the patient change positions frequently, either in the bed or the wheelchair. At times, the physical or occupational therapist may design splints for the arms, hands or neck to help maintain proper positioning. Physical therapy begins as soon as possible to help restore or maintain muscle tone, strength and joint range of motion. While patients are unable to move about themselves, nurses and therapists will do passive exercises and can train family members on how to help with these exercises, as well.

Symptoms after Brain Injury

The brain controls everything we do. Therefore, a brain injury can result in physical, cognitive or behavioral changes in your loved one. During the early stage of recovery, it's important for family members to better understand these changes in order to maintain the safety of their loved one and help them recover.

- **Physical Problems:** Physical symptoms such as headaches, seizures, decrease in strength and coordination, loss of sensation, changes in vision, hearing, taste, or smell and pain can occur. The treatment team will do ongoing assessments to better understand and provide treatment activities and recommendations.
- **Cognitive Impairments:** Sometimes changes in memory or thinking skills may be less apparent than physical concerns. However, patients often show difficulties with memory for new information, slowness of thinking, poor attention and difficulty speaking reading or writing. Impulsivity and a tendency to act quickly without thinking is common.
- **Behavioral and Emotional Changes:** As a person progresses through the Rancho Levels, it may be difficult to determine typical behavior compared to behavioral or personality changes resulting from the brain injury. Often pre-existing personality traits become more magnified following a brain injury. Depression, anxiety, irritability and restlessness are common, as well. Medications may help. The treatment team and neuropsychologist can provide guidance to the family how to address these issues on a day-to-day basis.



Impact on the Family

Brain injury affects the whole family. Many family members and friends struggle with their emotions during the early stages of recovery following moderate to severe brain injury. Frustration, anger, sadness and denial are all common emotional reactions. Feelings can be overwhelming and there may be a sense of isolation, despite having support of other family members and friends. Talk more with your nurse or other treatment team members about ways to manage this.

Expectations

Patients and family members learn to expect both good and bad days. Several days of progress may be followed by days of agitation, confusion or medical complications. Try to stay positive on the bad days and know that better days will come.

What Is Your Role in Your Loved One's Recovery?

People cope with stressful situations differently. What works for one person may not work for another. We hope some of these suggestions will help you get through this difficult time.

Contact Person – Select a primary contact and identify that person to the staff so decisions about medical care, permission forms and information are shared with this single source. This helps ensure the patient's privacy and accuracy of information shared with others.

Wash Hands – The risk of infection is high for brain injury patients. Please help us reduce the risk of infection by washing your hands before you touch your loved one. If you have a cold, ask the nurse for a mask.

Express Your Feelings – You will draw more support from those around you than you realize. Talk about both positive and negative feelings with family, friends and staff. Discuss the patient's progress with staff and feel free to ask questions.

Be Kind to Yourself – Take time for a walk outside or leave the hospital for lunch or dinner with a friend. Go home for a restful night's sleep. By taking care of yourself, you'll be better prepared to care for your loved one.

Journal or Notebook – Write down important information or thoughts in a journal or notebook. Try to keep records and medical information together in a file for easy access. After recovery, patients and family often find this information helps put their situation in perspective.

Rotate Family Visitation – If you need or want to leave the hospital, you could ask a friend or family member to stay with the patient. Also, remember to limit visitation at the advice of the staff, especially if the patient is agitated or restless.

Voicemail/Answering Machine – Change the message on your voicemail or home answering machine to include updates for friends, church members or family. You may want to consider having a friend or family member set up an email list, social site or a website such as CaringBridge to communicate information to loved ones and friends.

Talk Positively to Your Loved One – When speaking, assume the patient can understand what you are saying. Speak in a comforting and familiar way, even if the patient is unconscious. Tell stories about family activities, like the children at school, fun things they are doing, etc. If your loved one has a favorite location or a restful place, like the beach or mountains, talk about it in descriptive words. Read them their favorite books.

Touch – Touch is a very personal and meaningful therapy, especially the touch of a loved one. It can be relaxing and therapeutic. You can rub your loved one's hands and feet with lotion, which the staff will give you.

Pictures – Bring in pictures of your loved one so that the staff will know how they looked before the injury. You may also bring pictures of family and friends to place on the patient's board. Please label the pictures with names so the staff can use them to talk with your loved one and call people by name.

Music/Messages – Music has been found to be soothing as patients become more stable. You could bring some favorite music, or you could record messages from family members, including small children, for your loved one to hear.

Children – Children older than age 12 are allowed to visit in the hospital. In some cases, younger children are allowed to visit. Please talk to the nursing staff about the best way to talk to children and prepare them to see sick loved ones. There are child life specialists on staff to assist. Please make sure children who visit are not sick.

Understand that every patient is different and that staff is trying their best to adapt to your loved one's needs. We respect your knowledge about the patient's emotional and physical needs and encourage your participation.

There are many services available to you and your family for support, including the care nurses, physicians, social workers, chaplains, trauma specialists and child life specialists. We can help you contact these caregivers as the need arises.

How to Help

Family involvement in the early stage of care and rehabilitation is important. The following guidelines will be particularly helpful during the early rehabilitation phase:

- **Avoid Overstimulation:** This is especially important in the early stages. A person who is physically weakened tires quickly and overstimulation may increase agitation and confusion. A low stimulation environment promotes recovery.
- **Use the Familiar:** Patients with short attention spans are more likely to focus on something familiar and comfortable rather than something new and strange. Play familiar music or bring in objects or pictures that will be familiar to your loved one.
- **Be Consistent:** Develop a routine as much as possible. Following a daily routine in the early phase of recovery can be challenging in a hospital setting but may help your loved one become better oriented to their environment and feel more secure.
- **Stay Calm:** Be the role model for your loved one. Interact with your loved one and staff in a calm manner, even when situations become frustrating. If you become upset, this may trigger your loved one to become agitated.

What Happens Next?

Patients with serious brain injuries usually become stabilized after a matter of days to weeks in the acute hospital. This means that many of the life-threatening aspects of the brain injury have passed, though the process of recovery continues.

Rehabilitation services begin in the acute hospital, but, because of their fragile state, patients are often limited in their ability to participate. After a period of recovering, other rehabilitation services may be needed to help your loved one regain as much independence as possible. WakeMed is the region's leading provider of comprehensive rehab services for people with traumatic brain injuries. If your loved one was brought to WakeMed at the time of their injury, it's likely a Rehab representative has been monitoring their progress. By doing this, the Rehab representative can help your loved one transition to the next level of care, which may be:

- **WakeMed Neuro Care Unit and Program:** This unit is for patients with severe brain injuries who remain minimally responsive or whose behavioral issues are complex. Patients will receive ongoing nursing care as well as rehabilitation therapies, as tolerated. This is the only unit of its kind in the region.
- **WakeMed Rehabilitation Hospital:** The WakeMed Rehab Hospital is for patients who continue to recover from their brain injury but still require full time nursing care and can tolerate 3 hours of therapy a day. The Rehab Hospital's brain injury program is accredited by the Commission on Accreditation for Rehabilitation Facilities (CARF).
- **WakeMed Day Treatment Program:** The Day Treatment Program is for patients who are able to safely discharge to the community but still require intensive therapies. Patients receive at least 2 therapy services (physical therapy, occupational therapy, speech therapy) as well as case management, nursing and neuropsychology services.
- **WakeMed Outpatient Rehab:** Outpatient Rehab is for patients who require less intensive therapy and services, including occupational therapy, physical therapy and/or speech therapy.

Resources for You and Your Loved One

Brain Injury Association of North Carolina

3733 National Drive, Suite 115
Raleigh, NC 27612
(919) 833-9634
www.bianc.net

Brain Injury Association of America

8201 Greensboro Drive, Suite 611
McLean, VA 22102
(703) 761-0750
www.biausa.org

The Triangle Area Brain Injury Support Group meets regularly at WakeMed Raleigh Campus on the third Tuesday of each month at 7 pm in Conference Dining. This group is for survivors and families. Members share information and support one another as they navigate the TBI recovery journey.

Notes



www.wakemed.org

Raleigh Campus • Cary Hospital • North Hospital
Apex Healthplex • Brier Creek Healthplex • Garner Healthplex • Raleigh Medical Park
Outpatient Rehabilitation Facilities • Home Health • WakeMed Physician Practices

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