Traumatic Brain Injury

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What is a Traumatic Brain Injury? (TBI)

A TBI occurs when sudden trauma to the head causes damage to the brain, resulting in bleeding, bruising, or tearing of nerves.

Patients may incur more than one type of brain injury.

Damage may occur at the time of injury, or may evolve as a result of bleeding or swelling of brain tissue.

Severity may range from mild to severe.
How big is the problem?

- 1.7 million Americans suffer TBI each year (now 3.5 million)
  - Figure based on death, hospitalizations and ED visits*
- 52,000 deaths: 1/3 of all injury related deaths
- 275,000 hospital admissions each year
- 80,000 - 90,000 develop disability each year
- 5.3 million survivors in America
- 1,365,000 ED visits
- Concussion – estimated at 1.4 to 3.8 million occurrences per year
Injuries related to MVC are the leading cause of TBI worldwide.

In United States:
- 35.2% of TBI due to falls
- 17.3% of TBI due to MVA
- 16.5% of TBI due to external cause of “being struck”, including sports-related injuries
- 21% unknown
- 10 assault
TBI Mechanism of Injury

- **Age Group**
  - Children 0-4 yo
    - Falls leading cause at 50% of TBI
  - Adults > 75 yo
    - Falls leading cause at 60% of TBI
- **Gender**
  - Incidence – 1.4 times higher in males than females
  - Death
    - Male: 37,000 deaths per year
    - Females: 13,000 deaths per year
Estimated Financial Cost

- In the year 2000 the total cost of all injury in the USA was $406 billion
- $80 billion in direct cost
- $326 billion in lost productivity
- $283 billion male
- $164 billion for between ages 25 - 44 years
- $76.5 billion is the cost for TBI in 2010
- $51 billion in lost productivity
- $9 billion in lifetime medical costs
Traumatic Brain Injury: Overview

- Refers damage to the brain tissue from external mechanical forces
- May produce altered levels of consciousness, cognition, and/or physical ability
- Is not degenerative or congenital
- Open and closed brain injuries
  - Open injuries caused from penetration and result in communication between the intracranial structures and the environment
  - Closed injuries do not involve penetration but may include depressed or nondepressed skull fractures
Traumatic vs Non Traumatic

- **Traumatic**
  - Damage to the brain caused by an external physical force
  - Motor vehicle accidents
  - Falls
  - Sport accidents
  - Blast injuries

- **Non Traumatic**
  - Not due to an external physical force
  - Brain hemorrhage
  - Ischemic stroke
  - Hydrocephalus
  - Brain tumors
  - Anoxia
  - Infections
  - Encephalopathy
# Traumatic Brain Injury: Overview

<table>
<thead>
<tr>
<th>Primary Injury</th>
<th>Secondary Injury</th>
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<tbody>
<tr>
<td>• May be focal or diffuse</td>
<td>• Cerebral edema</td>
</tr>
<tr>
<td>• Open</td>
<td>• Seizures</td>
</tr>
<tr>
<td>• Penetration of skull and brain</td>
<td>• Increased intracranial pressure</td>
</tr>
<tr>
<td>• Closed</td>
<td>• Brain herniation</td>
</tr>
<tr>
<td>• Concussion</td>
<td>• Hypoxia</td>
</tr>
<tr>
<td>• Diffuse axonal injury</td>
<td>• Ischemia</td>
</tr>
<tr>
<td>• Contusions/coup contrecoup</td>
<td>• Focal hypoperfusion, electrolyte imbalance, infections</td>
</tr>
<tr>
<td>• Hematomas</td>
<td>• Excitotoxicity and production of free radicals</td>
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</table>
Primary Injuries

Acceleration and deceleration injuries produced from MVAs or falls from heights > 6 ft. causes damage from shearing and tension forces to brain tissue and the surrounding cerebral vasculature.

Coup/contre brain contusions or bruising at two sites, the initial site of impact and a second impact occurring at the opposite side of the skull.

Diffuse axonal injuries (DAI) the axon of the neuron cell is deformed by stretching and shearing forces causing defective axonal transport, axonal swelling and ultimately results in separation.

Focal injuries damaged by localized trauma and results in tissue destruction, hemorrhage and edema.
Traumatic Brain Injury: Assessment

- Glasgow Coma Scale is used to describe severity of injury
  - Mild TBI is indicated by a score of 13 or greater
  - Moderate TBI is a score between 9-12
  - Severe TBI is a score of 8 or less

<table>
<thead>
<tr>
<th>Glasgow Coma Scale</th>
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<tbody>
<tr>
<td><strong>Eye Opening Response</strong></td>
</tr>
<tr>
<td>Response</td>
</tr>
<tr>
<td>Eyes open spontaneously</td>
</tr>
<tr>
<td>Eyes open to verbal command, speech, or shout</td>
</tr>
<tr>
<td>Eyes open to pain (not applied to face)</td>
</tr>
<tr>
<td>No eye opening</td>
</tr>
</tbody>
</table>

| Verbal Response |
| Response | Scale | Score |
| Oriented | 5 Points |
| Confused conversation, but able to answer questions | 4 Points |
| Inappropriate responses, words discernible | 3 Points |
| Incomprehensible sounds or speech | 2 Points |
| No verbal response | 1 Point |

| Motor Response |
| Response | Scale | Score |
| Obey commands for movement | 6 Points |
| Purposeful movement to painful stimulus | 5 Points |
| Withdraws from pain | 4 Points |
| Abnormal (spastic) flexion, decorticate posture | 3 Points |
| Extensor (rigid) response, decerebrate posture | 2 Points |
| No motor response | 1 Point |

*Minor Brain Injury = 13-15 points; Moderate Brain Injury = 9-12 points; Severe Brain Injury = 3-8 points*
Ranchos Los Amigos Levels of Cognitive Functioning
- Used to differentiate levels of cognitive functioning
- Interpret the cognitive recovery process after a brain injury

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>No response to visual, verbal, tactile, auditory, noxious stimuli</td>
</tr>
<tr>
<td>II</td>
<td>Generalized response</td>
</tr>
<tr>
<td>III</td>
<td>Localized response</td>
</tr>
<tr>
<td>IV</td>
<td>Confused-agitated</td>
</tr>
<tr>
<td>V</td>
<td>Confused-inappropriate</td>
</tr>
<tr>
<td>VI</td>
<td>Confused-appropriate</td>
</tr>
<tr>
<td>VII</td>
<td>Automatic-inappropriate</td>
</tr>
<tr>
<td>VIII</td>
<td>Purposeful and appropriate</td>
</tr>
<tr>
<td>IX</td>
<td>Purposeful and appropriate (standby assistance on request)</td>
</tr>
<tr>
<td>X</td>
<td>Purposeful and appropriate (modified independent)</td>
</tr>
</tbody>
</table>
Changes After Frontal Lobe Damage

- Difficulty sequencing
- Perseveration
- Difficulty with attention
- Personality changes
- Difficulty with problem solving
- Loss of verbal expression
- Loss of spontaneity
- Inflexible thinking
- Uncontrollable emotional, social and sexual behavioral changes
- Poor initiation of voluntary movements
Changes After Occipital Lobe Damage

Vision deficits (visual field cuts)
Difficulty visually locating objects
Difficulty identifying colors
Hallucinations and visual distortions
Inability to recognize object movement
Difficulty reading and writing
Poor processing of visual information
Difficulty understanding spoken words
Disturbance of selective attention
Short term memory loss
Impaired learning
Persistent talking
Increased aggressive behavior
Difficulty identifying and categorizing objects
Difficulty recognizing faces and visually locating objects
Changes After Parietal Lobe Damage

- Difficulty naming objects
- Right/left confusion
- Impaired processing of tactile senses (touch)
- Inability to focus visual attention
- Difficulty with eye hand coordination
- Lack of awareness of body parts
- Impaired spatial orientation
Changes After Brain Stem Damage

- Difficulty swallowing food and fluid
- Difficulty with balance and movement
- Dizziness and nausea
- Impaired arousal and sleep regulation
- Impaired regulation of temperature, heart rate and respiration
Impaired gross and fine motor coordination
Loss of the ability to walk
Poor postural control
Inability to make rapid movements
Impaired control of eye movement
Tremors
Dizziness

Changes After Cerebellum Damage
Hierarchy of Cognition

- Executive Functions
- Memory—retrieving and encoding
- Spatial and constructional
- Language and communication
- Attention and concentration
- Sensory and motor skills
- Arousal
## Impact of Brain Injury (BI)

- Functional mobility
- Self care and independence
- Family dynamics
- Economic impact on family unit
- Body Image and self awareness
- Sexual expression
- Cognition and behavior
- Sleep disturbances
- Communication
- Sensory Loss
- Impaired arousal or wakefulness
- Slow or delayed processing of information
- Confusion or disorientation
- Difficulty with attention and concentration
Ranchos Los Amigos Stages of Recovery

1. Persistent vegetative/no response to pain, touch, sound, sight

2. Generalized reflex response to pain

3. Localized response to pain, touch, sound, sight

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Coma</th>
<th>Vegetative</th>
<th>Minimally Conscious</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye Opening</td>
<td>None</td>
<td>Spontaneous</td>
<td>Spontaneous</td>
</tr>
<tr>
<td>Spontaneous Movement</td>
<td>None</td>
<td>Reflexive</td>
<td>Automatic/Object Manipulation</td>
</tr>
<tr>
<td>Response to Pain</td>
<td>Posturing/None</td>
<td>Posturing/Withdrawal</td>
<td>Localization</td>
</tr>
<tr>
<td>Visual Response</td>
<td>None</td>
<td>Startle/Tracking</td>
<td>Object Recognition/Tracking</td>
</tr>
<tr>
<td>Commands</td>
<td>None</td>
<td>None</td>
<td>Inconsistent</td>
</tr>
<tr>
<td>Verbalization</td>
<td>None</td>
<td>Random Vocalization</td>
<td>Intelligible Words</td>
</tr>
<tr>
<td>Communication</td>
<td>None</td>
<td>None</td>
<td>Unreliable</td>
</tr>
</tbody>
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Giacino 2012
JFK Coma Recovery Scale- Revised

- Purpose is to assist with differential diagnosis and treatment planning
- 23 items and 6 subscales- lowest item represents reflexive activity and highest items represent cognitively-mediated behaviors
  - Auditory
  - Visual
  - Motor
  - Oromotor
  - Communication
  - Arousal
Stages of Recovery: DoC

Features of Vegetative State

- Spontaneous eye opening
- Return of sleep-wake cycle
- May:
  - moan or make sounds, often in response to stimuli
  - cry, grimace, or smile without apparent cause
  - Exhibit teeth grinding (bruxism), lip smacking
- No reproducible or purposeful responses
Features of Minimally Conscious State

- Sustained/reproducible and purposeful responses to external stimuli, though not consistently
- May:
  - inconsistently follow simple commands
  - communicate yes/no, or use head nods/gestures
  - speak intelligible words
- No functional interactive communication
- No functional object use
Nursing Management: DoC

Neurologic/cognition

- Monitor arousal, sleep-wake cycle, pharmacological effectiveness
- Promote recovery of consciousness: familiar scents, sounds, tactile stimulation, pictures
- Monitor for over stimulation
- Monitor for signs and symptoms of increased intracranial pressure
Nursing Management: DoC

Respiratory

- Assess for signs/symptoms of hypoxia
- Monitor patency of airway, oxygen saturation
- Pulmonary toileting
- Oxygen/trach weaning
- Assess for potential aspiration
Nursing Management: DoC

**Cardiovascular**
- Monitor potential side effects of stimulants
- Management of autonomic dysfunction

**Nutrition/Hydration**
- Monitor weekly weights, daily hydration status, lab work
- Monitor tolerance to feeding type, rate, residuals
Nursing Management: DoC

Sensory/perceptual/environment

- Monitor response to stimulation
- Assess for comfort - room temperature, tight-fitting clothing
- Assess for pain (wounds, procedures)
Bowel and Bladder

- Monitor daily bowel movements
- Monitor signs and symptoms of a urinary tract infection
- Ensure adequate fluid intake
- Bladder protocol
Nursing Management: DoC

**Musculoskeletal**
- Assess for heterotopic ossification, contractures, tone, spasticity, foot drop
- Monitor tolerance to splints/casting
- Monitor effectiveness of pharmacological interventions

**Integument**
- Assess risk for compromised skin integrity
- Incisional healing
- Need for special surface mattress
- Wound care consult
Communication

- Assess for any vocalization/verbalization
- Assess for non-verbal communication
- Utilize any assistive device (e.g., picture boards)
- Allow for adequate processing time for responses

Behavior

- Monitor for signs of over-stimulation
- Monitor for motor restlessness
Safety

- Assess risk for aspiration pneumonia
- Assess risk for infection (Foley, PICC, wounds)
- Secure tubes/lines
- Padded side rails/low beds/floor mats
- Frequent rounding
- Agitated Behavior Scale
- Fall Reassessment
Goals: DoC

- Accurate assessment of vegetative vs. minimally conscious
- Interdisciplinary communication to establish functional goals for the patient
- Maintenance and preservation in preparation for next level of rehabilitation
- Family training and education in preparation for potential discharge to home
- Family support
Episodic over-activity of the sympathetic component of the autonomic nervous system (ANS)

- Unexplained fever
- Tachycardia, tachypnea, hypertension
- Diaphoresis
- Posturing
- Agitation
Nursing Management: Autonomic Dysfunction

- Early identification of autonomic dysfunction
- Identification of triggers
- Symptom management/treatment
- Environmental modifications
- Prevention of complications/disability
- Family education to support and promote involvement in care
Rancho Los Amigos Stages of Recovery

• **4- Confused agitated**, internal stimuli, heightened activity, confusion, aggressive behavior, short attention span, performs motor activity but behavior is non purposeful

• **5- Confused, inappropriate**, non agitated but can be with too much stimulation, alert, responds to commands, distractible, poor concentration, gross attention to environment, requires continual redirection, difficulty learning new tasks
Post -Traumatic Amnesia (PTA)

A closer look at PTA:

- Defined as that period in which the brain is unable to lay down continuous day to day memory
- It may last for hours to months after the initial injury
- Duration of PTA is the best indicator of the extent of cognitive and functional deficits
Post Traumatic Amnesia

**Behaviors**

- Confusion, anxiety, and/or agitation
- Uncharacteristic violence or aggressive behaviors
- Sexual disinhibition
- Behavioral regression to a younger age
- Risk behaviors such as wandering despite physical disability/risk for elopement
- Confabulation
Nursing Management: Stages 4 and 5

**Neurologic/cognition**

- Monitor arousal and sleep-wake cycle
- Orientation log (O-log)
- Identify areas of motivation for self care tasks
Orientation Log

• Measures orientation to time, place and situation
• 10 questions
• 0-30 points possible- spontaneous, cueing multiple choice
• Score of 25 or greater denotes emergence from post traumatic amnesia
• Post traumatic amnesia is a state of confusion immediately following a traumatic brain injury
  • When continuous memory returns, PTA is considered resolved
Nursing Management: Stages 4 and 5

**Nutrition/Hydration**

- Monitor PO intake (poor attention)
- Monitor caloric needs with increased activity
- Monitor weekly weights (motor restlessness)
- Electrolyte imbalances
- Wean off peg feedings/flushes
Nursing Management: Stages 4 and 5

Sensory/perceptual/environment

- Decrease environmental stimulation
- Monitor for fatigue, pain, comfort
- Introduce memory aids, orientation
Bowel and Bladder

- Time void
- Bowel program
- Monitor for signs of UTI
- Monitor for nonverbal signs of toilet assistance
- Fluid management
Nursing Management: Stages 4 and 5

Musculoskeletal

- Monitor tolerance to splints/casting
- Monitor effectiveness of pharmacological interventions
- Monitor for skin breakdown/injury
- Observe gait, mobility, balance
- Pain management
Communication

- Assess for aphasia (expressive, receptive)
- Assess communication for pragmatics/semantics
- Assess language
- Cognitive domains (arousal, attention, executive functioning, information processing)
Agitated Behavior Scale: An Assessment Tool

• 14 item standardized assessment

• Scoring:
  • 1 = Absent
  • 2 = Present to a mild degree
  • 3 = Present to a moderate degree
  • 4 = Present to an extreme degree

• Total score is the best overall measure of agitation:
  • < 21 No agitation, normal presentation
  • 22-28 Minimal agitation
  • 29-35 Moderate agitation
  • >35 Severe agitation
Agitated Behavior Scale: An Assessment Tool

Behavior/Safety Assessment: Elements of the Agitated Behavior Scale

- Short attention span, easy distractibility and inability to concentrate
- Impulsive, impatient, low tolerance for pain or frustration
- Uncooperative, resistant to care, demanding
- Violent and/or threatening violence toward people or property
- Explosive and/or unpredictable anger
- Rocking, rubbing, moaning or other self stimulating behavior
- Pulling at tubes, restraints
Agitated Behavior Scale: An Assessment Tool

Behavior/Safety Assessment: Elements of the Agitated Behavior Scale

- Wandering from treatment areas
- Restlessness, pacing, excessive movement
- Repetitive behaviors, motor and/or verbal
- Rapid, loud or excessive talking
- Sudden changes in mood
- Easily initiated or excessive crying or laughter
- Self abusiveness, physical and/or verbal
Behavior/Safety Assessment: Agitation

- Non aggressive verbal: incoherent rambling
- Non aggressive physical: pacing restlessness, wandering
- Aggressive verbal: cursing, yelling
- Aggressive physical: hitting, biting, scratching, kicking
Behavior/Safety Assessment: Akathisia

- A movement disorder characterized by a feeling of inner restlessness and a compelling need to be in constant motion
- Motor restlessness
- Constant sense of inner restlessness: pacing, rocking, fidgeting, repetitive actions, inability to sit or stay still
- May not feature aggressive behavior
Nursing Management: Stages 4 and 5

Behavior/Safety Assessment: Assess for other possible causes of agitation

- Infection
- Dehydration
- Electrolyte imbalance
- “Sun downing”
- Basic needs (hunger, thirst, comfort/pain, fatigue)
- Bowel and bladder
Behavior/Safety: Environmental Modification

- Limit visitors/manage overstimulation
- Provide orienting stimuli (clocks, calendars, memory book)
- Provide familiar objects (photos)
- Adequate/appropriate lighting
- Comfortable temperature
- Manage noise levels
- Manage sensory factors (glasses, hearing aids)
Behavior/Safety: Manage sleep wake cycle

- Environment: quiet, minimal interruptions (medications, treatments)
- Identify type of sleep disturbance
- Identify possible cause of sleep disturbance
- Describe quality/quantity of sleep
- Promote good sleep hygiene (fluids, pain, bladder)
Stage 1
Transition phase/light sleep; Muscle activity slows down and slight twitching can occur; easily awakened

Stage 2
Breathing pattern and heart rate slow down; spend the greatest part of our sleep in his stage

Stage 3
Brain begins to produce delta waves, breathing and heart are at their lowest level, urine formation decreases

Stage 4
Rhythmic breathing and limited muscle activity; if awakened you might feel groggy for several minutes

REM Sleep
Not conscious; brain very active; dream state; rapid eye movement, breathing rate and blood pressure rise; body paralyzed

Cycle can take 90-110 mins and then start again

Typical Sleep Cycle
Behavior/Safety: Managing activities

- Know patient’s interest and attempt to engage them in the activity
- Ambulate patient with supervision if appropriate
- Out of bed/provide diversion activities that patient can do
- Emphasize and encourage functional tasks
Nursing Management: Stages 4 and 5

Behavior/Safety: Managing activities

- Provide structured daily routine
- Allow adequate rest periods throughout the day
- Careful scheduling of cognitively or physically demanding therapies to permit optimal participation
- Promote uninterrupted sleep at night
Nursing Management: Stages 4 and 5

**Behavior/Safety: Managing interactions**

- Consistency in caregiver assignment
- Introduce yourself with every interaction
- Explain actions
- Speak with a calm, non threatening voice
- Reorient patient as needed
Behavior/Safety: Managing interactions

- Do not argue, scold or try to reason with patient
- Offer simple choices, no more than 2
- Redirect conversation to a topic unrelated to the cause of the agitation
- Offer positive feedback; do not reinforce negative behavior
- Provide nursing care in short blocks
- No short term memory so consequences may not work
Nursing Management: Stages 4 and 5

Behavior/Safety: Manage safety

- Hand off communication
- Individualized care plan
- Behavior management plan
- Relocation of patient room/treatment area PRN
- Use of low bed, bed alarms, frequent rounding
Nursing Management: Stages 4 and 5

Behavior/Safety: Manage safety

- Secure/hide lines and tubes
- Family education
- Restraints - least restrictive
- Provide adequate supervision
- Evaluate need for 2:1/1:1
Target specific problematic behaviors with "ABC-R Method"

- **A:** Antecedent (trigger)
  - What led up to or triggered the behavior
  - Could be pain, boredom, specific person, or frustrations over task

- **B:** Behavior
  - Specifically, what behavior occurs

- **C:** Consequence
  - Events that immediately follow the behavior that have the ability to influence the person acting out
  - Based on the behavior, how do staff respond

- **R:** Result (how did the patient respond?)
  - Was the result the desired effect?
    - Yes: Then continue
    - No: Then the consequence needs to change (meaning staff need to adapt)
Goals: Behavior/Safety: Stages 4 and 5

- Goals need to focus on the specific behavior
- Goals need to consider the patient’s cognitive status
- Goals need to be inclusive of all team members
- Goals need to focus on short term gains as well as long term
- Goals need to be achievable, realistic and meaningful
Behaviors Associated With Cognitive Deficits

- Disorientation
- Apathy
- Lack of initiation
- Impulsivity
- Depression
- Impaired problem solving
- Memory loss
- Impaired judgement
- Agitation
- Lack of insight
- Confabulation
- Emotional lability
- Disinhibition
- Perseveration
Behaviors Associated With Cognitive Deficits

Confusion is the inability to recall minute to minute, hour to hour, or day to day events

- Use orientation cues (printed names, personal or family pictures, calendars, schedules, clocks)
- Ensure in consistency in the environment, schedules and staff

Impulsivity is the tendency to act without considering the consequences

- Utilize bed and wheelchair alarms
- Evaluate environment for safety
- Avoid fatigue by developing a sleep wake cycle
- Establish a routine with meaningful activities

Perseveration is the reflexive repetition of behaviors, vocalizations, or activities

- Provide visual distraction
- Engage in simple activities
- Pet, art, music therapy
Behaviors Associated With Cognitive Deficits

Confabulation is the invention of detail or life experience in an attempt to compensate for memory loss

- Provide family education and assure family that confabulation is a symptom of memory deficits
- Communicate frequently with the family about patient’s day
- Utilize a log book to track activities and interactions
- Avoid correcting or making comments to the patient about confabulation

Emotional Lability is characterized by uncontrollable, fluctuating emotional behaviors in alternating gaiety, somberness and crying

- Provide distraction in the early stages
- Calm atmosphere, soothing music
- Reduce situations that promote frustration or anger
- Use physical activities (chair exercises)
Behaviors Associated With Cognitive Deficits

Disinhibition is uncontrollable behaviors or activities that are considered socially inappropriate, exhibits egocentric behaviors

- Encourage appropriate touch and contact by family, friends and staff
- Engage in identification of socially accepted behaviors
- Take patient to the bathroom or provide toileting routinely
- Educate family and other staff to avoid over-reacting to patient swearing
- DO NOT laugh, encourage behavior, react or pass judgement

Agitation is an excess of one of more behaviors that occurs during an altered state of consciousness

- Avoid using physical restraints
- Limit visitors
- Regulate sleep wake cycles, provide adequate rest periods
- Give simple instructions
- Explain all actions to the patient
- Allow time away from required activity if agitation is heightened
- Use distraction
Stages of Recovery
Rancho Los Amigos: Stages 6, 7 and 8

- 6- Confused, appropriate with cueing, inconsistent orientation, retention span/recent memory impaired, goal directed behavior, can relearn old ADL skills, memory deficits
- 7- Automatic, appropriate response with deficits, robot like behavior, minimal confusion but shallow recall, impaired judgment, skills noticeably deteriorate in unfamiliar surroundings, lack of unrealistic planning for own future
- 8- Purposeful appropriate, recalls and integrates past events, learns new activities and continues without supervision, independent at home, persisting deficits
Nursing Management: Stages 6, 7 and 8

• Continue to monitor all areas of assessment
• Incorporate techniques learned in therapy/carryover skills
• Utilize adaptive equipment
• Assess gait and balance to promote early ambulation
• Provide cues and strategies when encouraging independent activities
• Provide the patient opportunities to problem solve
• Medication management
Nursing Management: Stages 6, 7 and 8

- Ambulation program
- In room OT
- Bladder retraining
- Finalize all education/training
- Continue to encourage family participation
- Discuss safety do’s and don’ts: provide information on bed alarms, w/c alarms, 24 hour supervision
Goals: Stages 6, 7 and 8

- Goals need to be individualized, realistic and attainable
- Goals focus on enhancing ability to
  - Communicate effectively and appropriately
  - Improving memory and increasing sensory awareness
  - Promoting safety
- Goals need to be sensitive to
  - Family involvement and family dynamics
  - Cultural needs
- Goals need to be meaningful to the patient and family
Which of the following types of BI causes widespread shearing and rotational injury?

a. A cerebral contusion
b. A concussion
c. A diffuse axonal injury
d. A contra coup injury
Correct answer is : c

A diffuse axonal injury, caused by widespread shearing and rotational forces, produces damage THROUGHOUT the brain. It is associated with poorer prognosis than a focal lesion.
Which of the following symptoms is NOT associated with brain stem injuries?

a. Pupillary changes
b. Loss of consciousness
c. Abnormal posturing
d. Tinnitus
Correct answer is : d

Tinnitus or ringing in the ear can only be perceived by a conscious person. Injuries to the brain stem cause pupillary changes, immediate loss of consciousness, abnormal posturing, cranial nerve deficits and changes in vital functions such as heart rate and respirations.
John sustained a brain injury and his CT scan shows a significant impact to the front of the frontal lobe. Which of the following deficits do you anticipate?

a) Difficulty with left-right discrimination, spatial orientation, and body image perception
b) Emotional lability, difficulty with executive function and personality changes
c) Problems with memory, loss of smell and taste, and Wernicke’s aphasia
d) Problems with depth perception and difficulty interpreting visual input
Correct answer is: b

The anterior portion of the frontal lobe controls emotions, houses personality and processes complex issues with problem solving and executive function.
Susan sustained a brain injury in a fall from a ladder showing focal injury to the occipital lobe. Which of the following deficits do you anticipate?

a. Difficulty with left-right discrimination, spatial orientation, and body image perception
b. Emotional lability, difficulty with executive function and personality changes
c. Problems with memory, loss of smell and taste, and Wernicke’s aphasia
d. Problems with depth perception and difficulty interpreting visual input
Correct answer is: d

The occipital lobe is primarily focused on receiving and interpreting visual stimuli.
Robert sustained a brain injury when he received a blow just above the ear on the left side. Which of the following deficits do you anticipate?

a. Difficulty with left-right discrimination, spatial orientation, and body image perception
b. Emotional lability, difficulty with executive function and personality changes
c. Problems with memory, loss of smell and taste, and Wernicke’s aphasia
d. Problems with depth perception and difficulty interpreting visual input
Correct answer is: c

The temporal lobe controls hearing, taste, and smell and includes the receptive speech center.
Carol sustained a brain injury in a fall and her CT scan shows a localized lesion in the parietal lobe. Which of the following deficits do you anticipate?

a. Difficulty with left-right discrimination, spatial orientation, and body image perception
b. Emotional lability, difficulty with executive function and personality changes
c. Problems with memory, loss of smell and taste, and Wernicke’s aphasia
d. Problems with depth perception and difficulty interpreting visual input
Correct answer is: a

The parietal lobe processes sensory input such as pain, temperature, spatial orientation, shape, texture
The behavior of a patient with a Rancho Los Amigos Scale Level 5 is

a. Confused and agitated  
b. Confused and appropriate  
c. Confused and non agitated  
d. Automatic and appropriate
Correct answer is C

A patient with a level 5 demonstrates confusion with the agitation expressed at level 4
Sample Question 8

Which of the following in an example of an “executive” functioning?

a. Setting the table
b. Heating an item in the microwave
c. Doing dishes
d. Grocery shopping
Correct answer is D

Executive functions require anticipation, goal selection, planning, self monitoring and incorporating feedback. All of the other activities are less complex tasks.
The ability to respond to relevant information and to screen out unimportant information is known as:

a. Orientation  
b. Initiation  
c. Attention  
d. Problem solving
Correct answer is C

Orientation is the ability to understand self and the relationship of self to the environment. Initiation is the ability to start actions independently and carry them through completion. Problem solving refers to the ability to define and analyze a problem, develop a strategy, and evaluate the results.
Deep sleep occurs in phases 3 and 4 of the sleep cycle. During this period which of the following occurs?

a. All vital signs are similar to the individual’s resting waking state
b. Respirations are irregular and increase in rate
c. Muscle tone increases in all skeletal muscles
d. Vital signs, urine formation and muscle oxygen consumption decrease
Correct answer is d

During stage 3 and 4 sleep, muscles are relaxed, respirations are regular, and blood pressure, pulse and urine formation decreases. The individual is soundly asleep and strong stimuli will be needed to awaken him or her.
On her rounds, the night nurse enters a patient’s room and finds that the patient appears to be sleeping. As the nurse listens to the patient’s breathing, she notes that the respirations are very irregular and the patient’s eyes seem to be moving rapidly under the closed lids. The nurse recognizes this state as which of the following sleep states?

a. REM
b. Stage 2
c. Stage 3
d. Stage 4
Correct answer is a

During REM sleep, respirations are irregular and the eye moves rapidly. During the other phases of sleep the patient is relaxed with no eye movements and regular respirations.
Sample Question 12

Which assessment scale is used to interpret the cognitive recovery process after a brain injury?

a. Glasgow Coma Scale  
b. Disability Rating Scale  
c. Ranchos Los Amigos Scale  
d. Functional Independence Measure
Glossary of Terms

- Agnosia: failure to recognize familiar objects
- Agraphia: inability to express thought in writing
- Anomia: inability to recall names of objects
- Anterograde Amnesia: inability to remember ongoing events
- Aphasia (receptive): loss of ability to understand language
- Aphasia (expressive): loss of ability to formulate language
- Apraxia: inability to carry out purposeful movement
- Asterognosis: inability to recognize objects by touch
- Agitation: excesses of behavior, often characterized by restlessness, inability to focus or maintain attention, and irritability
Glossary of Terms

- **Ataxia**: difficulty with muscle coordination
- **Apathy**: presents as bland affect, general lethargy and low motivation
- **Clonus**: rhythmic jerks following quick stretch of muscle
- **Confabulation**: inventing details to compensate for memory loss and other deficits, not done purposefully
- **Contracture**: decreased range of motion due to tissue shortening
- **Cortical blindness**: loss of vision due to visual cortex lesion
- **Diplopia**: seeing two images of a single object
- **Disorientation/confusion**: result of attention problems, fluctuating states of alertness, and memory problems
Glossary of Terms

- Dysarthria: difficulty in speaking due to muscle weakness
- Depression: sadness that may be evident in social withdrawal, crying, self-degrading comments, anxiety and irritability
- Disinhibition: the inability to control verbalizations or behaviors in a socially appropriate way
- Echolalic: imitation of sounds or words without comprehension
- Hemiplegia: paralysis of one side of the body
- Hemiparesis: weakness of one side of the body
- Impulsivity: to act without thought of consequences, may appear to act quickly
Glossary of Terms

- **Kinesthesia**: sensory awareness of body parts as they move
- **Lability**: drastic changes in emotions without apparent reason
- **Lack of insight**: results in denial. Lack internal feedback about their capabilities
- **Nystagmus**: involuntary movement of the eyes
- **Perseveration**: reflexive repetition of certain behaviors, either verbalizations or actions
- **Proprioception**: sensory awareness of the position of body parts
- **Spasticity**: involuntary increase in muscle tone causing resistance
- **Visual field cut**: not seeing object in specific viewing regions
• The number of neurons present in the brain is approximately 100 billion which is about 15 times of the total human population on earth
• When awake, the human brain produces enough electricity to power a small light bulb
• New brain connections are created every time you form a memory.
• The smell of chocolate increases theta brain waves, which triggers relaxation
• You have about 70,000 thoughts a day
• "Sphenopalatine ganglioneuralgia" is the scientific term for brain freeze.
• The human brain has enough memory to hold three million hours of television
• Your brain weighs about 3 pounds. Of that, the dry weight is 60% fat, making your brain the fattiest organ