BRAIN INJURY
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What is a Traumatic Brain Injury
- Blow or jolt to the head or a penetrating injury that disrupts the function of the brain.
- The severity may range from "mild," to "severe,"
- Can result in short or long-term problems with independent function
- Damage to the brain causes a wide variety of different symptoms

Traumatic BI
- **Open Head Injury** - penetrating wound; exposure of the brain, tearing of dura
- **Closed Head Injury** - non-penetrating
  - Focal injury--localized contusions
  - Diffuse injury--severe straining/shearing of axon
  - Coup Contra coup--frontal/temporal vulnerable
  - Stretching/tearing neural structures
  - Acceleration/deceleration
  - Rotational component
Definitions Continued

Non-traumatic Brain Injury (Acquired)
- Disease affecting CNS
- Anoxia
- Aneurysm
- Stroke (CVA)
- Arteriovenous Malformation (AVM)
- Brain Infection/Abscess
- Viral Encephalitis
- Brain Tumor

Typical Causes of TBI
- Falls 35%
- Motor Vehicle 17%
- Struck by/against 16%
- Assault 10%
- Other 22%
TBI Facts and Figures According to BIA
- 5.3 million Americans live with a long-term disability as a result of TBI.
- Motor vehicle crashes and traffic-related incidences are the cause of 31.8% of TBI deaths.
- Males are more likely than females to sustain a TBI at any age.
- 75% of traumatic brain injuries are classified as "mild."
- The annual cost of TBI to society exceeds $76.5 billion.

Symptoms Of Brain Injury
- Physical Impairments: speech, vision, hearing, headaches, motor coordination, spasticity of muscles, paresis or paralysis, seizure disorders, balance, and fatigue.
- Cognitive Impairments: short term memory deficits, impaired concentration, slowness of thinking, limited attention span, impairments of perception, communication skills, planning, writing, reading, and judgment.
- Emotional Impairments: mood swings, self-centeredness, anxiety, depression, lowered self-esteem, sexual dysfunction, restlessness, lack of motivation, and difficulty controlling emotions.

Facts / Risk Factors for TBI
- After one TBI, the risk for a second increases three fold, after two the risk increases eightfold.
- Males are 1.5 times more likely than females to sustain a TBI.
- Males are 3.5 times more likely than females to die of TBI.
- Highest risk group 0-4yrs and 15-19 yrs.
- About half of all persons who sustain TBI are intoxicated at the time of injury.
- Substance Abuse.
- Prior Head Injury or Learning Disability.
- "Risk-Taker" (Personality Style).
- Psychiatric Co-morbidities.
GERIATRIC POPULATION

- Increasing incidence
- Highest morbidity and mortality
- Minor event - major injury
- Delayed symptoms - Brain "shrinkage" in the elderly.

## Factors that Predict Outcome following a BI

- Age - younger do better
- Length of Coma - GCS
- Length of Post traumatic Amnesia - GOAT
- Medical Management/Management of Brain Swelling/ Intracranial Pressure
- Type of Injury
  - Initial Severity of Injury
  - Focal versus Diffuse Injury
- Presence or absence of Secondary Complications

## How Does the Brain Function

- Parietal Lobe
- Frontal Lobe
- Occipital Lobe
- Temporal Lobe
- Cerebellum
- Brainstem
Brainstem

- Where brain connects to the spinal cord.
- Controls—survival functions including breathing, digestion, heart rate, blood pressure and arousal
- Most of the cranial nerves
- Pathway for all fiber tracts passing up and down from peripheral nerves and spinal cord to the highest parts of the brain

Cerebellum

- The portion of the brain (located at the back) which helps coordinate movement
- Damage may result in ataxia or balance problems.
- This can interfere with a person’s ability to walk, talk, eat, and to perform other self care tasks

Temporal Lobe

- Deals with Auditory, visual and memory function
- Language ability
- Sequencing Skills
- Damage causes trouble hearing/processing language/recalling long-term memory/Personality changes
**Parietal Lobe**
- Mostly concerned with sensory input & recognizing sensory information - Tactile Perception (touch)
- Understanding spoken or written language
- Awareness of spatial relations - Allows you to perceive where your body is in relation to other things

**Occipital Lobe**
- Vision control centre for body and brain
- Reading
- Visual Perception
- Recognizing shapes/colors
- Depth perception

**Frontal Lobe**
- Most complicated thought processing & conscious thinking occurs
- Involved in planning, decision making, organizing, problem solving, selective attention, personality and a variety of “higher cognitive functions” (executive functions) including behavior and emotions
Cranial Nerves

- Almost any of the cranial nerves may be damaged at the time of injury
- Frequency of injury to the cranial nerves has been underestimated

What to know:

- Every brain injury is unique
  -- Type and extent of primary injury
  -- Secondary injury and complications
Classifications

- Mild (75%)
  - Temporary effects, but repeated injuries may be cumulative
- Moderate
  - May have good recovery or learn compensation techniques for deficits
- Severe
  - May make significant improvements but often left with permanent residual deficits

Nursing Assessment

- Physical
  - All systems
- Communication
- Behavior
- Safety-Fall Prevention
- Psychosocial
- Education Needs

Most Common Assessment Scales

- Glasgow Coma-Assesses level of Consciousness
- Ranchos Los Amigos-Assesses Cognitive recovery following BI
- FIM- Assesses functional ability
**Glasgow coma scale scoring**

Glasgow scale after 24 hours:
- **11-15** = 91% good recovery
- **8-10** = 59% good recovery
- **5-7** = 28% good recovery
- **3-4** = 13% good recovery

**RANCHO LOS AMIGOS COGNITIVE FUNCTION SCALE**

- Designed as a universal language
- Consists of eight phases
- Patient does not go smoothly from one phase to the next
- Patient may vacillate between phases in the course of one day
- Patient may plateau at any phase

**Road of Recovery**

- Injury
- Coma
- Minimally conscious
- Confusional
- Agitated
- Evolving independence
- Independence
Rancho Levels

- I - No Response - Unresponsive to touch/pain/verbal stimuli
- II - Generalized Response - inconsistent non-purposeful response to pain/stimuli
- III - Localized Response - more focused, tracking, responds to pain, follow simple commands
- IV - Confused/Agitated - Alert, v. active. Possible verbal/physical aggression, inappropriate non-purposeful behavior in response to internal confusion.

Rancho Levels: cont......

- V - Confused/Inappropriate - alert, easily distracted, wandering risk, easily frustrated/agitated by too much external stimuli
- VI - Confused/Appropriate - follows command, short term memory deficits
- VII - Automatic/Appropriate - better performance in familiar environment, robotic manner, increased insight to deficit
- VIII - Purposeful/Appropriate - consistently oriented, intact memory, needs supervision

FIM – Functional Independence Measure

- Constructed to provide a uniform measure of function in rehabilitation setting
- Measures items of self care, mobility, locomotion, communication and social cognition
Brain Injury - Behaviors

- Impulsivity - Diminished Insight (Judgment and safety)
- Perseveration
- Distraction
- Abstract reasoning
- Emotional Lability
- Disinhibition
- Confabulation
- Poor Initiation
- Flat Affect
- Depression
- Anxiety
- Paranoia

Managing Specific Behaviors you may encounter:

- Impulsivity – Tendency to act suddenly & spontaneously without planning or thinking of consequences
  - Ensure safe environment
  - Inform pt when observe behavior; Call attention to consequences
  - Cue pt to slow down and think
  - Orient to use of safety devices/call bell

Managing Specific Behaviors you may encounter: cont….

- Perseveration – Difficulty switching from one topic/task to another; “Stuck”
  - Reorient and redirect as indicated

- Distraction - Can not concentrate
  - Verbal – Acknowledge concern then re-direct to next topic/task or refer to schedule
  - Physical – Guide and re-direct to next step
  - Don’t argue or rationalize
Managing Specific Behaviors you may encounter: cont….

- **Abstract Reasoning** - Concrete thinkers do not understand jokes/humor - Need repetition and consistency
- **Limited Processing**
  - Decreased rate of processing
  - Allow extra time to process directions and for patient to respond to an instruction
  - Read slowly (not loudly)
  - Ask patient for feedback to ensure directions were understood
  - Provide repetition

Managing Specific Behaviors you may encounter: cont….

- **Disinhibition** – Inability to self-monitor thoughts, feelings or actions
  - Try not to laugh or encourage behavior
  - Do not pass judgment
  - Intervene immediately for unsafe/inappropriate behavior
  - Describe behavior to patient and explain why inappropriate; Suggest alternatives
  - Have patient describe why behavior was inappropriate and ask for an appropriate alternative

Managing Specific Behaviors you may encounter: cont….

- **Demanding Behavior** – Unable to delay needs and call for attention
  - Acknowledge and recognize needs and reassure that you want to assist
  - Plan goals and procedures with pt
  - Adhere to schedule
  - Ensure follow through
Managing Specific Behaviors you may encounter: cont….

- **Agitation** - Excessive restlessness; Primitive reaction to perceived internal/external threat

**KEY: PREVENT ESCALATION**
- Acknowledge patient's discomfort; reassure you want to help
- Speak in calm, soothing manner
- Keep lights low in room; Keep TV off
- Be simple and concise
- Step outside room to speak with others
- Observe for triggers; communicate to team

Managing Specific Behaviors you may encounter: cont….

- **Aggression/Combativeness** - Marked by striking out intentionally or unintentionally

- Be aware of your position in relation to patient.
- Stand back to avoid being hit or kicked and to give patient room
- Acknowledge patient's crisis calmly
- Don't back yourself into corner or impulsively react
- Remove objects that may harm patient or others
- Inform patient of specific inappropriate actions, i.e., "It is not OK to hit me. Tell/show me what is bothering you."
- Give patient "Time Out"

Nursing management using the Rancho Scale
Rancho I & II (No Response & Generalized Response)

Level I - Unresponsive to touch, pain or verbal stimuli
Level II – Displays inconsistent, non-purposeful responses to stimuli or pain

Nursing Management
- Talk to pt and family
- Talk in normal tone - using short simple phrases - explain all nursing care
- Orient patient
- Cautious about what is said in front of patient

Rancho Level III (Localized Response)

- Responds in a more focused manner to certain types of stimuli
  - Turns to sound; Tracks
  - Withdraws from pain
  - May follow simple commands inconsistently

Nursing Management
- Allow extra time for response
- Promote sleep/wake cycle
- Do not over stimulate
- Educate family in the above

Rancho Level IV (Confused/Agitated)

- Alert and in heightened state of activity
- Possible verbal and physical aggression
- May display inappropriate, non-purposeful behavior in response to internal confusion
- Short attention span
Nursing Management of Level IV (Confused/Agitated)

- Limit visitors to 2
- Provide quiet and calm; eliminate "noise", control environment for safety
- Reorient and reassure frequently
- Allow as much freedom of movement as is safe
- Do nursing care in short blocks with low stimulation
- Remove items that may frighten/stimulate patient
- Do not force to do things; Listen and follow lead
- Use structure; same way of doing things, same staff
- Give breaks (Patients and staff); look for patterns; involve team
- No short term memory, so consequences don't work
- Prevention is better than intervention...

Nursing Management of Level V (Confused/Inappropriate/Non-agitated)

- Reorient frequently to person, place, time
- Use repetition and constant cueing/re-direction
- Use short, simple comments & questions
- Assist with activity initiation and set-up
- Change topic &/or give rest break for frustration
- Share pictures and objects that were of interest pre-injury

Rancho Level V (Confused/Inappropriate/Non-agitated)

- Alert, easily distracted
- Responsive to commands
- Pays gross attention to environment
- Severely impaired memory; Displays absent carryover from one situation to another
- Wandering with no safety awareness
- May become frustrated/ agitated by too much external stimuli

Nursing Management

- Limit visitors
- Introduce memory aides
- Monitor safety
- Structured activities (Therapy)- encourage participation & give positive feedback
- May use “Behavior plans” and positive feedback
**Rancho Level VI (Confused/Appropriate)**

- Follows commands consistently
- Inconsistently oriented to time and place
- Short-term memory deficits
- Begins to participate in self-care

**Nursing Management**

- Limit visitors
- Use memory aides
- Monitor safety
- Structured activities (Therapy): encourage participation & give positive feedback
- May use “Behavior plans” and positive feedback

**Rancho Level VII (Automatic-Appropriate)**

- May perform tasks in familiar environment
- Robotic manner
- Begins to have insight into deficits
- Continues to have poor judgment and problem-solving skills

**Nursing Management**

- Main goal is reintegration to society
- Do problem solving tasks/exercises: e.g. lost keys
- Treat individual as adults: respect and dignity

**Rancho Level VIII (Purposeful-Appropriate)**

- Consistently oriented
- Correct responses
- Intact memory
- Realistic planning skills
- Needs supervision

**Nursing Management**

- Encourage patient to use own judgment/problem solving
- Encourage independent functioning: use memory aides as needed
- Support need for continued treatment: out-patient/CRP
When Prevention Fails

- Signs of “Escalating” Patient
  - Your own physiological reaction
  - If you sense internal tension, chances are your patient is escalating
- Breathe; Encourage patient to breathe with you
- Have confidence you will do the right thing

When Prevention Fails

- Speak in a manner which is:
  - Soft and calm
  - Reassuring
  - Kind but firm and authoritative

  **AVOID:**
  - Condescending tones
  - Trembling voice
  - Speaking too loud or soft
  - Sounding annoyed

When Prevention Fails

- Neutralize the Reaction

  *****Know your patient’s baseline**
  - Lower stimulation immediately
  - Stop talking
  - Back away, making sure person is safe
  - Calmly reassure patient
  - Find a neutral topic from pt’s history
  - Try to walk with patient
  - Remain in driver’s seat
Preparation for Discharge

- Critical role of nurse in discharge planning
- Identify educational needs for patient and families
- Identify barriers for SAFE discharge home

RN To Discuss:

- Rest & activities limits/Avoid doing anything that could cause another blow or jolt to the head.
- when it’s safe to drive a car, ride a bike, or use heavy equipment due to slow reaction/delayed response.
- Take only NEW meds ordered by MD
- Avoid alcohol- Brain more spongy/soaks in more
- Use memory tools-writing things down
- programs, supports, and services- BIAUSA or regional

Factors that Predict Outcome

- Initial Severity of Injury (using Glasgow Coma Scale)
- Focal versus Diffuse Injury
- Secondary Complications
- Length of Post-traumatic Amnesia (PTA)
- Medical Management/Management of Brain Swelling/Intracranial Swelling
- Pre-morbid functioning/PMH
- Support System
Sample Question 1

Q. One of the best ways to ease the transition from rehabilitation to home for the individual with cognitive and memory impairment is to:

a. Keep the environment at home as calm as possible
b. Have a big welcome home party
c. Have family and friends come to the hospital to attend therapy
d. Follow the same routine at home as in the hospital

Correct answer is: d

In the rehabilitation setting, the patient often flourishes in the very controlled environment, but once home he or she may have a hard time adjusting to the unpredictability of everyday life. A routine will help the individual maintain some sense of control.

Sample Question 2

Q. Family pictures with labels, calendars, maps and schedules are tools that aid a patient with a/an:

a. Memory deficit
b. Attention deficit
c. Cognitive deficit
d. Perceptual deficits
These are all methods to help someone with a memory problem.

Sample Question 3

Q. 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

Answer 3

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.
Sample Question 4

Q. Which of the following symptoms is NOT associated with brain stem injuries?

a. Pupillary changes
b. Loss of consciousness
c. Abnormal posturing
d. Tinnitus

Answer 4

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.

Sample Question 5

Q. Your patient is in recovery from a brain injury and is Racho IV cognitive level. Which of the following is the best example of the structured environment that is recommended in his plan of care?

a. Consistent caregivers with little variation in the daily routines
b. Consistent caregivers with 1:1 caregivers rotated every 4 hours so that they remain fresh.
c. Keeping the room set up in the same manner and using a predictable daily routine.
d. Matching the environment to the patient’s home environment as much as possible so that it is consistent and familiar.
Consistency, repetition and routine are the cornerstone of a structured environment.

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Sample Question 6

Q. Which of the following is less likely to be associated with a poor prognosis from an anoxic brain injury?

a. Older age  
b. Extended time in a coma  
c. Absence of focal injury on brain scans  
d. Delayed development of motor control problems

Answer 6

Correct answer is : c

Injuries sustained in a blow to the head can make an anoxic injury worse. Anoxic injuries tend to be quite diffuse throughout the brain. In addition, focal injury combined with a diffuse injury makes a bad situation that much worse.

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Sample Question 7

Q. 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

Answer 7

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.

Sample Question 8

Q. 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
Answer 8

Correct answer is : c

The temporal lobe controls hearing, taste, and smell and includes the receptive speech centre.

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Sample Question 9

Q. What is the best response to Jim’s mother when she comments, “He can’t really be as bad as you say; he is walking and talking. His confusion will clear and he will be fine.”

a. “Sometimes it is difficult to define outcomes in persons with brain injury. Let’s just wait and see how he recovers. Sometimes, patients with this type of injury do well and at other times they do very poorly with cognitive functioning—even years later.”

b. “He is not out of the woods yet. He could still develop complications from the injury so we need to proceed carefully. Let me teach you about some of the signs and symptoms you need to watch for.”

c. “It is really great that he has progressed so far. We have often seen this type of injury result in significant problems with mental processing so we will need to continue to work on that.”

d. “If we look at where his brain injury occurred, we can expect that he will be in great shape physically and has no damage to his communication centers. We are still worried about the damage to the front of his brain and how it will impact his decision-making and judgment.”

Answer 9

Correct answer is : d

Provide data for the mother to use to learn about function of the brain and why we see what we see. Don’t remove hope but do guide her towards realistic responses to the situation at hand.

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Sample Question 10

Q. 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

Answer 10

Correct answer is: a

The parietal lobe processes sensory input such as pain, temperature, spatial orientation, shape, texture, etc…

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Sample Question 11

Q. 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
Answer 11

Correct answer is: d

The occipital lobe is primarily focused on receiving and interpreting visual stimuli.

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Questions??

References


Welcome to the Brain Injury Association of America. (n.d.).