

Traumatic Brain Injury 101



SANFORD SCHOOL OF MEDICINE

The University of South Dakota

CENTER FOR DISABILITIES

Objectives

- Participants will be able to:
 - Define brain injury and related terms
 - Identify causes of TBI
 - Identify the prevalence of TBI
 - Identify risk factors of TBI
 - Identify brain structures and name their function
 - Discuss why behavior changes due to brain injury



Definitions

Traumatic Brain Injury: An insult to the brain, not of a degenerative or congenital nature but caused by an external physical force, that may produce a diminished or altered state of consciousness, which results in an impairment of cognitive abilities and/or physical functioning. It can also result in the disturbance of behavioral or emotional functioning. These impairments may be either temporary or permanent and cause partial or total functional disability or psychosocial maladjustment.

As defined by the National Head Injury Foundation, now known as the Brain Injury Association of America



Definitions, continued

Acquired Brain Injury: (ABI) is an injury to the brain that has occurred after birth and is not congenital or degenerative. The injury commonly results in a change in neuronal activity, which affects the physical integrity, the metabolic activity, or the functional ability of the cell. The term does not refer to brain injuries induced by birth trauma.

As defined by the National Head Injury Foundation, now known as the Brain Injury Association of America



Causes of TBI/ABI

TBI

- Motor Vehicle Crashes
- Falls
- Gunshot Wounds
- Sports Injuries
- Workplace Injuries
- Shaken Baby Syndrome
- Child Abuse
- Domestic Violence
- Military Actions
- Other injuries caused by trauma

ABI

- TBI
- Tumors
- Blood Clots
- Strokes
- Seizures
- Toxic Exposures
- Infections
- Metabolic Disorders
- Neurotoxic Poisoning
- Lack of oxygen to the brain



Incidence and Prevalence

Incidence

Number of cases of a disease having their onset during a prescribed period of time.

Incidence rate of 506 per 100,000 persons.

1.4 MILLION people sustain a TBI in the United States every year. Of these, there are:

- 50,000 deaths
- 235,000 Hospitalizations
- 1,100,000 Emergency Room Visits

Prevalence

Number of cases of a disease present during a particular interval of time.

5.3 MILLION people in the United States live with a disability as a result of TBI.



Risk Factors



Sex

- Male
- Female



Race

- Caucasian
- African American
- American Indian



Age

- 0-4 years
- 5-9 years
- 10-14 years
- 15-19 years
- 20-24 years
- 25-34 years
- 25-34 years
- 35-44 years
- 45-54 years
- 54-64 years
- 65-74 years
- Over 75 years



Risk Factors

SEX: Males account for 59% of TBI's, females 41%. Males have 1.5 times higher the number of TBI's than females. Also, males have higher rates of hospitalization, ER visits, and deaths. This may be due to: fire-arm use, alcohol use, work related incidents (farm and construction), and participation in contact sports

RACE: African Americans have a higher incidence rate than whites/American Indians.

AGE: The highest incidence is 0-4 year olds, then 15-19 year olds, 5-9 year olds, and over 75 year olds.

The highest rates of death occur in 75 and older group, followed by 20-24 year olds, and 15-19 year olds.

The highest rate of hospitalization is 75 and older, than 15-19 year olds, and 20-24 year olds.

The highest rate of Emergency Room visits were 0-4 year olds, 15-19 year olds, 5-9 year olds, and 10-14 year olds.

AFTER one TBI, the risk for a 2nd is 3 times greater. After 2 TBI's, the risk is 8 times greater.



Severity of Injury

Degree of Injury	#	%	Definition	Glasgow Coma Scale	Signs	Symptoms
Mild	290,000 hospital admissions each year	Up to 80% of injuries are mild	LOC for less than 30 minutes or no LOC	13-15	Amnesia may occur for less than 24 hours, temporary or permanent mental state	Post concussion symptoms
Moderate	No information	10%-30% of injuries are moderate	Coma more than 20-30 minutes, less than 24 hours	9-12	Bruising and bleeding in the brain. Signs on EEG, CT, or MRI.	Some long term problems in one or more areas of life (home, work, community)
Severe	50,000-75,000 persons sustain a severe TBI each year, and between 1/3 & 1/2 of them die	5%-25% are considered severe	Coma longer than 24 hours often lasting days or weeks	3-8	Possible skull fractures with bruising and bleeding. Signs on EEG, CT, or MRI.	Long term impairments in one or more areas of life (home, work, community).



Systems of Care

Acute Hospital Care

Acute Rehabilitation

Skilled Nursing Facility

Post-Acute Rehabilitation

Outpatient Services

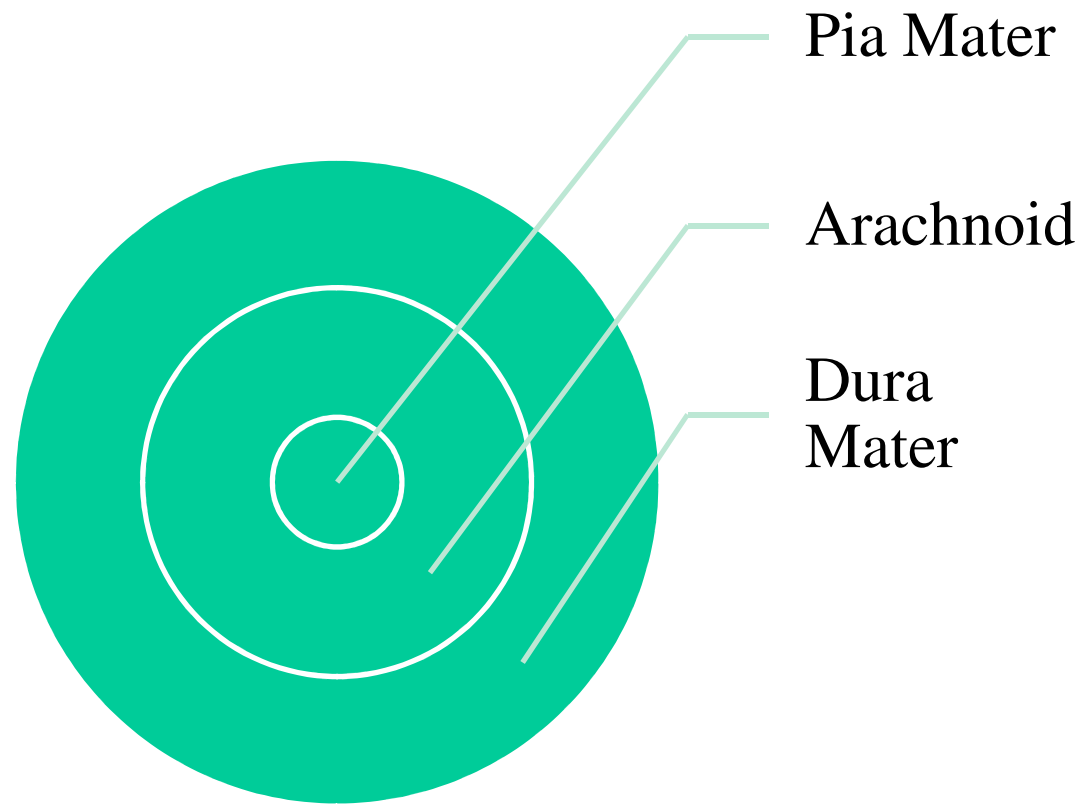
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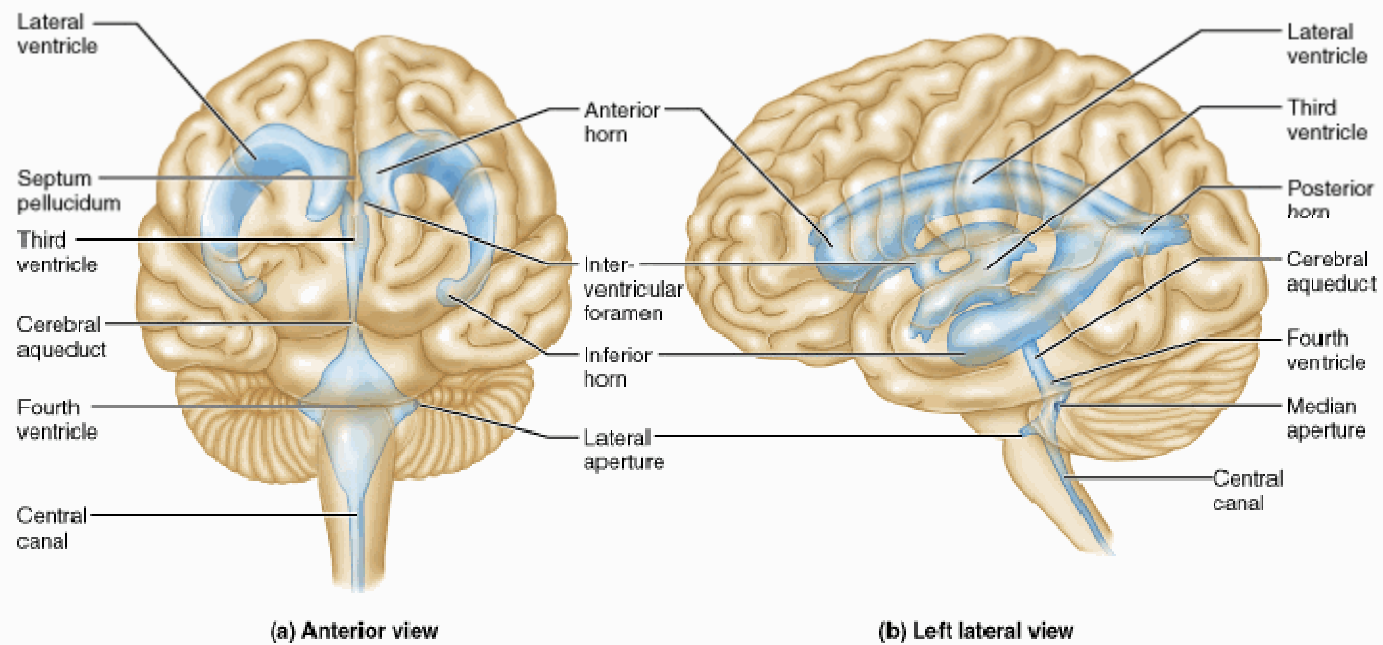
The Brain



Meninges



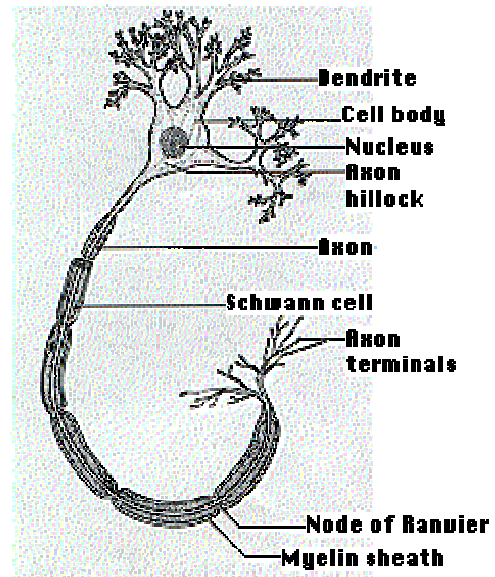
Ventricles



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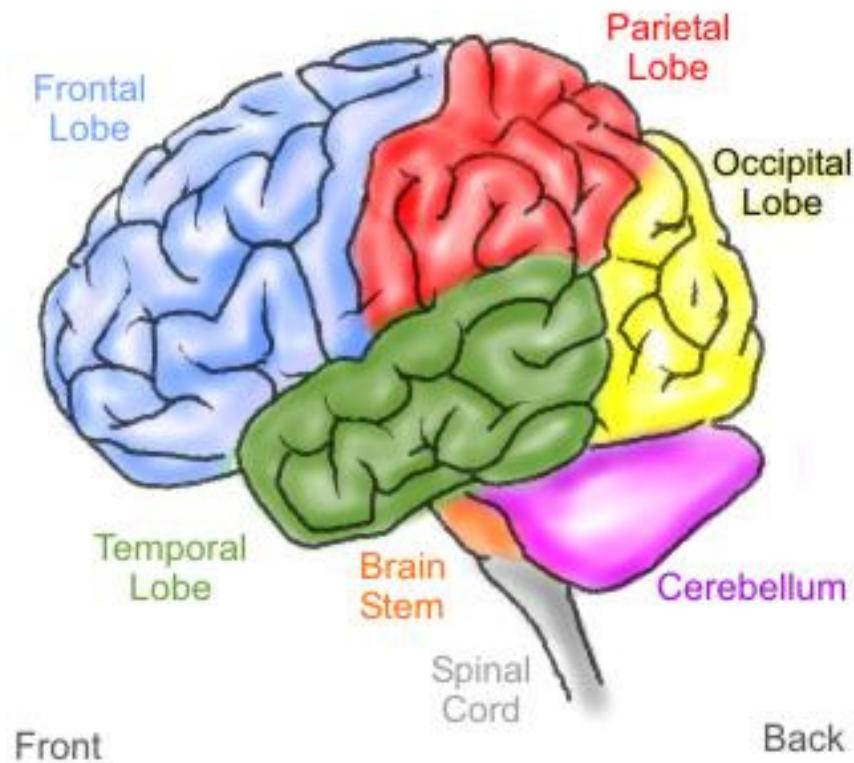


Neurons



Basic parts of the brain

Regions of the Human Brain



Frontal Lobe Functions

Initiation

Problem – Solving

Judgment

Inhibition of behavior

Planning/Anticipation

Self-monitoring

Motor planning

Personality/Emotions

Awareness of abilities/limits

Organization

Attention/Concentration

Mental Flexibility

Speaking



Accommodation Ideas for Executive Functions

- Memory Book/System
- Sequential lists to complete tasks
- Decrease clutter in the environment
- Ensure you have the attention of the person you are talking to



Temporal Lobe Functions

Memory

Hearing

Expressive and Receptive Language

Organization and Sequencing



Accommodation Ideas for Memory Difficulties

- Use a memory book, date book, journal
- Hang a calendar on the wall and note important dates
- Use cueing systems as a reminder of important times
- Post a map of the city where they live
- Label cabinets/drawers



Accommodation Ideas for comprehension difficulties

- Speak in shorter sentences – put one thought in each sentence
- Speak at a slower pace
- Encourage the individual to ask for clarification if it is confusing
- Support communication with simple gestures – like pointing or picking up an object



Accommodation Ideas for expressive language difficulties

- Set up a discrete cueing system to let the person know they are off topic
- Avoid lengthy in-depth discussions
- Use wh- questions as structure for communication
- Follow recommendations from ST



Parietal Lobe Functions

Sense of touch

Differentiation of size, color, shape

Spatial perception

Visual perception



Accommodation Ideas for visual perceptual difficulties

- Place text to the side of where the person will see it
- Place objects on the side where the person may see it
- Decrease clutter and objects



Occipital Lobe Functions

Vision



Accommodation Ideas for visual difficulties

- Place text and objects in the person's view
- Decrease clutter
- Follow ophthalmologists' rec's



Brain Stem Functions

Breathing

Heart rate

Arousal/Consciousness

Sleep/Wake functions

Attention/Concentration



Accommodation Ideas for Attention/Concentration Difficulties

- Make sure working environment is clear and quiet
- Engage the individual in tasks that are shorter in length initially
- Designate a space in the residence where the individual can work uninterrupted
- Assist the individual to keep personal space organized and free of clutter



Cerebellum Functions

Balance

Coordination

Skilled motor activity



Accommodation Ideas for balance/coordination difficulties

- Assist the person with walking, transitioning positions, and ADL's
- Follow rec's from OT/PT



Understanding Behavior

Neurologic Influences: When the brain is injured, the ability to perform certain tasks can be affected as can the ability to control unwanted behaviors.

Environmental Influences: Includes the person's history with the environment and what is learned from that history.



Task Analysis

Break down skill into meaningful, teachable steps.

Example: Brushing Teeth

1. Get Toothbrush
2. Wet Toothbrush
3. Apply Toothpaste
4. Move toothbrush around teeth
5. Rinse mouth
6. Put away toothbrush and toothpaste



Shaping

Used to reinforce target behavior. Relies on steps in task analysis and gradually requires more.

Example: Making a bed



Fading

Uses a gradual change from artificial to more natural cueing.

Example: setting the table



Incidental Teaching

Accidental moment of ability to teach something when it wasn't intended.

Example: Accidentally burns toast while making breakfast



Rewards

When good things happen after a behavior, the behavior is more likely to be repeated in the future. It has been strengthened or reinforced.



Escape and Avoidance

When behavior gets someone out of an unpleasant situation, or removes the threat of one, that behavior may be strengthened.



Punishment

When behavior leads to a negative consequence, it is less likely to happen again.



Extinction

When a behavior that has been previously reinforced is now not followed by a positive reinforcer, the behavior is weakened.



Decreasing Unwanted Behavior

Person centered: Include the individual as much as possible

Supportive: design a plan that will ensure the individual will succeed

Simplicity: make it easy for all staff to understand

Consistency: implement the plan consistently across all staff and settings

Flexibility: make the plan flexible enough to adapt to changes of the individual

Positive: only discuss successes when the person is nearby

Treat everyone with dignity and respect: don't look down on persons you are working with

Stay calm

Don't talk down to people

Don't take things personally

Avoid arguments

Maintain a sense of humor

Redirect: try to get the person to interact or do something different



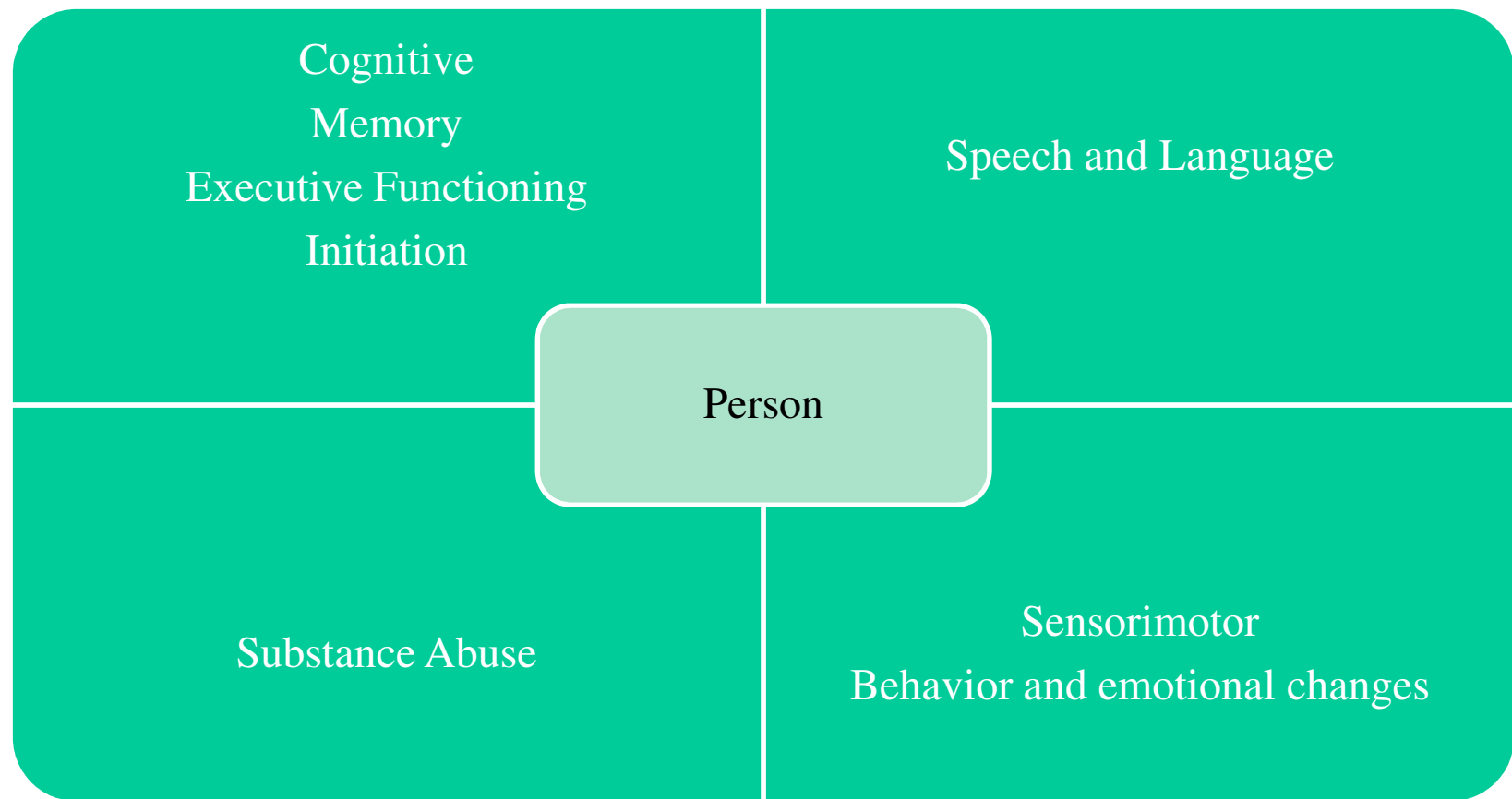
Recovering/Living with a Brain Injury

<http://www.youtube.com/watch?v=8WqNRcc5C0k>

<http://www.youtube.com/watch?v=FgtHvBF4t-E>



Lifelong Difficulties



Communication do's and don'ts

DO:

- Be accepting
- Take every issue seriously
- Address people age appropriately
- Convey respect
- Assist them in problem solving
- State relevant facts to those that need to know
- Remember that you don't know how they feel
- Get all the facts
- Be their equal
- Be sincere

DON'T:

- Be blame/fault finding
- Ignore an issue
- Talk down to anyone
- Patronize
- Take responsibility for their situations
- Gossip
- Say "I know how you feel"
- Make promises you can't keep
- Dominate



For more Information on services available at the Center for Disabilities, please contact us at 800-658-3080, visit our website at www.usd.edu/cd, or email at cd@usd.edu.



Cited Resources

The Essential Brain Injury Guide. (4th ed.)(2007). McLean, VA: Brain Injury Association of America.

Traumatic Brain Injury Provider Training Manual. (2005). Brighton, MI: Department of Health and Human Services Health Resources and Services Administration, Maternal and Child Health Bureau.

Fralish, K. B., & Guercio, A. (1998). Integrative Approaches to Cognitive Rehabilitation. *Brain Injury Source*, 2(3), 18-20, 40.

