

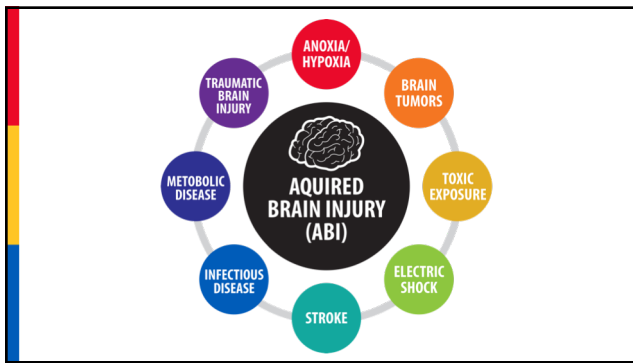
# AN INTRODUCTION TO TRAUMATIC BRAIN INJURY

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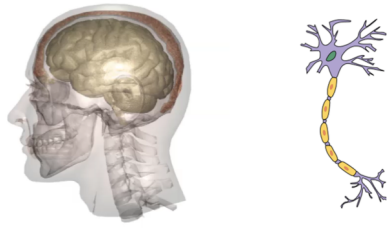
The Brain Injury Association of Michigan 2018 Conference

## OBJECTIVES

- 1 Review the incidence and prevalence of brain injury in Michigan and the nation
- 2 Discuss the recovery and rehabilitation process
- 3 Learn more about how brain injury affects individuals
  - Physically
  - Cognitively
  - Neurobehaviorally
- 4 Review brain injury resources available to you



## MECHANISMS OF TRAUMATIC BRAIN INJURY



## SEVERITY OF TBI

- Glasgow Coma Scale (GCS)
  - 15-point scale that quantifies level of consciousness during very acute phase
  - Measures a person's best
    - eye opening
    - verbal
    - motor response
- Loss of consciousness
- Post traumatic confusion
- Imaging

BEHAVIOR	RESPONSE	SCORE
EYE OPENING RESPONSE (E)	Spontaneously	4
	To speech	3
	To pain	2
VERBAL RESPONSE (V)	Oriented to time, place and person	5
	Confused	4
	Inappropriate words	3
MOTOR RESPONSE (M)	Obeys commands	6
	Moves to localized pain	5
	Flexion withdrawal from pain	4
Abnormal flexion (decorticate)		3
Abnormal extension (decerebrate)		2
No response		1

E + V + M = TOTAL SCORE

3-8 = severe  
9-12 = moderate  
13-15 = mild

## MILD TRAUMATIC BRAIN INJURY (mTBI)

- Glasgow Coma Scale 13-15 at the scene or emergency department (ED)
- Loss of consciousness less than 30 minutes
- Post-traumatic confusion/amenia less than 24 hours
- Most are not treated in the hospital
  - If treated in the ED, individuals are generally seen and released home

## MILD TRAUMATIC BRAIN INJURY (mTBI)

- mTBI accounts for 75% of all TBIs that occur in the US
- Symptoms are considered nonspecific
  - Headache, fatigue, poor sleep, low mood, noise sensitivity, poor memory
  - Symptoms can become a vicious cycle
- For the majority of people, symptoms resolve in 2-4 weeks
- Early intervention, education, and reassurance are the most effective means of reducing disability
  - Coping strategies

## MODERATE AND SEVERE TBI

- Moderate
  - Glasgow Coma Scale 9-12
  - Loss of Consciousness: 30 minutes to 36 hours
  - Confusion/amnesia less than 7 days
  - Potential for life-long changes
- Severe
  - Glasgow Coma Scale 3-8
  - Loss of Consciousness more than 36 hours
  - Confusion/amnesia greater than 1 week
  - Life-long changes in functioning

## OBJECTIVE 1

Review the incidence and prevalence of brain injury in Michigan and the nation

## ANNUAL NUMBER OF TBI CASES IN MICHIGAN

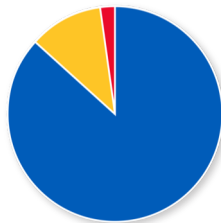


MI TBI Services and Prevention Committee 2012

## INCIDENCE OF TBI

2.5 MILLION TBIs

- TREATED AND RELEASED FROM EMERGENCY DEPARTMENT (2,213,826)
- HOSPITALIZED (283,630)
- DEATH (52,844)



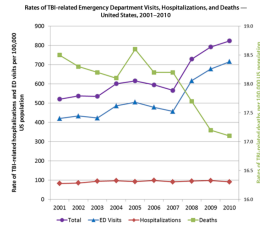
Center for Disease Control and Prevention, 2015

## QUESTION?

Has the reported number of TBI-related deaths increased or decreased?

## INCIDENCE AND PREVALENCE OF TBI

- TBI is a contributing factor in approximately one third of all injury-related deaths in the U.S.
- 75% of TBIs that occur each year are mild TBIs



Centers for Disease Control and Prevention, 2015

## QUESTION?

What **age groups** have the highest incidence of traumatic brain injury?

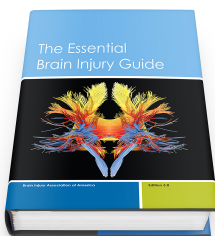
## QUESTION?

Are TBI rates higher for **men** or for **women**?

## OBJECTIVE 2

Rehabilitation and recovery for persons with moderate to severe traumatic brain injury

## TBI AS A CHRONIC HEALTH PROBLEM



- 3.2-5.3 million people in the United States are living with a TBI-related disability
- Among adolescents and adults who received rehabilitation for a TBI:
  - 2 in 10 will have died at 5 years post-injury
  - Nearly 4 in 10 will have declined in functioning as compared to the level of recovery they attained 1-2 years post injury

Centers for Disease Control and Prevention, 2015

## LOOK FOR THE SEAL OF QUALITY

- Joint Commission on the Accreditation of Healthcare Organizations (JCAHO)
  - Hospital-based programs
- Commission for the Accreditation of Rehabilitation Facilities (CARF)
  - Inpatient Rehabilitation
  - Skilled Nursing
  - Residential Rehabilitation
  - Home & Community
  - Vocational
  - Outpatient



## THE RECOVERY PROCESS

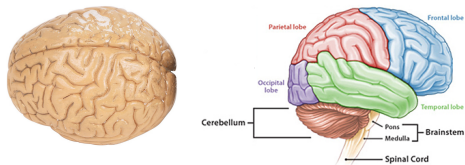
- Educate
- Rehabilitate/Practice
- Compensate
- Acknowledge residual disability
- Anticipate
- Environmental adaptation
- Provide support and structure



## OBJECTIVE 3

Review how brain injury affects individuals

## THE BRAIN



## PHYSICAL COMPLICATIONS

- TBI affects multiple body systems
  - Metabolic/Endocrine
  - Neurological
  - Cardiovascular
  - Pulmonary
  - Gastrointestinal
  - Musculoskeletal
  - Integumentary (Skin)



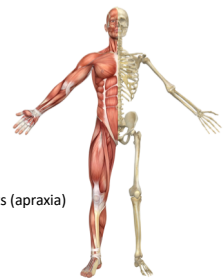
## CARDIOPULMONARY SYSTEM



- Heart rate and blood pressure may be affected
- Aspiration pneumonia
- Deep vein thrombosis
- Long-term lifestyle issues
- Issues can be acute or chronic

## MUSCULOSKELETAL SYSTEM

- Traumatic physical injuries
- Neurologically based complications may include:
  - Decreased muscle tone (flaccidity)
  - Paralysis/paresis of one or more limbs
  - Balance and coordination (ataxia) problems
  - Difficulty planning muscle/motor movements (apraxia)
  - Decreased endurance (neurofatigue)
  - Increased muscle tone (spasticity)



## SENSORY CHANGES



- Vision problems
  - Depth perception
  - Involuntary eye movements (nystagmus)
  - Increased sensitivity to light (photophobia)
- Impaired hearing
  - Ringing in ear (tinnitus)
  - Increased sensitivity to sound

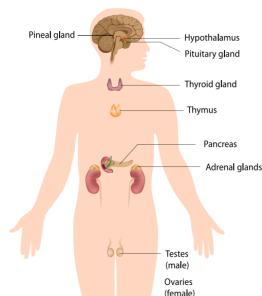
## SENSORY CHANGES



- Loss of sense of smell (anosmia)
  - Up to 30% of individuals with severe TBI may be affected (Costanzo & Zasler)
- Loss of sense of taste
- Safety risks
- Quality of life issue

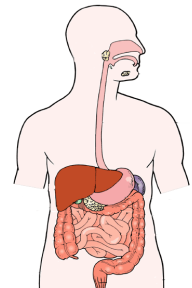
## METABOLIC/ENDOCRINE

- Symptoms may go undiagnosed
- Seek medical consultation



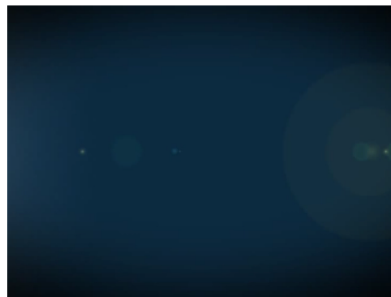
## GASTROINTESTINAL

- Swallowing
  - Complex process and dysfunction can lead to aspiration
- Bladder issues
  - Neurogenic bladder: urgency, incontinence, decreased bladder capacity
  - Awareness of bladder
- Bowel management
  - Important to establish a routine



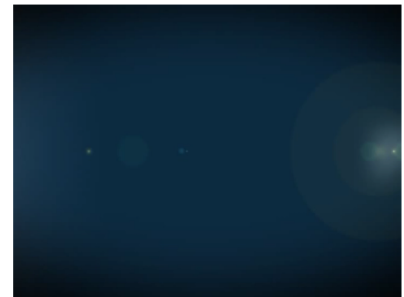
## SKIN

- Monitor for skin integrity
- Pressure relief



## SKIN

- Monitor for skin integrity
- Pressure relief



## QUESTION?

Are **post-traumatic headaches** more prevalent in mild TBI cases or with moderate to severe TBI?

## PAIN

- Headaches
  - More common in mTBI
- Musculoskeletal pain
- Neurological pain



## COGNITIVE IMPACT

- Confusion about who one is, where one is, and the time (disorientation to person, place, and time)
- Common cognitive deficits after moderate to severe TBI include:
  - Attention
  - Processing Speed
  - Learning and Memory
  - Executive Functioning

## ATTENTION

### FOCUSED ATTENTION

The ability to recognize and acknowledge specific sensory information

### SUSTAINED ATTENTION

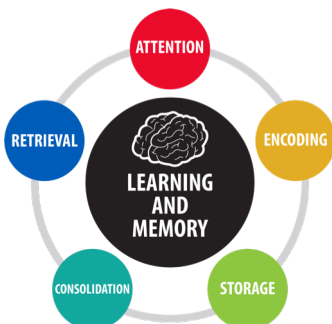
The ability to maintain attention over a period of time during continuous activity

### ALTERNATING ATTENTION

The ability to shift focus between tasks that require different behavioral or cognitive behaviors

### DIVIDED ATTENTION

The ability to respond to more than two events or stimuli simultaneously



## EXECUTIVE FUNCTIONING

- Those capacities that enable a person to engage successfully in independent, purposive, self-serving behaviors." (Lezak, 1995)
  - Difficulty with changes in routine
  - Difficulty with sequencing
  - Difficulty with monitoring, error correction, and trouble shooting
  - Impaired ability to think abstractly
  - Inappropriate or impulsive behavior

## COGNITION

- Visuospatial deficits
- Language deficits
  - Receptive (understanding what is said)
  - Expressive (producing meaningful speech)
- Processing speed
  - Typically slowed after TBI
- Lack of awareness of deficits (anosognosia)

## NEUROBEHAVIORAL

- TBI is associated with changes in personality, mood, and behavior
- Behavior can be excessive or deficient
  - Irritability, anger, difficulty controlling emotions (labile), aggressive, personality changes, inappropriate sexual behavior
  - Lack of emotion or initiation

## QUESTION?

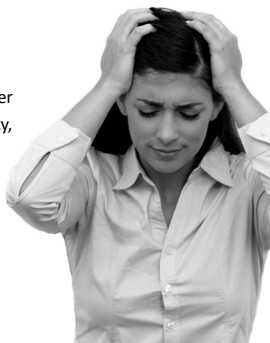
Does the severity of the **TBI** coincide with the severity of **depression**?

## DEPRESSION AND TBI

- Major depression occurred in 44.3% of people with TBI up to 7.5 years post injury (van Raaij, Cohen, & Wong, 2000)
- Estimates are higher than the lifetime prevalence of depression in the general community (Bourdon et al., 1992)
- Multiple factors contribute to the development of depression after TBI
  - Premorbid personality/factors
  - Psychiatric history
  - Social support
  - Reaction to disability and injury
  - Organic changes
  - Gender?

## ANXIETY AND TBI

- A normal human response to danger
- Increased risk of generalized anxiety, panic disorder, and post-traumatic stress disorder (PTSD), obsessive compulsive disorder
  - PTSD is more common in individuals with less severe TBI (Bryant & Harvey, 1998)
  - Changes to the brain contribute to development of anxiety post-TBI



## QUESTION?

Does substance abuse **increase or decrease** post-injury?

## SUBSTANCE USE DISORDERS (SUD)

- High prevalence pre-TBI
- Decline during first year post-injury
- High return-to-use rate within one year post-TBI for persons with pre-injury SUD
- Increased use as time post-injury increases



## QUESTION?

What type of TBI-related deficits cause the most distress for **caregivers**?

## OBJECTIVE 4

Strategies for Success

## QUESTION?

What have you found helpful that has improved your client's life, your significant other's life, or your life?

## FINDING SUCCESS

- Establish a consistent sleep/wake cycle
- Be part of a team
  - Psychiatrist, psychiatrist, PT, OT, SLP, nursing, neuropsychology, etc.
- Evaluate environmental stimulation
  - Quiet environments, dim lights
- Take breaks and seek support
- Advocate

## FINDING SUCCESS

- Create and keep consistent and predictable daily routines
- Planners, memory aides
- Timers and schedules
- Identify hazards/anticipate responses
- Reinforce positive behaviors
- Keep your sense of humor
- Build resilience



## LIVING YOUR BEST LIFE

**P**ositive emotion  
**E**ngagement  
**R**elationships  
**M**eaning  
**A**chievement



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