Introduction to Traumatic brain injury (TBI)

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The instructors have no financial relationships or conflicts of interest to disclose.
Learning Objectives

• Identify statistical trends of TBI in the general US and military populations
• Demonstrate an increased knowledge of the pathophysiology of TBI;
• Identify common signs of mild TBI;
• Identify causes of TBI in service members and civilian population and;
• Explain the key components of evaluation and management of mild TBI.
VA Definition of TBI

A traumatically induced structural injury and/or physiological disruption of brain function as a result of an external force and is indicated by new onset or worsening of at least one of the following clinical signs immediately following the event:

- Any period of loss of or a decreased level of consciousness
- Any loss of memory for events immediately before or after the injury (posttraumatic amnesia)
- Any alteration in mental state at the time of the injury (e.g., confusion, disorientation, slowed thinking, alteration of consciousness/mental state)
- Neurological deficits (e.g., weakness, loss of balance, change in vision, praxis, paresis/plegia, sensory loss, aphasia) that may or may not be transient
- Intracranial lesion

http://www.healthquality.va.gov/guidelines/Rehab/mtbi/mTBICPGFullCPG50821816.pdf
What is a Concussion

• It is at the mild end of the spectrum of traumatic brain injury

• May be confused or have a lapse in memory
  • Reflecting brain dysfunction

• You don’t have to lose consciousness in order to sustain a concussion
What happens to the brain

• Impact shakes the brain inside the skull

• A wave through brain tissue causes discharge of damaging chemicals

• Nerve cells can shear

• Microscopic damage can affect the anatomy and function of brain cells
How can I tell if I had a concussion?

- You don’t have to lose consciousness

- The person may think they were unconscious because they can’t account for some span of time (memory gap)
Common Symptoms of Mild TBI

- Headaches
- Nausea
- Confusion
- Slow thinking
- Sleep changes
- Mood changes
- Dizziness
- State of confusion
  - Length of time can vary, depending on the severity of the injury
  - Could last a few seconds, minutes, or even hours
Continued

• Nausea
  • Due to the swelling of the brain and the release of neurochemicals

• Headaches
  • Most common sign of a concussion

• Mood changes
  • May result in depression due to the dysfunction of the brain
  • Depression may go away, but some need help in counseling or medications
Common Cause of mild TBI

- Motor vehicle collisions
- Falls
  - Toddlers learning to walk
  - Elderly who are beginning to experience coordination problems
- Contact sports
  - More common amongst 15 – 25 year old males
Leading Causes of TBI in General US Population

**Top cause for elderly and children**

- Falls, 40.5%
- Struck by/against, 15.5%
- Unknown/Other, 19.0%
- Motor vehicle traffic, 14.3%
- Assaults, 10.7%

**Top cause for military Non deployed**

http://www.cdc.gov/traumaticbraininjury/get_the_facts.html

*DOD is not included in the CDC numbers*
TBI in General US Population

An estimated 1.7 million people sustain a TBI annually in the U.S. Of them:

- 52,000 die
- 275,000 are hospitalized
- 1.365 million (80%) are treated and released from the ED
- About 75% of TBIs are mild

Source: Centers for Disease Control and Prevention (CDC)
DoD TBI Incidence by Severity

DoD Numbers for Traumatic Brain Injury
Worldwide – Totals

2000-2014

- Penetrating: 4,619
- Severe: 3,171
- Moderate: 26,548
- Mild: 264,344
- Not Classifiable: 21,662

Total - All Severities: 320,344

Source: Defense Medical Surveillance System (DMSS), Theater Medical Data Store (TMDS) provided by the Armed Forces Health Surveillance Center (AFHSC)

Prepared by the Defense and Veterans Brain Injury Center (DVBIC)

2000-2014, as of Feb 23, 2015
Severity

Penetrating (0.05%)
An Injury in which the dura, the outer layer of the meninges, is compromised.

Closed (99.5%)
An injury where the dura remains intact. Further classified as mild, moderate, and severe.
Mechanisms of Blast Injury

- **Primary blast injuries** are caused by the blast’s over pressure wave traveling
  - through the body
- **Secondary blast injuries** are
  - caused by shrapnel and other flying debris hitting the body
- **Tertiary blast injuries** occur
  - from acceleration into a solid object (e.g. ground or interior of vehicle)
- **Quaternary blast injuries**
  - include crush injuries, burns and injuries caused by
  - inhalation of smoke or noxious gases
INITIAL MANAGEMENT OF MILD TBI
If red flags are present: refer to appropriate specialist/level of care

**Provider Algorithm Red Flags:**

1. Progressively declining level of consciousness
2. Progressively declining neurological exam
3. Pupillary asymmetry
4. Seizures
5. Repeated vomiting
6. Clinically verified GCS < 15
7. Neurological deficit: motor or sensory
8. LOC > 5 minutes
9. Double vision
10. Worsening headache
11. Cannot recognize people or disoriented to place
12. Slurred speech
13. Unusual behavior
ACUTE MTBI SYMPTOMS

- Confusion/ memory problems
- Nausea/Emesis
- Irritability
- Balance problems
- Vertigo/dizziness
- Headache
- Photophobia
- Phonophobia

- Sleep problems
- Difficulty concentrating
- Visual disturbances
- Tinnitus
Questions????