Concussion Recognition and Care
Karen Williams, MSN RN, FNP-BC
Temple VA Neurology/Headache Clinic

Disclosures
- Off label use of medications
- The views expressed in this presentation are those of the author and do not reflect the official policy of the Department of the Veterans Affairs, Department of Defense, or U.S. Government.

Overview
- Define Concussion
- Discuss mechanisms of injury
- Review concussion symptoms
- Review treatment
- Resources
- Case review

Traumatic Brain Injury
- Mild/Concussion
- Moderate
- Severe
- Penetrating

Clarifications
- While Mild Traumatic Brain Injury (mTBI) and Concussion are the same thing, term Concussion vs mTBI depends on your specialty
- Not all blows or jolts to the head result in a TBI
- The severity of a TBI may range from “mild” to “severe”
- Mild TBI does not mean the symptoms are mild
- It is not a condition, it is an event

A traumatically induced physiological disruption of the brain function as indicated by at least one of the following:
- Any period of loss of consciousness
- Any loss of memory for events immediately before or after the accident
- Any alteration in mental state at the time of the accident
- Focal neurological deficits that may or may not be transient

 Blow or jolt to head + AOC = concussion
Alteration in Consciousness

- Dazed - inability to process info
- Confused
- “Seeing stars”
- Befuddled facial expression
- Slowed thinking/disorientation
- Difficulty following commands
- Reduced awareness of one’s self
- Inability to carry out a sequence of goal-directed movements

VS.

Adrenalin Rush/Stunned?

Post-traumatic Amnesia

- Period of time where the individual is unable to form new memories
- Determine first thing remembered after the injury event

Westmead post-traumatic amnesia scale

- An incorrect response to any one question on the WPTAS is considered a positive test for cognitive impairment after head injury:
  - What is your name?
  - What is the name of this place?
  - Why are you here?
  - What month are we in?
  - What year are we in?
  - In what town/suburb are you in?
  - How old are you?
  - What is your date of birth?
  - What time of day is it? (morning, afternoon, evening)
  - Three pictures are presented for subsequent recall 14,15

Traumatic Brain Injury Severity

<table>
<thead>
<tr>
<th>Severity</th>
<th>GCS</th>
<th>AOC</th>
<th>LOC</th>
<th>PTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>13-15</td>
<td>&lt;24 hrs</td>
<td>0-30 min</td>
<td>&lt;24 hrs</td>
</tr>
<tr>
<td>Moderate</td>
<td>9-12</td>
<td>&gt;24 hrs</td>
<td>30 min-24 hrs</td>
<td>&gt;24 hrs&lt;7 days</td>
</tr>
<tr>
<td>Severe</td>
<td>3-8</td>
<td>&gt;24 hrs</td>
<td>&gt;24 hrs</td>
<td>&gt;7 days</td>
</tr>
</tbody>
</table>

GCS = Glasgow Coma Scale
AOC = Alteration of consciousness/mental state
LOC = Loss of consciousness
PTA = Posttraumatic amnesia

Positive Neuro imaging increases the severity to at least a moderate
Department of Defense guidelines

TBI Numbers By Severity – All Armed Forces

- Penetrating 4,213
- Severe 2,709
- Moderate 21,779
- Mild 219,921
- Not Classifiable 18,188
- Total - All Severities 266,810

Source: Armed Forces Health Surveillance Center Numbers for 2008 – 2012

TBI Prevalence in Civilian Sector

- Est 2.5 million/year (does not include Armed Forces)
- Falls (40.5%)
- Motor vehicle – traffic (14.3%)
- Struck by/against events (15.5%)
- Assaults (10.7%) 1

Source: http://www.cdc.gov/traumaticbraininjury/get_thefacts.html

19.0% 40.5%
10.7% 14.3%
15.5% 14.3%
10.7% 14.3%
What Studies have to Say About Concussion

• Up to 25% of those with a concussion do not seek medical attention

• Many of those who receive medical attention do not have a head injury diagnosis recorded, esp. if they have multiple traumas

• Pediatricians and primary care providers may be seeing more concussion patients than reported as a 2016 study showed: 81% of pediatric patients were seen first by their primary care, instead of the ER according to a epidemiological study completed on over 8000 pediatric patients in Philadelphia area

Cumulative Brain Injury

• Single concussion increases the risk of additional concussions

• Slower and more difficult recovery times reported with subsequent concussion

• More severe symptoms

Medical Attention

• Natural history is recovery within weeks/months

• A small percentage will have persistent symptoms

• Educational interventions effective in reducing symptoms
Anatomy and Physiology of the Brain

- **Cerebrum**
  - Frontal lobes
  - Parietal lobes
  - Temporal lobes
  - Occipital lobes

---

**Frontal Lobe**

- Memory
- Executive function
  - Calculations
  - Abstract thinking
- Impulse control
  - Broca's area
    - Motor program for spoken and written language

---

**Parietal Lobes**

- Primary somatosensory cortex
- Serves as sensory integration center
- Relay station

---

**Temporal Lobes**

- Hearing
- Memory
- Speech
  - Wernicke's area
    - Receptive speech

---

**Occipital Lobes**

- Primary visual cortex

---

**Clinical diagnosis**

Need the INTERVIEW

- Often helpful to approach the patient in conversation vs. repeated questions
- Ask appropriate questions to nail down the entire timeline
  - Events leading up to the injury event
  - Ask specific questions about the time exactly before and when the event occurred (feeling, seeing, or hearing)
  - Determine whether they have clear memories of being injured
  - LOC or PTA?
    - It is possible to have PTA without LOC

---

*Let them tell the story*
Physical Exam for Concussion

A focused neurologic examination: including a Mental Status Examination (MSE): cranial nerve testing, extremity tone testing, deep tendon reflexes, strength, sensation, gait and postural stability (Romberg/Modified BESS)

A focused vision examination: including gross acuity, eye movement, binocular function and visual fields/attention testing

A focused musculoskeletal examination of the head and neck: including range of motion of the neck, jaw, occipital and focal tenderness and referred pain

Sideline testing of Concussion

- Standard assessment of concussion (SAC)
  - Tests for orientation, immediate memory, concentration, delayed recall, with neurological screening and exertional maneuvers in between the concentration testing and delayed recall

- Military Acute Concussion Evaluation (MACE)
  - Developed by Defense and Veterans Brain Injury Center (DVBiC)
  - History of event + SAC

Red Flags

Condition that requires urgent consultation to Neurology/Neuro-Surgery

- Altered consciousness
- Progressively declining neurological examination
- Pupillary asymmetry
- Seizures
- Repeated vomiting
- Double vision
- Worsening headache
- Cannot recognize people or is disoriented to place
- Behaves unusually or seems confused and irritable
- Slurred speech
- Unsteady on feet
- Weakness or numbness in arms / legs

CT Indications

Acute phase (7 days or less) / New Orleans Criteria

- Physical evidence of trauma above the clavicles
- Seizure
- Vomiting
- Headache
- Short-term memory deficits
  - (persistent anterograde amnesia)
- Age ≥ 60
- Drug or Alcohol Intoxication
- Coagulopathy
- Ejected or struck by a vehicle or fall of 3 ft or 5 stairs*

* Canadian Criteria

Concussions are INVISIBLE; Behavior is the visible part

Common Symptoms Associated with a Concussion

**Physical**

- Headache
- Dizziness
- Balance Problems
- Nausea/Vomiting
- Fatigue
- Visual Disturbances
- Light Sensitivity
- Sleep disturbances

**Cognitive**

- Slowed Thinking
- Poor Concentration
- Memory Problems
- Difficulty Finding Words

**Emotional**

- Anxiety
- Depression
- Irritability
- Mood Swings

**Physical, Cognitive and Emotional Symptoms**
Treatments for Most Common Symptoms

- Headaches
  - Non narcotic pain meds (avoid tramadol)
  - NSAIDS
  - Triptans
  - Tri-cyclics
  - Occipital blocks/Botox/ Acupuncture

- Sleep
  - Relaxation techniques
  - Short-term Sleep-aides (non-benzodiazepine)

**Avoid Tramadol and Benzo's**

### Balance

- Intact Vestibular System
- Visual Input
- Functional Nervous System

**Balance Intact Vestibular System Visual Input Functional Nervous System**

### Concussion Symptom Interaction

- Sleep
- Headache
- Cognitive
- Irritability/Mood

**Treat the most disturbing symptom first**

### Approach to Treatment

- Confirm diagnosis
- Identify most trouble-some symptoms
- Prioritize needs
- Identify appropriate resources
- Provide education
- Medications
  - Start low and go slow
  - Avoid medications that can worsen cognition

### Early Interventions

- Encourage monitored progressive return to normal duty/work/activity
  - Per American Academy of Neurology guidelines 2013

- Recommend graded exercise with close monitoring: important to keep from having additional head injuries
  - 2nd impact syndrome is rare but can occur
  - Potential for long term issues, longer recovery

- House Bill 1824
  - Return To Play for children to age 18
  - Requires an evaluation by a licensed healthcare provider trained in evaluation and treatment of concussion
### Education
- Early education decreases symptom prevalence (Ponsford et al., 2002)
  - Natural history of TBI & Expected Recovery
  - Sleep hygiene techniques (avoid Benzodiazepines)
  - Abstinence from drug & alcohol use
  - Proper nutrition/limited caffeine/Omega 3 fish oil
  - Coping strategies/Journaling/Stress management
  - Avoidance of repeat concussions

**Early Education is Key**

### Safety
- At-risk population
  - Physical injury
    - Falls
    - Vehicular crashes
  - Accidental overdose/use medication organizers
  - Change/ delay in reaction time
  - Repeat concussions
  - Effects of Anesthesia
    - Increased cognitive deficits and inability to recover/Brain-injured patients are more sensitive to medication
    - Use of local anesthetics whenever possible
    - Limited use of systemic medication

**Multiple areas of concern**

### “I take a little blue pill”

#### The Little Blue Pill
- Amitriptyline
- Carbidopa/levodopa
- Morphine
- Percocet
- Naproxyn
- Cyclobenzaprine

### CoOccurring Symptom Aggregate (COSAG)
- Impaired concentration
- Sensitivity to noise/light
- Dizziness
- Vision difficulties
- Change in sleep/wake patterns
- Loss of interest in activities

### mTBI/Concussion
- Impaired concentration
- Sleep disturbances/Fatigue
- Headaches
- Cognitive impairment
- Meltdowns
- Irritability
- Depression
- Anxiety
- Loss of interest in activities

### Look for Co-occurring conditions

### PTSD
- Flashbacks
- Hypervigilance
- Nightmares
- Social avoidance
- Depression/Anxiety
- Loss of interest in activities

### Sleep Disturbances
- Impaired concentration
- Decreased reaction time
- Daytime sleepiness
- Fatigue
- Impaired immune system
- Weight gain
- Chronic pain

### When symptoms increase:
Consider Pre-morbid/Co-morbid Issues
Multiple disciplines may be needed for treatment

- Neurology- Initial Evaluation and Headache, Sleep and Pain Management
- Behavioral Health- Mood, Sleep, and Pain Management, Neuropsych/Cognitive Testing and Treatment
- Social Work- Biopsychosocial Evaluation Educate and support (individual and family) based upon this evaluation
- Audiology- Tinnitus, Vestibular Assessment, Auditory Processing, hearing aids (may need ENT as well)

Specific Specialties for Concussion Treatment

- Physical Therapy- Balance, Gait and Vestibular Management
- Optometry- Binocular Function testing and treatment (Ocular Motor Dysfunction)
- Speech Language Pathology- Evaluate Speech and Language Skills for Social and Cognitive Communication and Fluency
- Occupational Therapy- Cognitive Assessment, ADL including Functional Independence and Vocational Skills
- Registered Dietitian- Evaluate intake, Chewing/Swallowing Difficulties, Nausea, Poor Dietary Habits

Case presentation

Service member injured while on deployment in Iraq

Background

- Service member evacuated from Iraq- was in the front right seat in a MRAP direct hit from Improvised Explosive Device (IED). Stated he was dazed with head ringing, able to continue on the mission and was assessed at the Forward Operating Base (FOB).
- C/o H/a, tinnitus, irritability, dizziness and photophobia
- Initial Treatment included rest and started on Nortriptyline, but still symptomatic after 16 days.
- Evacuated to Landstuhl Regional Medical Center (LRMC)

Symptoms

- Headache- throbbing all over, pain behind the eyes, nausea when headache severe, worse with exertion and bright lights
- Photophobia/phonophobia
- Vision- pain with moving eyes
- Short-term memory issues
- Tinnitus in right ear
- Irritability
- Trouble falling and staying asleep with nightmares
Social history

- E4 (Corporal) with 4 yrs in service
- Military Occupational Specialty (MOS)- truck driver
- 2nd deployment and 8 months into 12 month deployment
- Separated /High school graduate, 2 college courses/ no tobacco/10 beers on weekend/no caffeine/balanced diet
- Medical Hx-none significant

Significant exam findings

- Short-term memory issues- MMSE 29/30
- Right occipital tenderness
- c/o pain with moving eyes
- In-balance with first ambulating

Treatment/Outcome

- Occipital block- Bilateral
- Ibuprofen 800mg TID
- Nortriptyline 25mg changed to morning /ambien 10mg at night- improved sleep and reduced headache to occasional
- Optometry and PT- balance improved with exercises given
- Speech Thy- testing revealed normal memory after sleep improved
- Psychology- improvement in mood with sleep and headache improvement
- Tinnitus improved and cleared from audiology
- Return To Duty (RTD) after 10 days of therapy at LRMC/33 days after event

RESOURCES

- Practice Guideline
  - Care of the Patient with Mild Traumatic Brain Injury
  - Practice Guideline Series from:
    - American Association of Neuroscience Nurses (AANN)
    www.AANN.org
    - Association of Rehabilitation Nurses (ARN)
    www.rehabnurse.org

VA/DoD Guidelines

- Management of Concussion/Mild Traumatic Brain Injury
dvbic.dcoe.mil

- DVBIC Network Interactive Map
- Education and Care Coordination
- TBI Surveillance
- Research
- Provider Information
- Friends and Family
- TBI Basics

Pocket Guide/Coding

To order hard copies of the:
MILD TBI Pocket Guide or ICD-10 Coding Guidance for Traumatic Brain Injury Pocket Card, contact DVBIC at dvbic.dcoe.mil

Training

Centers for Disease (CDC) “Heads UP” program
- Partnering with Sports leagues
- Coaches training
- School Personnel training
- Provider training
  - Acute Concussion Eval (ACE)
  - Care plans for work and school

www.CDC.gov

Summary

- Blow or jolt to head + AOC = concussion
- Concussion = mild Traumatic brain Injury or mTBI
- Mild TBI does not mean the symptoms are mild
- Invisible Injury/Common Injury/LOC not needed
- Early Education is Key/Prevention of future Injury is Important

Summary

- Let them tell the story
- Physical, Cognitive and Emotional Symptoms
- Look for balance, vision and headache
- Treat the most disturbing symptom first
- Consider co-occurring disorders
- Multidisciplinary treatment may be needed
- Utilize resources
Don’t forget prevention is the best medicine

References

3. Moss NE et al. Admissions after a head injury: How many occur and how many are recorded. Inj 1996; 27 156-161
4. Arbogast KB et al. Point of Health Care Entry for Youth with Concussion. Within a Large Pediatric Care Network. JAMA Pediatric. Published online May 31, 2016

References (continued)


Karen Williams MSN, RN, FNP-BC

karen.williams1@VA.gov

254-743-2759