

Traumatic Brain Injury in War Veterans

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(AP PHOTO)

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The views expressed in this presentation are of the presenter and not of DOD or VA



Traumatic Brain Injury in Veteran Population

- Diagnostic criteria for TBI
 - Clinical presentation, symptoms of TBI
 - Relate how combination of PTSD and TBI may impact presenting symptoms amongst veterans
 - Relate how TBI affects most aspects of veterans' lives
 - Relate how new generations of veterans may react to understanding of TBI and how it may impact treatment of TBI
 - Understand the current state of research and development in treatment modalities for veterans who suffer from TBI
 - Treatment modalities
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What is TBI?

- Traumatic Brain Injury (TBI) is a non-degenerative, non-congenital insult to the brain from an external mechanical force.
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DVBIC (Defense and Veterans Brain Injury Center) Definition of TBI

- A Traumatic Brain Injury (TBI) is the result of a blow or jolt to the head or a penetrating head injury that disrupts the function of the brain.
 - **Not all blows or jolts to the head result in a TBI.** The severity of such an injury may range from “mild”—a brief change in mental status or consciousness—to “severe.”
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Mild Traumatic Brain Injury

- DOD and VA define mTBI: A traumatically induced structural injury and/or physiological disruption of brain function as a result of an external force that is indicated by new onset or worsening of at least one of the following clinical signs, immediately following the event:
 - Loss of consciousness
 - Alteration of consciousness
 - Post-traumatic Amnesia
 - Neurologic deficits that may not be transient
 - Intracranial lesion
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Traumatic Brain Injury

- A common question is, "can someone have TBI but never lose consciousness?"
 - YES
 - Some one with bullet in head walk in conscious and ask for help.....
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I.E.D. Blasts on the roadside in Iraq/Afghanistan brought awareness to TBI



Number of cases of TBI

- Mild Traumatic Brain Injury (mTBI) is commonly reported in the military population with approximately **344,030** incident diagnoses in service members since 2000.
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DVBIC Number of Service Members Diagnosed with Traumatic Brain Injury

2009	28,958	
2008	28,538	
2007	23,218	
2006	17,036	
2005	15,530	
2004	14,468	
2003	12,815	
2002	12,407	
2001	11,619	
2000	10,958	

DVBIC Number of Service Members Diagnosed with Traumatic Brain Injury

Year	Number of Service Members Diagnosed	
Total	344,030	
2015	22,594	
2014	25,093	
2013	27,646	
2012	30,801	
2011	32,907	
2010	29,442	

Report to Congress on Traumatic Brain Injury in the United States:

- The Centers for Disease Control and Prevention's (CDC) National Center for Injury Prevention and Control (NCIPC) estimates: Each year approximately 1.7 million **civilians** sustain a TBI.
 - Of these TBI injuries, which can occur alone or in combination with other injuries, about 1.36 million are treated and released from EDs, 275,000 are hospitalized, and 52,000 die. However, not all of these ED visits, hospitalizations and deaths are attributable to TBI, but may be due to other co-occurring injuries. These data suggest that approx. 80% of TBIs are mild.
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Mild Traumatic Brain Injury: Background

- The resolution of symptoms is generally rapid in the civilian literature with many individuals resolving all symptoms by 3 months.
 - Both the civilian and military literature provide evidence that the greater the burden of co-occurring disorders, the higher the likelihood that symptoms will persist following mTBI.
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Mechanism of Injury during war

- Insert movie clip
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Can this cause TBI and PTSD

- The answer is yes in large number of veterans
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Typical Presenting Symptoms of mTBI

- Headache
- Insomnia
- Memory, attention problems
- Neuropsychiatric issues – depression, anxiety, irritability, anger, lability
- Pain
- Balance problems, dizziness, vertigo, hearing problems
- Getting lost due to cognitive deficits
- Decreased sexual drive



Clinical presentations

- Case of 24 years old W/M who was hit in head in hatch of a tank, and also exposed to explosion with injury to neck with loss of consciousness, returned home and getting lost in his hometown due to loss of navigation system in brain
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Examples of Personality Change Due to General Medical Condition

- A 46 years old soldier who had stroke on Russian ship at the beginning of OIF-1 with no medical care for 3-4 days and eventually returned to Fort Hood with marked labile mood and aggressive behavior and punched his first sergeant during formation
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Traumatic Brain Injury

Every thing is processed through brain

- **Physical problems.**
 - Physical problems may include hearing loss, tinnitus (ringing or buzzing in the ears), headaches, seizures, dizziness, nausea, vomiting, blurred vision, decreased smell or taste, dizziness, reduced strength and coordination in the body, arms, and legs
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Traumatic Brain Injury

- **Communication problems.**
 - Individuals with a brain injury often have cognitive and communication deficits that significantly impair their ability to live independently. These deficits vary depending on how widespread brain damage is and the location of the injury
 - E.g. Chaplain in Iraq hit by rocket attack..
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Communication Problems

- Trouble *finding the words or grammatical constructions* and to *understand both written and spoken messages*,
 - May have newfound difficulties with *spelling, writing, reading skills* that presented no problem prior to their injury
 - Deficits in *social communication skills*
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Cognition Problems

- Cognition refers to thinking skills. Cognition includes an awareness of one's surroundings, sustained attention to tasks, memory, calculations, reasoning, problem solving, and executive functioning (e.g., Goal setting, planning, initiating, self-awareness, self-inhibiting, self-monitoring and evaluation, flexibility of thinking).
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Cognition disturbance

- Ask a person what do you do with a pen...
 - A case of OIF soldiers who cannot find his way around while driving on roads he used to drive in the area he grew up
 - Cannot plan a day: Chaplain from Iraq could not plan day's activities and sermon
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Emotional problems

- Labile mood/affect from tearful to angry
 - Anger outbursts
 - Analogy of brain processor damaged which controls emotions
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Behavioral disturbance

- Impulsive behavior
- Getting into fights
- Use of inappropriate profane language
- Driving recklessly
- Withdrawn from family
- Personality change

There is overlap of symptoms between TBI and PTSD

Mechanism of Injury during war

- Video of mechanics of brain injury
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Traumatic Brain Injury

- “Subtle brain injury.”
 - It is essential to understand that even though there was no documented loss of consciousness, no blow to the head, negative imaging studies that there can be a profound permanent change in the way the brain works, after a concussion
 - E.g. Blast injury from explosion
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Traumatic Brain Injury

- **Regeneration isn't total recovery:**
 - Neurometabolic changes
 - Alteration of neuro-modulation
 - Up or down regulation of neurochemical transmission
 - Changes in neuro pathways due to Diffuse Axonal Injury
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Traumatic Brain Injury

- **Hematoma**

- A swelling or mass of blood. **Epidural** - a hematoma above the dura mater. **Subdural** - a hematoma located beneath the dura. **Intracerebral** - a hemorrhage localized in one area of the brain.
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Traumatic Brain Injury

- **Gunshot**
 - Gunshot wound to the head causing lacerations and bleeding
 - **Contrecoup**
 - A specific area of brain injury located directly opposite to the site of impact to the head that results from linear violent collisions of the brain with the skull
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Traumatic Brain Injury

- **Aneurysm**

- Localized abnormal dilation of a blood vessel due to weakness in the wall of the vessel

- **Diffuse injury**

- Widespread and extensive injury to tissues of the brain resulting from severe distortions of the brain and collisions of the brain with the skull.
This injury may not be detectable by routine MRI or CAT scan
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Traumatic Brain Injury

- Regardless of the severity of the injury, there is a significant ignorance about the long term behavioral problems and symptoms of brain injury.
 - Fortunately awareness of TBI is rapidly increasing due to massive efforts in training in TBI through DOD and VA
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Importance of obtaining history

- Specifically ask for history of head injury.
 - E.G. convoy was hit by I.E.D.S., crashes
 - Head injuries during accidents.
 - Gather history from family members and friends who had known the individual prior to head injury.
 - History of other medical conditions including strokes, meningitis.
 - Case of gulf war I vet who was hospitalized for ear infection later causing meningitis.
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Referral for neuropsychological testing

- The diagnosis is established by focused clinical history obtained from the patient, **his/her family members** and neuropsychological testing. Neuropsychological testing is an extensive battery of tests which will assess the cognitive deficits to be completed **30 days post-injury**.
 - Neuropsychological testing is available in larger DOD medical facilities and most V.A. Medical centers as well as in private sectors. The extent of Neuropsychological testing varies from facility to facility
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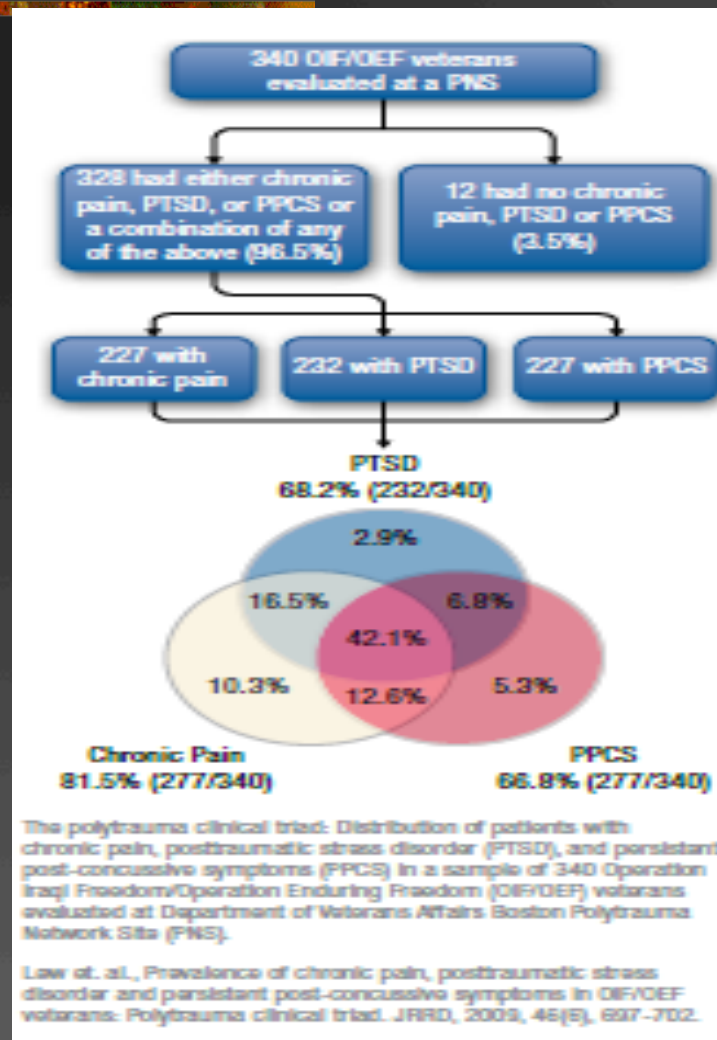
Incidence of TBI

- 75-95% are mild
 - 30% of all football players may have mild TBI
 - This injury often goes undiagnosed, exacerbating the accompanying symptoms and prolonging the recovery
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Mild Traumatic Brain Injury (mTBI) & Co-Occurring Disorders

- The vast majority of patients who present to the clinic with a diagnosis of mild Traumatic Brain Injury (mTBI) do not often present with mTBI alone
 - Of the veterans presenting to a **Polytrauma Network Site** in Lew's study (2009), 81.5% had more than one diagnosis and 42.1% had three co-occurring diagnosis including pain, posttraumatic stress disorder (PTSD), and Persistent post-concussion syndrome (PPCS)
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Co-Occurring Disorders, PTSD, Chronic pain and Persistent Post Concussion Symptoms



Mild Traumatic Brain Injury (mTBI) & Co-Occurring Disorders

- Veterans with positive TBI screens are more likely to have a diagnosis of PTSD, depression, and substance abuse disorder
 - Given these preliminary findings, there is a need to consider how to approach the Service member or veteran with mTBI and co-occurring psychological health difficulties
 - Both the civilian and military literature provide evidence that the greater the burden of co-occurring disorders, the higher the likelihood that symptoms will persist following mTBI
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PTSD and TBI

- Individuals who serve in combat are at a high risk for the development of PTSD
 - A recent systematic review of the evidence found that for those with probable mTBI the frequency of co-morbid probable PTSD was 33-39% (Carlson et al., 2010).
 - The presence of PTSD complicates the diagnosis of mTBI post-injury as many of the complaints overlap (irritability, depressive symptoms, cognitive difficulties)
 - Recent studies of individuals who have persistent symptoms following a mTBI suggest that the presence of PTSD may prolong the duration of symptoms and potentially exacerbate the severity of those symptoms (Brenner et al., 2010)
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PTSD and TBI

- Is there a way to differentiate anger, irritability, concentration, mood changes vs lability, caused by PTSD Vs TBI?
- There is no neuropsychological testing detects personality changes, lability caused by TBI. The diagnosis made by clinical interview of patients and family members to know pre-morbid functioning and personality. E.g OIF veterans who was hit in head by power point projector screen with 20 minute loss of consciousness

TBI and Chronic pain

- A meta-analysis that considered veteran populations separately found a 43.1% pain prevalence rate (95% CI, 39.9%-46.3%; Nampiaparampil, 2008).
- Though that study found that brain injury has an independent relationship with chronic pain, over and above other diagnoses (i.e., PTSD or depression), other reports have demonstrated the contribution of PTSD, insomnia, fatigue, and depression to reports of pain severity (Dobschka et al., 2008).
- In addition, many veterans from the OEF/OIF/OND conflicts present with other injuries, such as amputations, orthopedic injuries
- Narcotic pain meds may worsen cognition and PTSD

mTBI and Headache

- Headache is the most frequent persistent symptom following mTBI and is often the most disruptive to the individual's functional ability
 - Approximately 90% of individuals experience headache following a mild TBI (Lew et al., 2006) and they generally develop within 7 days of the injury. One third to one-half of individuals with mTBI report headache five years after injury (Dobscha et al., 2008)
 - Headache origin does not follow only from impact to the head but can arise from trauma to the head, neck cervical spinal column, spinal cord, neck musculature
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OIF/OEF veterans with common sequelae of Blast Injury

- • Brain Injury
 - • Fractures
 - • Psychological-PTSD
 - • Burns
 - • Eye, Orbit, Face injury
 - • Renal
 - • Cardiac and Vascular
 - • Auditory/Vestibular
 - Amputation
 - Wounds
 - Crush Injuries
 - Pain
 - Dental
 - Respiratory
 - Gastrointestinal
 - Peripheral Nerve
-

OIF and OEF veterans

- Younger population
 - Screened before and after leaving theater of war for both PTSD and TBI
 - Screened after return back to home
 - Have been coming to VA in increasing numbers.
 - Most TBI cases diagnosed are OIF/OEF vets as shared above
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Model for TBI treatment program

- Screening
 - Assessment
 - Treatment
 - Education
 - Patient follow up
 - Surveillance
 - Usually done at a specialized TBI clinic
 - Treat the whole person not a isolated symptom
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Principles of TBI Treatment

- PM&R, Neurology
 - Primary Care
 - Mental/Behavioral Health, Neuropsychology, Clinical psychology, Social work
 - Speech, Occupational, Physical Therapy,
 - Case Management, Nursing
 - Vestibular, Audiology,
 - Pain management, Optometry
 - Mood stabilizers for anger management
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OIF and OEF veterans

- Treatment challenges
- Many may not come to VA till repeated referral and requests by family members
- After being diagnosed with PTSD and TBI may not stay in treatment long enough to get benefits from it
- Return to VA behavioral when in crisis
- Approximately only 10% comply and use treatment to improve lives
- Multiple family problems at this age group
- Alcohol and substance abuse

Rehabilitation programs

- **VA Sites**

Hunter McGuire VAMC, Richmond, VA
[Richmond DVBIC.pdf](#)

James A. Haley VAH, Tampa, FL
www.tampavapmrs.org/TBI.htm

Minneapolis VAMC, Minneapolis, MN
[Minneapolis VA Web Site Narrative.pdf](#)

VA Palo Alto Health Care System, Palo Alto, CA
<http://guide.stanford.edu/varehab>

When to Refer

- Refer if the evaluation/referral will:
 - Tell you something you don't already know
 - Make a difference in the patient's treatment or management
 - Patients who present with memory, attention, executive function problems which did not respond to initial treatment of re-assurance, sleep education may be referred to cognitive rehab therapists with expertise in TBI (speech/language pathology, occupational therapist and Neuro-psychology)
 - Use of external memory aids (PDA and navigation devices)
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Poly-trauma/TBI system of care

- Polytrauma Rehabilitation Centers (PRC) (San Antonio)
 - Polytrauma Network Sites (PNS) (St Louis)
 - Polytrauma Support Clinic Teams (PSCT) (KCVA)
 - Polytrauma Point of Contact (PPOC)
 - Case Management
 - Family Support
 - Integrated Communication System
 - Community Reintegration
 - Long Term Follow-up
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Conclusion

- It is essential for us to look for after effects of head injuries in soldiers, civilians who have been exposed to explosions from IEDs, VBIEDs, other explosions, sport injuries and accidents.
 - Obtain history from family members and close friends for change in behavior.
 - With any suspicion of traumatic brain injury refer the soldier to Neuropsychologist or a clinician who is trained to assess traumatic brain injury.
 - Ideal cognitive rehab team: Holistic, interdisciplinary team with designated team leader competent in brain injury rehab and military culture.
 - VA/DOD have published guidelines for details for management of mTBI.
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Conclusion

Traumatic brain injuries are common during war time.

To conclude as one of the General said “if a soldier has his legs blown off by I.E.D, we better start looking for what happens to his brain which is only 3-4 feet away from his legs”.



Questions

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