TBI Clinical Guidance Initiatives

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DoD TBI Definition

- **Traumatically induced structural injury or physiological disruption of brain function as a result of external force to the head**
- **New or worsening of at least one of the following clinical signs**
  - Loss of consciousness or decreased consciousness
  - Loss of memory immediately before or after injury
  - Alteration in mental status (confused, disoriented, slow thinking)
  - Neurological deficits
  - Intracranial lesion
- **DoD Definition parallels standard medical definition**
  - CDC, WHO, AAN, ACRM

Severity Rating for TBI

Traumatic Brain Injury Description

Severity	GCS	AOC	LOC	PTA	Imaging
Mild	**13-15**	**≤ 24 hrs**	**0-30 min**	**≤ 24 hrs**	**Normal**
Moderate	**9-12**	**> 24 hrs**	**> 30 min** **< 24 hrs**	**> 24 hrs** **< 7 days**	**Normal or Abnormal**
Severe	**3-8**	**> 24 hrs**	**≥ 24 hrs**	**≥ 7 days**	**Normal or Abnormal**

GCS- Glasgow Coma Score

AOC- Alteration in consciousness

LOC -Loss of consciousness

PTA- Post-traumatic amnesia

TBI Clinical Standards: Severity, Stages, Environment

Types of TBI

Mild

Moderate

Severe

Penetrating

TBI Post-Injury Stages

Acute

Sub-Acute

Chronic

Levels of TBI Care

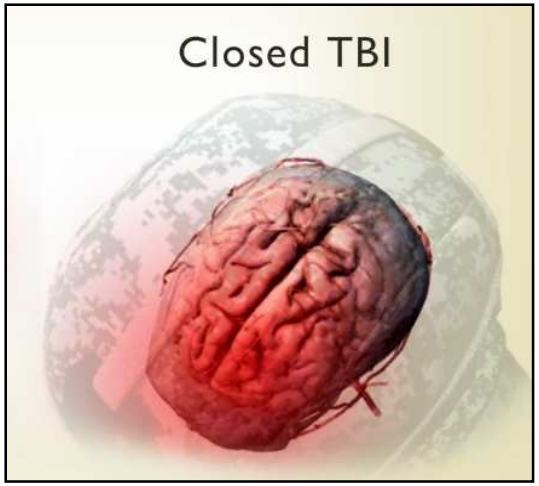
In-theater

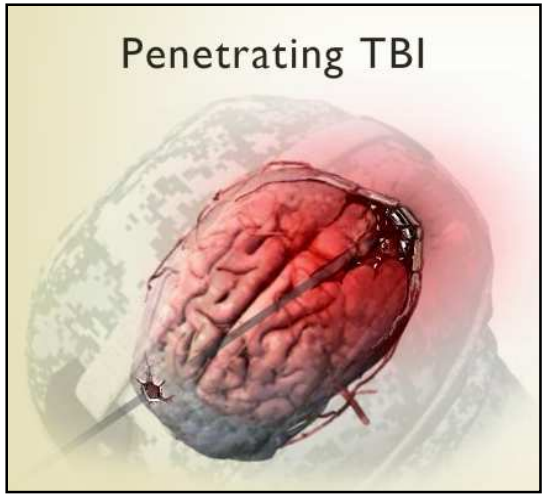
CONUS

In-patient

Outpatient

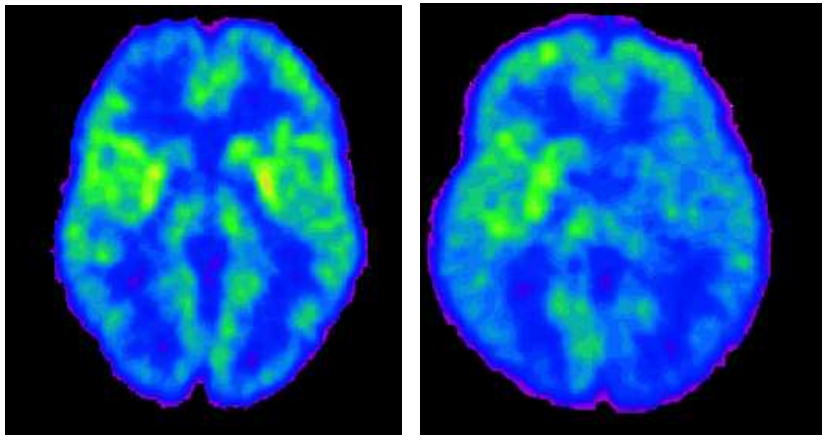
Community

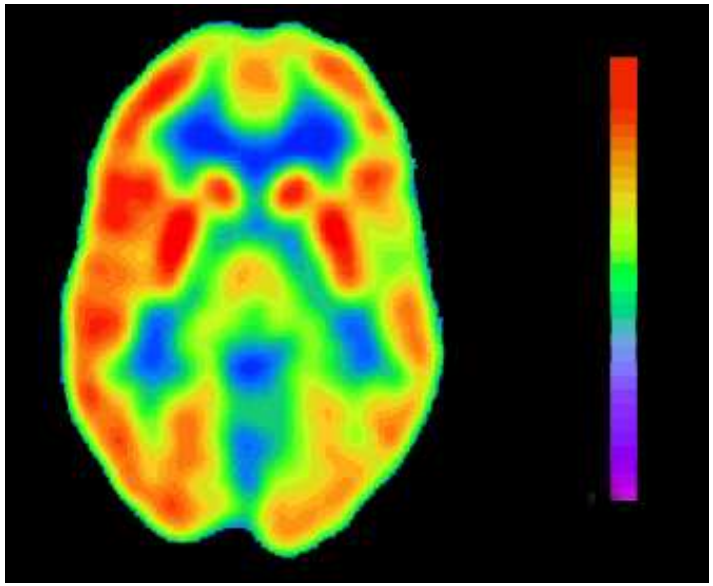




Operational Implications

- **Growing body of science shows the pathophysiologic effects of concussion**
- **Early detection leads to early treatment and improved outcome**
- **Undiagnosed concussion can result in:**
  - Symptoms affecting operational readiness
  - Risk of recurrent concussion during the healing period
- **Tracking recurrent concussion will allow for comprehensive medical evaluation of high risk Service members, ensuring a fit fighting force and care for the individual**





Bergsneider et al., J Neurotrauma 17:2000

Treatment

MILD TBI

- **Primary Care**
- **Referral to TBI specialist after initial management failure**
- **Core TBI interventions (if required) may include:**
  - Cognitive rehabilitation
  - Vestibular/balance therapy
  - Medication management
  - Vision therapy
  - Driving rehabilitation
  - Assistive technology
  - Tinnitus management
  - Headache Management
  - Complementary and alternative medicine interventions

MODERATE / SEVERE / PENETRATING

- **In-theater Acute Field Management**
- **First Responder actions (Combat Lifesaver)**
- **Neurosurgical theater presence**
- **Continuing evolution of air transport capabilities**
- **DoD TBI centers, VA Polytrauma Rehabilitation Centers, Civilian Rehabilitation Programs**
- **Family Caregiver Education Curricula**

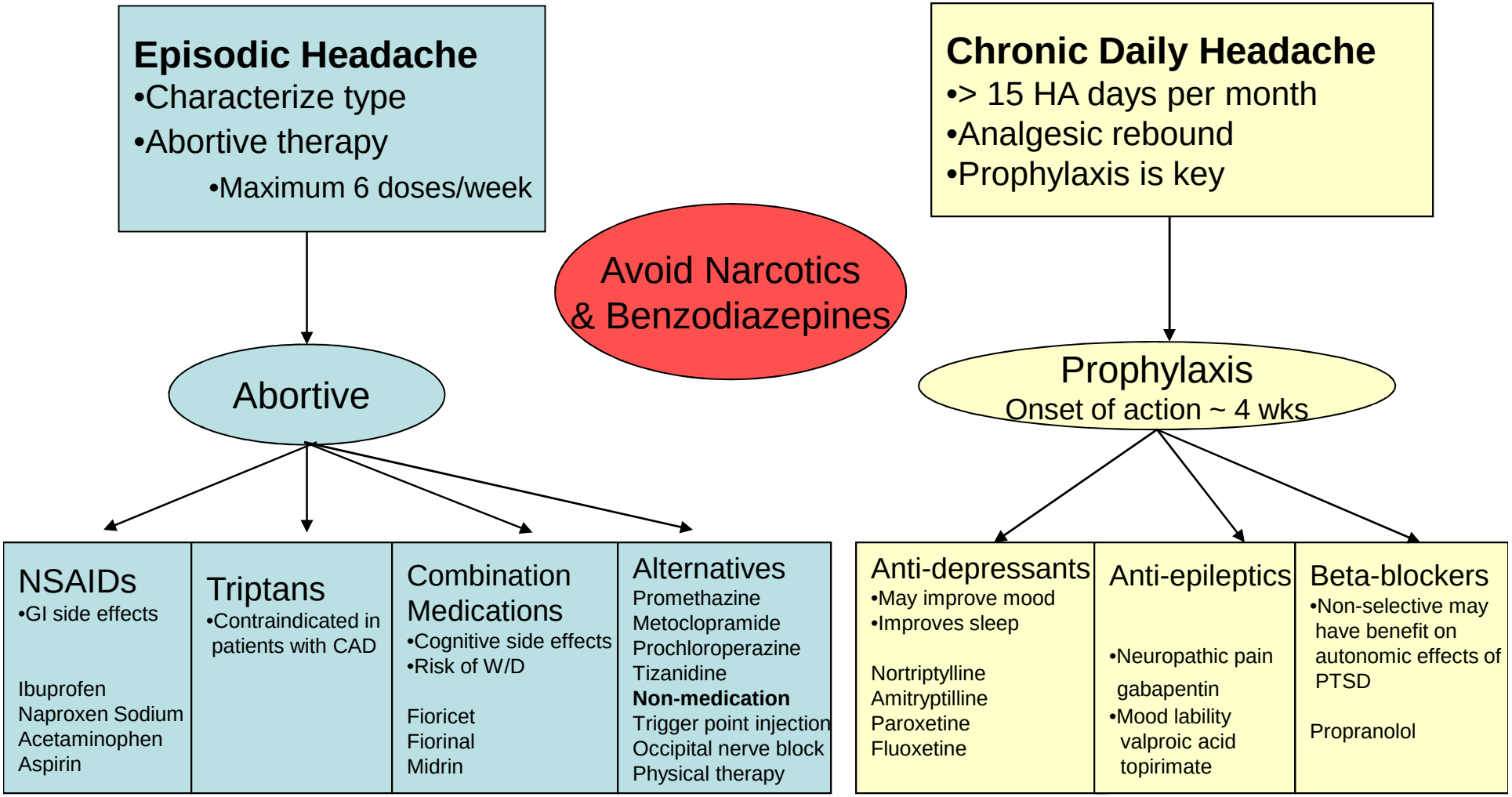
Treatment

- **Moderate/Severe/Penetrating CPGs**
  - Guidelines for Management of Severe TBI (1995, 2004, 2007)
    - Brain Trauma Foundation
  - Field Mgt of Combat Related Head Trauma (2006)
    - DVBIC and Brain Trauma Foundation
  - Surgical Management for TBI
    - AANS/CNS Section
  - Penetrating Brain Injury Guidelines
    - AANS/CNS Section
  - Guidelines for the Pharmacologic Treatment of Neurobehavioral Sequelae of TBI (2006)
    - DVBIC
  - Nursing Management of Adults with Severe TBI (2008)
    - DVBIC/DCoE Supported

CONUS Guidelines for mTBI/Concussion

- **OSD/HA Clinical Guidance (May 2008):**
  - Acute: up to 7 days
  - Subacute
  - Class III (Consensus) Guidelines
- **VA/DoD Clinical Guidelines (April 2009):**
  - Subacute: beyond 7 days
  - Chronic

Treatment: Headache



Treatment: Cognitive Rehabilitation in mTBI

- **Accelerating but still small body of scientific literature supporting cognitive rehabilitation in mTBI**
- **DoD Programs (inventory of current programs)**
- **Outsourced care vs MTF provided**
- **DCoE/DVBIC Consensus Conference – April 2009**
  - 2-day; 50 members
  - DoD (Quad Service)
  - DVA representation
  - SOCOM representation
  - Reserve Affairs representation
  - Civilian Subject Matter Experts

Treatment: Cognitive Rehabilitation in mTBI

- Cognitive domains affected after TBI
  - Attention
    - Foundation for other cognitive functions/goal-directed behavior
    - Efficacy of attention training established
  - Memory
    - True memory impairment vs poor memory performance from inattention
    - Evidence to support development of memory strategies and training in use of assistive devices (‘memory prosthetics’)
  - Social/Emotional
    - Evidence to support group sessions in conjunction with individual goal setting
  - Executive Function
    - Evidence to support training use of multiple step strategies, strategic thinking and/or multitasking
- Compensatory vs restorative therapy

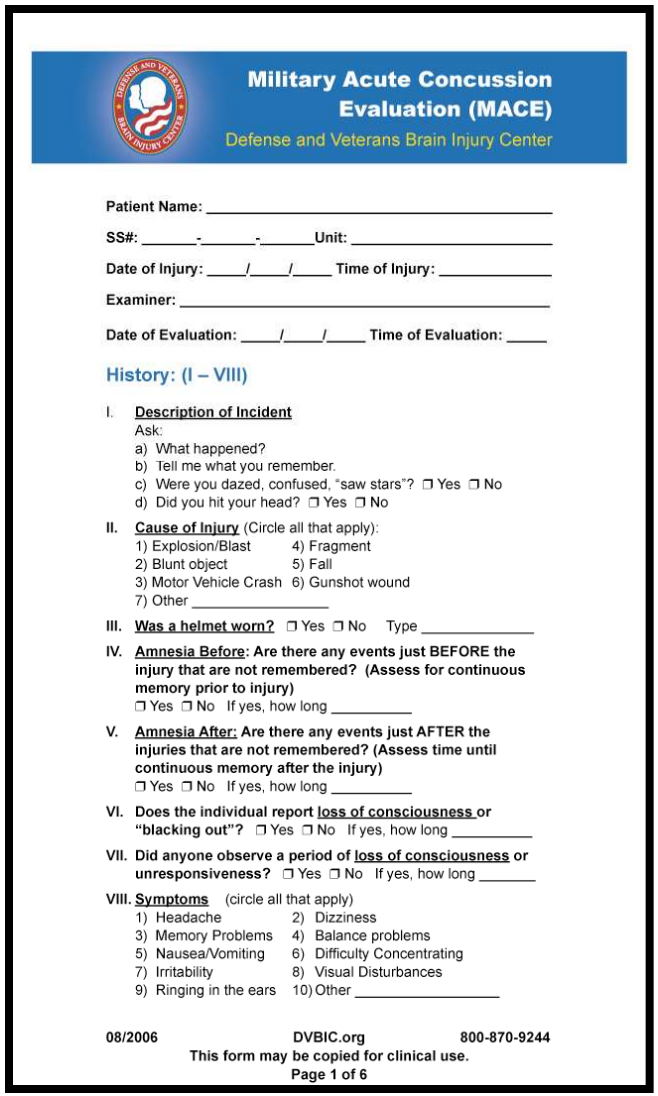
In-Theater Guidelines for Mild TBI/Concussion

- 2007: Developed by JTTS and DVBIC and deployed
- 2008: Revision: Includes Psychological Health Co-Morbidity
- 2009: Proposed Revisions
  - Symptom-Based → Incident-Based
  - Adding “Recurrent Concussion” Guidance
- Identification of red flags
  - Those that may need neurosurgical intervention
- Cornerstones of treatment
  - Protect from further injury to the brain
  - Medications for symptomatic relief
  - Education stressing positive expectations for full recovery
  - Follow recovery course and RTD

Tri-service Multi-agency Gray Team

- **Optimize care as close to point of injury as possible**
- **Policy on repeat concussions**
- **CENTCOM coordination to assign in-theater TBI champion**
- **Integrate clinical, operational and technical initiatives**

MACE: Military Acute Concussion Evaluation



Military Acute Concussion Evaluation (MACE)

Defense and Veterans Brain Injury Center

Patient Name: _____

SS#: _____-_____-_____ **Unit:** _____

Date of Injury: ____/____/____ **Time of Injury:** _____

Examiner: _____

Date of Evaluation: ____/____/____ **Time of Evaluation:** ____

History: (I – VIII)

I. **Description of Incident**
Ask:
a) What happened?
b) Tell me what you remember.
c) Were you dazed, confused, "saw stars"? ❒ Yes ❒ No
d) Did you hit your head? ❒ Yes ❒ No

II. **Cause of Injury** (Circle all that apply):
1) Explosion/Blast 4) Fragment
2) Blunt object 5) Fall
3) Motor Vehicle Crash 6) Gunshot wound
7) Other _____

III. **Was a helmet worn?** ❒ Yes ❒ No Type _____

IV. **Amnesia Before: Are there any events just BEFORE the injury that are not remembered? (Assess for continuous memory prior to injury)**
❒ Yes ❒ No If yes, how long _____

V. **Amnesia After: Are there any events just AFTER the injuries that are not remembered? (Assess time until continuous memory after the injury)**
❒ Yes ❒ No If yes, how long _____

VI. **Does the individual report loss of consciousness or "blacking out"?** ❒ Yes ❒ No If yes, how long _____

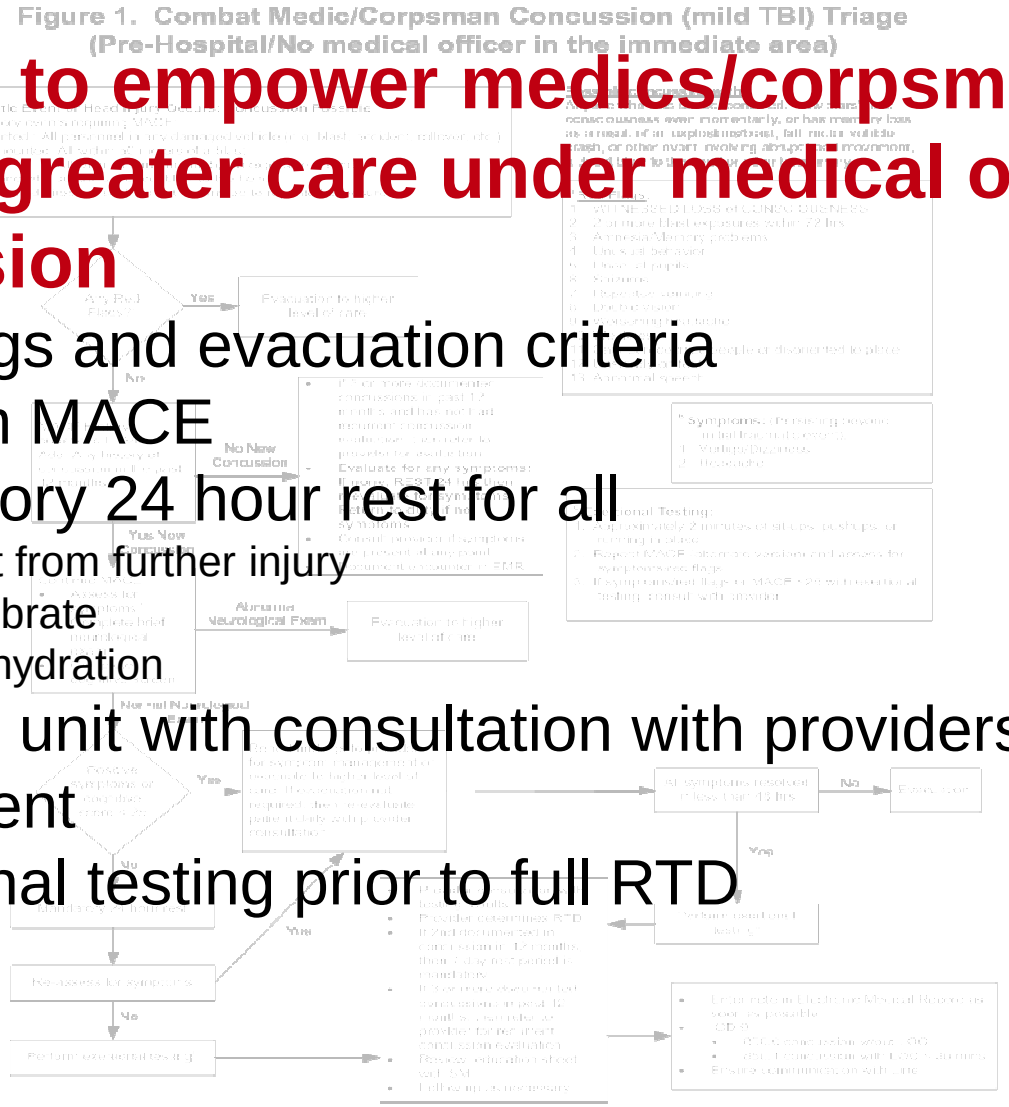
VII. **Did anyone observe a period of loss of consciousness or unresponsiveness?** ❒ Yes ❒ No If yes, how long _____

VIII. **Symptoms** (circle all that apply)
1) Headache 2) Dizziness
3) Memory Problems 4) Balance problems
5) Nausea/Vomiting 6) Difficulty Concentrating
7) Irritability 8) Visual Disturbances
9) Ringing in the ears 10) Other _____

08/2006 DVBIC.org 800-870-9244
This form may be copied for clinical use.
Page 1 of 6

- **Developed by DVBIC and released in Aug 2006**
- **Performed by medical personnel**
- **3-Part Screening Tool – "CNS"**
  - Cognition
  - Neurological Exam
  - Symptoms
- **Alternate versions available**
- **Upcoming revision will include recurrent concussion questions**
- **Can be used during exertional testing to ensure that cognitive function remains intact**

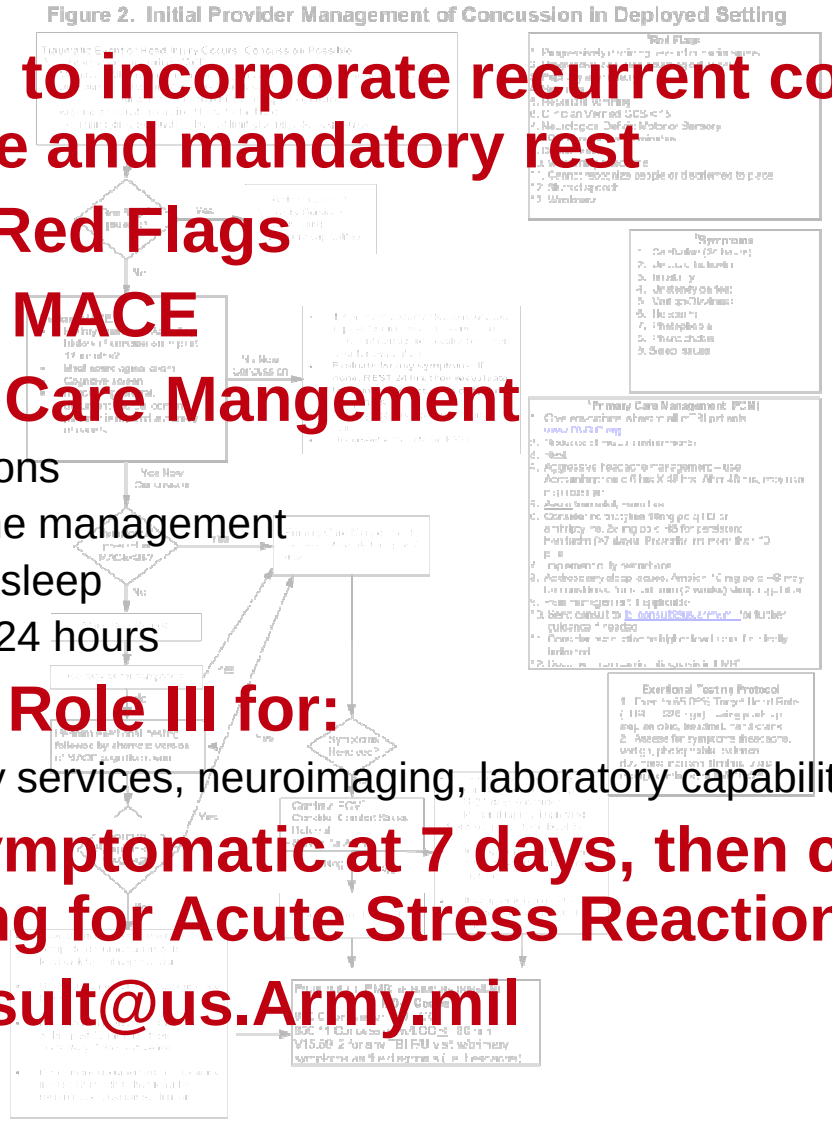
Combat Medic/Corpsman Algorithm



- **Updated to empower medics/corpsmen to provide greater care under medical officer supervision**
  - Red flags and evacuation criteria
  - Perform MACE
  - Mandatory 24 hour rest for all
    - Protect from further injury
    - Re-calibrate
    - Sleep/hydration
  - Keep in unit with consultation with providers
  - Document
  - Exertional testing prior to full RTD

Intent. The goal is to assess for red flags quickly and if a service member is found to require further consultation, the medic/corpsman is given guidance to further discuss the injury with a provider

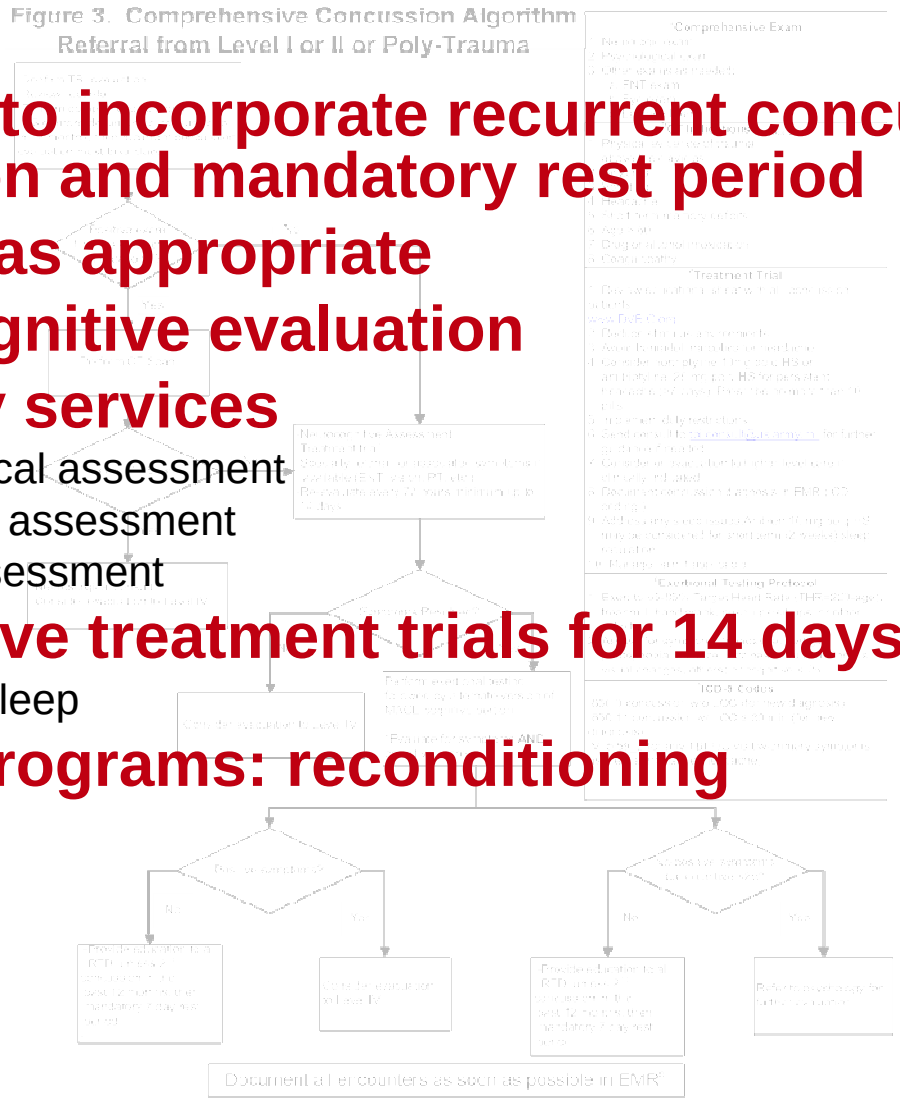
Initial Provider Management Algorithm



- **Updated to incorporate recurrent concussion guidance and mandatory rest**
- **Review Red Flags**
- **Perform MACE**
- **Primary Care Mangement**
  - Medications
  - Headache management
  - Address sleep
  - Rest for 24 hours
- **Refer to Role III for:**
  - Specialty services, neuroimaging, laboratory capability
- **If still symptomatic at 7 days, then consider screening for Acute Stress Reaction**
- **TBI.consult@us.Army.mil**

Intent: Definitive assessment and care is given by providers to include a more detailed assessment, management recommendations and consideration for evacuation to a higher level of care.

Comprehensive Concussion Algorithm

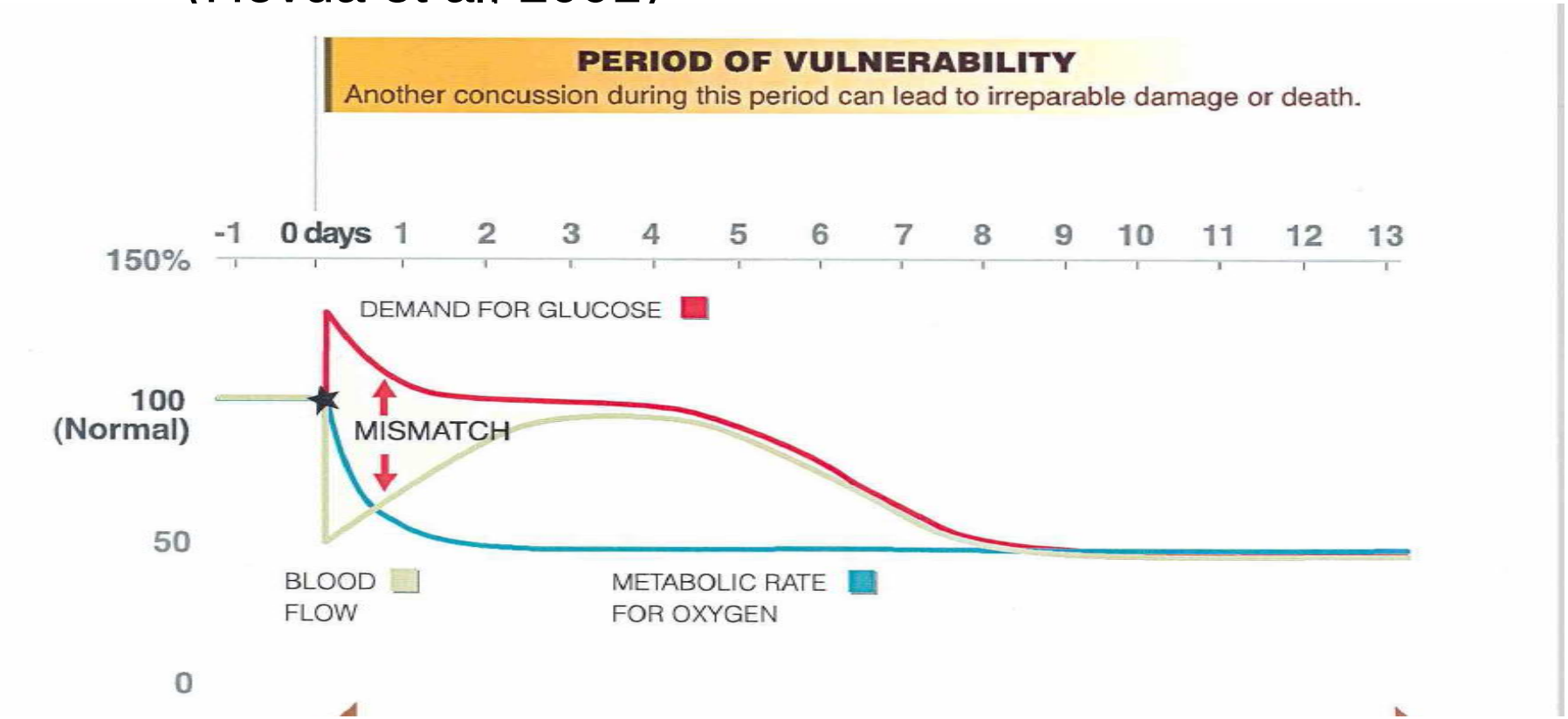


- **Updated to incorporate recurrent concussion evaluation and mandatory rest period**
- **CT scan as appropriate**
- **Neurocognitive evaluation**
- **Specialty services**
  - Neurological assessment
  - Vestibular assessment
  - Visual assessment
- **Aggressive treatment trials for 14 days**
  - Address sleep
- **Role III programs: reconditioning**

***Intent:** Additional resources available at Level 3 facilities allow further evaluation and more comprehensive management for those patients who present acutely with concussion and/or have persistent symptoms.*

Recurrent Concussion

Neurometabolic Changes and Concussion (Hovda et al. 2001)



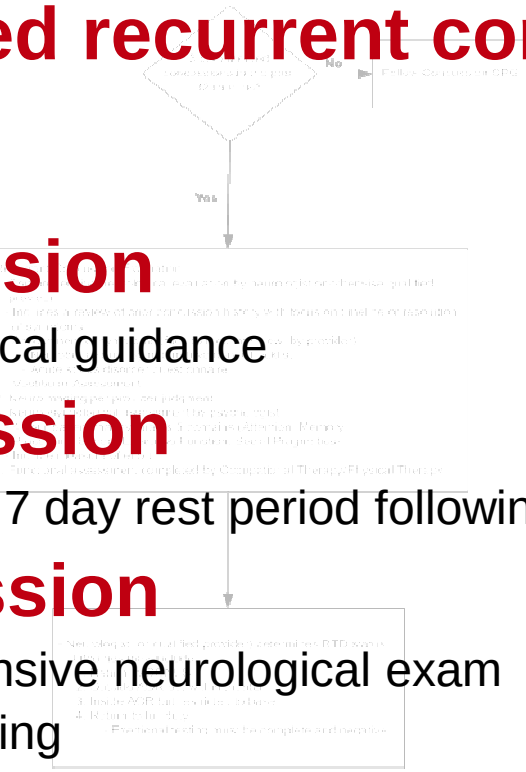
Recurrent Concussion: Cumulative Effects

- **History of 3 previous concussions increases the risk of repeat concussions 3-fold (Guskiewicz, 2003)**
- **Athletes with a history of 3+ concussions report significantly more symptoms, lower memory scores at baseline**
- **Symptoms following repeat concussion may be more serious and resolve at a slower rate**

- **USMC Policy RC South: Restrict to FOB**
  - 3 Concussions or 2 Grade III Concussions
  - USMC and Army data projects 1-2%
- **New Tasking: Theater neurologist to assist in evaluations and new protocols to address recurrent concussion**

Recurrent Concussion Evaluation Algorithm

Figure 4. Recurrent Concussion (3 documented in 12 month span) Evaluation Algorithm



Documented recurrent concussions within 12 months:

- **1st concussion**
  - Follow clinical guidance
- **2nd concussion**
  - Mandatory 7 day rest period following resolution of symptoms
- **3rd concussion**
  - Comprehensive neurological exam
  - Neuroimaging
  - Neuropsychological assessment (attention, memory, processing speed, executive function, social pragmatics)
  - Functional assessment

Mission requirements may supersede individual member welfare in certain operational environments.

Intent: To ensure those Service members who have sustained 3 documented concussions in a 12 month period receive a recurrent concussion evaluation in order to guide further treatment or guide return to duty recommendations.

Early Detection: In-Theater Clinical Practice Guidelines

Currently Being Codified in Directive Type Memorandum

SCENARIOS REQUIRING MANDATORY MEDICAL SCREENING

- **Mounted: All personnel in any damaged vehicle (e.g. blast, accident, rollover, etc)**
- **Dismounted: All within 50m of a blast; All within a structure hit by an explosive device**
- **Anyone who sustains a direct blow to the head or loss of consciousness**
- **Command directed**
  - NOT limited to repeated exposures

MEDICAL SCREENING REQUIREMENTS

- **ALL RECEIVE:**
  - **Medic/corpsman evaluation (MACE)**
  - **Minimum 24 hrs downtime**
  - **Medical re-evaluation pre-RTD**
  - **Event capture/tracking**
- **mTBI/Concussive Event**
  - **Medical evaluation above with physician, PA or NP oversight**
- **Witnessed Loss of Consciousness**
  - **Neurological evaluation by physician, PA or NP**
  - **Loss of consciousness greater than 5 minutes requires evacuation to Level III facility**

Early Detection: In-Theater Clinical Practice Guidelines

Currently Being Codified in Directive Type Memorandum

I.E.D. Assessment

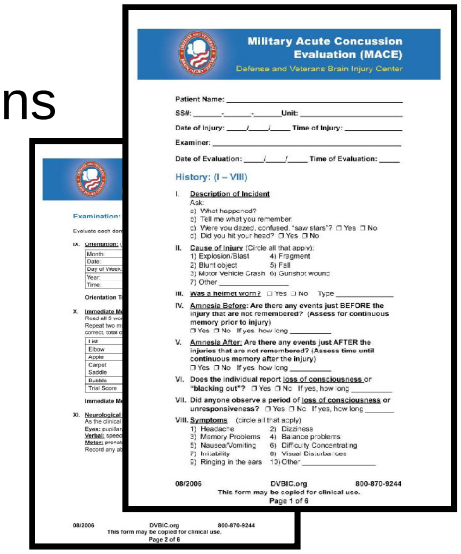
- **Performed by UNIT LEADERSHIP once SM out of danger zone**
  - Injury (Yes/No)
  - Evaluation – "HEADS" (Yes/No)
    - Headaches
    - Ears Ringing
    - Amnesia or Altered/Loss of Consciousness
    - Double Vision/Dizziness
    - Something Not Right
  - Distance (Proximity to Blast) or Damage (Yes/No)
- **Document distance from blast & action taken**

M.A.C.E.

(Military Acute Concussion Evaluation)

- **Performed by MEDICAL Personnel**
- **3-Part Screening Tool – "CNS"**
  - Cognition
  - Neurological Exam
  - Symptoms

- Alternate versions available
- Upcoming revision will include "Recurrent Concussion" questions



NATO Collaborations

- **Several NATO Allies have adapted DVBIC/DCoE Deployed Guidelines**
  - Active U.S. Delegation to NATO Exploratory Team on mild TBI

Early Identification and Treatment

GOAL: ID and treat as close to point of injury as possible.

- **PIES Principle: *Proximity – Immediacy – Expectancy – Simplicity***

- **Role II Local Treatment Initiatives**
  - Brief treatment reconditioning course
  - Focus on symptom management and rest with appropriate medications
  - Graduation: symptom resolution & pain free off of medications

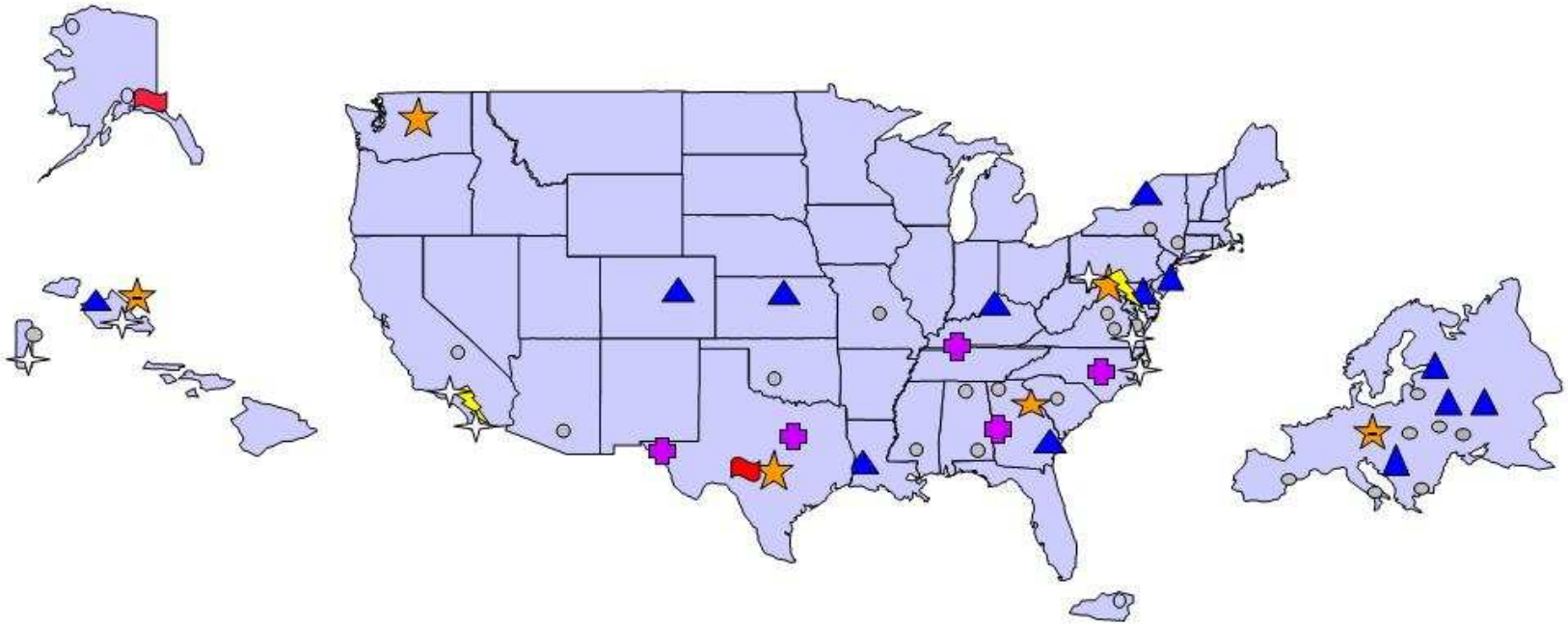
BEST PRACTICES IMPLEMENTATION

FOB Shank ~ 90% RTD rate; Majority that did not return had pre-existing psychiatric issues

TBI ICD-9 CM Coding

- **Standardize communication among providers and agencies (DoD/VA)**
- **DoD TBI Surveillance efforts**
  - Recurrent concussion
- **Maximize clinician productivity**
  - CPT code for Neurobehavioral Status Exam
- **TBI Coding Reference Fact Sheet**
  - Available at DVBIC and DCoE booths

DoD TRAUMATIC BRAIN INJURY PROGRAMS



Army (Category 1)

- Ft Gordon, GA; Ft Lewis, WA; Ft Sam Houston, TX; Walter Reed, DC

Army (Category 1-)

-Landsthul, Germany; Tripler, HI

Army (Category 2)

-Ft Benning, GA; Ft Bliss, TX; Ft Bragg, NC; Ft Campbell, KY; Ft Hood, TX

Army (Category 3)

-Bamberg, Germany; Baumholder, Germany; Ft Carson, CO; Ft Drum, NY; Ft Knox, KY; Ft Polk, LA; Ft Riley, KS; Ft Stewart, GA, Schofield Barracks, HI; Schweinfurt, Germany; Vilseck, Germany

Army (Category 4)

-Camp Shelby, MS; Camp Zama, Japan; Ft Belvoir, VA; Ft Buchanan, Puerto Rico; Ft Dix, NJ; Ft Eustis, VA; Ft Huachuca, AZ, Ft Irwin, CA; Ft Jackson, SC; Ft Leavenworth, KS; Ft Lee, VA; Ft Leonard Wood, MO; Ft McPherson, GA; Ft Meade, MD; Ft Monmouth, NJ; Ft Richardson, AK; Ft Rucker, AL; Ft Sill, OK; Ft Wainwright, AK; Grafenwoehr, Germany; Heidelberg/Mannheim, Germany; Redstone Arsenal, AL; Stuttgart, Germany; West Point, NY; Wiesbaden, Germany; Wurzburg, Germany

Navy Facilities

-Marine Corps Base, Camp Lejeune, NC; Marine Corps Base, Camp Pendleton, CA; National Naval Medical Center, MD; Naval Medical Center San Diego, CA; Naval Medical Center Portsmouth, VA; Naval Hospital Okinawa, Japan; Naval Medical Clinic, Hawaii

Navy Research Centers

-Silver Spring, MD and San Diego, CA

Air Force Facilities

-Elmendorf AFB, AK; Lackland AFB, TX

VA TBI Initiatives & Collaboration

- **Clinical**
  - Interdisciplinary team approach to care at VA/DVBIC Polytrauma Sites
  - TBI Assisted Living Initiatives in collaboration with DoD
  - ICD Coding revision in collaboration with DoD
  - Collaboration and Coordination of Veterans Health Initiative
  - VA/DoD Evidence-Based Guidelines for CONUS Management of Subacute-Chronic mild TBI

- **Research**
  - Multi-Center Clinical Trials (e.g., Cognitive Rehabilitation Clinical Trial)
  - New Research Centers of Excellence Incorporating TBI established in 2009
  - Quality Enhancement Research Initiative (QUERI): Polytrauma and Blast Related Coordinating center
  - VA's Journal of Rehabilitation Research and Development – 2 Special TBI Issues

- **Education**
  - Collaboration with DoD in Development of TBI Family Caregiver Curriculum/Guide
  - Collaboration with DoD in Annual TBI Training Conference, monthly VTC's
  - Network of Regional Education Coordinators

MILITARY SITES

MILITARY ASSOCIATE SITES

- Ft. Carson
- Landstuhl Regional Medical Center
- Ft. Bragg
- Camp Pendleton

MILITARY LEAD SITES

- Walter Reed Army Medical Center
- Wilford Hall Medical Center/ Brooke Army Medical Center
- Naval Medical Center San Diego

CLINICAL Sites

- Camp Lejeune
- Ft. Hood

VA SITES

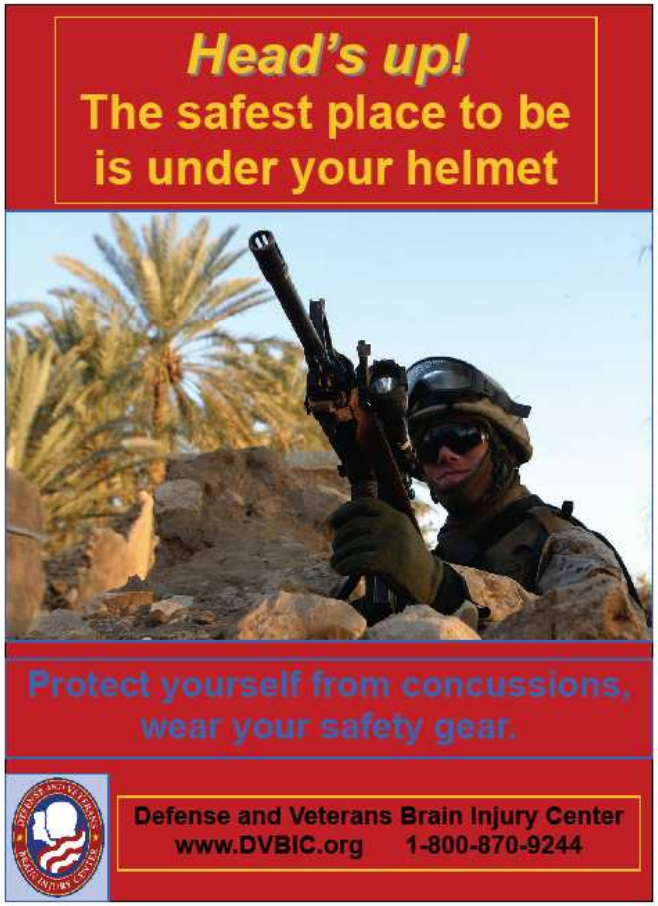
- Richmond VAMC
- Tampa VAMC
- Palo Alto VAMC
- Minneapolis VAMC
- Boston VAMC

CIVILIAN PARTNERS

- Lakeview Virginia Neurocare
- Laurel Highlands Neuro-Rehabilitation Center

- 225 Personnel
- > 20 Disciplines

TBI Prevention and Education



TBI Patient Education

Research has shown that educating mTBI patients about the expected symptoms and natural course of their injury reduces the likelihood that they will develop persistent symptoms[1-3]

Therefore…

It is important to set clear expectations about recovery as soon as possible after the injury

1.Bell KR, Hoffman JM, Temkin NR, Powell JM, Fraser RT, Esselman PC, Barber JK, Dikmen S. The effect of telephone counseling on reducing post-traumatic symptoms after mild traumatic brain injury: A randomized trial. *J Neurol Neurosurg* 2008; Epub May 9.

2.Ponsford J, Wilmot C, Rothwell A, Cameron P, Kelly AM, Nelms R, Curran C. Impact of early intervention on outcome following mild head injury in adults. *J Neurol Neurosurg Psychiatry* 2002; 73: 330-332.

3.Alves W, Macciocchi SN, Barth JT. Postconcussive symptoms after uncomplicated mild head injury. *J Head Trauma Rehabil* 1993; 8: 48-59.

Expectation of Recovery

•Appropriate risk communication to service members and veterans who may have had mTBI is crucial for minimizing the incidence of poor outcomes

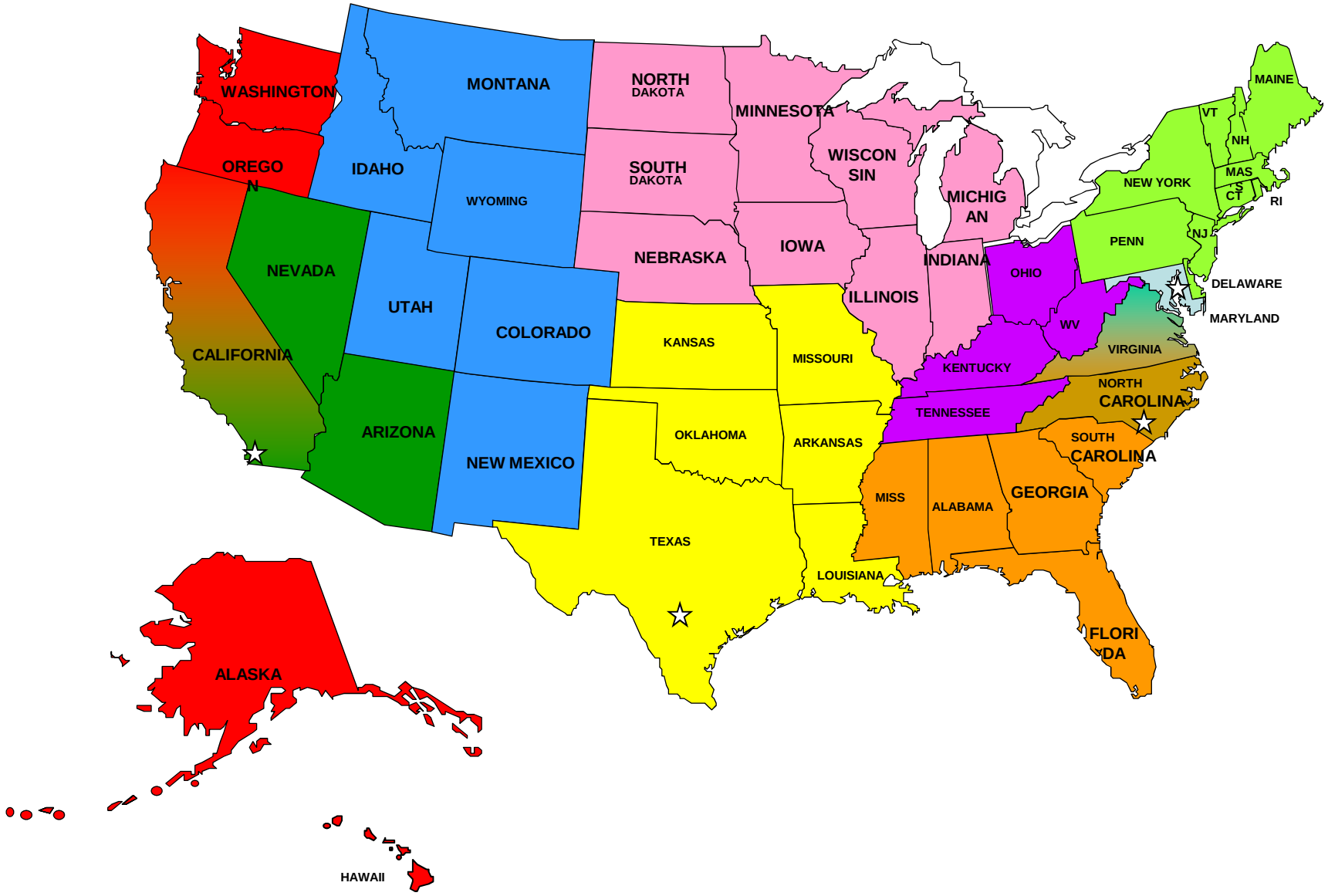
The key messages:

- Full recovery is expected in ***most*** cases within several hours to days to several weeks following the injury
- It is normal to experience post-concussive symptoms prior to recovery

TBI Education Highlights

- **4th Annual DoD TBI Training Conference**
  - SAVE THE DATE: 30 Aug – 1 Sep, Washington DC
- **“Survive, Thrive, and Alive” DVD**
  - Introduced by Gen. Colin Powell
- **Community**
  - WETA BrainLine Multimedia Web Initiative
  - Dept of Labor: “America’s Heroes at Work”
  - CDC: Heads Up and Other Information Sheets and CPGs
- **DoD materials developed through collaboration of the Services**
  - Products recognized by RAND Corporation for clinical accuracy and appropriateness of risk communication
- **Center of Excellence for Medical Multimedia**
  - The Journey Home (www.traumaticbraininjuryatoz.org)
- **Army TBI modules / Navy NCAT Training**

DVBIC TBI Regional Education and Regional Care Coordination Network

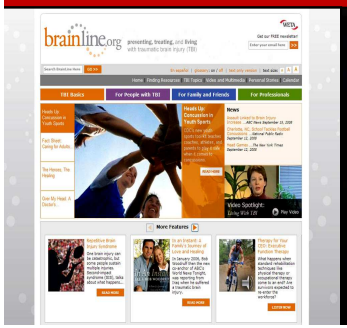


Family Caregiver Curricula

- **4 Modules:**
  - Module 1: Introduction to TBI (learning about the brain, acute care issues, complications)
  - Module 2: Understanding Effects of TBI and What You Can do to Help (physical , cognitive, communication, behavioral, emotional)
  - Module 3: Becoming a Family Caregiver for a Service Member/Veteran with TBI (starting the journey, caring for SM and yourself, finding meaning in caregiving)
  - Module 4: Navigating the system (recovery care, eligibility for compensation and benefits)

- **Center of Excellence for Medical Multimedia**
  - Providing Web / CD Interface

FEDERAL WEBSITES DEVELOPING TBI CONTENT	WEBSITES DEVELOPED FOR MILITARY WITH TBI	TBI WEBSITES DEVELOPING CONTENT FOR MILITARY
health.mil	realwarriors.net	web.mit.edu/isn
usuhs.mil	afterdeployment.org	www.jan.wvu.edu
darpa.mil	dvbic.org	Braintrauma.org
tricare.mil	americasheroesatwork.gov	afip.org
polytrauma.va.gov	brainline.org	biusa.org
www.myhealth.va.gov	traumaticbraininjuryatoz.org	caregiver.org
ed.gov (NIDRR)	www.dcoe.health.mil	
nih.gov	avbi.org	
cdc.gov		
vetssuccess.gov		
guidelines.gov		
tatrc.org		
dodvets.com		




Provider Resources

- **DCoE : www.dcoe.health.mil**
  - Outreach Center: 866.966.1020
  - Monthly video teleconferences
- **DVBIC: www.dvbic.org**
  - Annual TBI Military Training Conference
  - Education coordinators
  - TBI.consult: tbi.consult@us.army.mil
- **VA/DoD mTBI/Concussion CPG Fact Sheet**
- **ICD-9 DoD TBI Coding Fact Sheet**
- **Service TBI Points of Contact**

TBI.Consult@us.army.mil

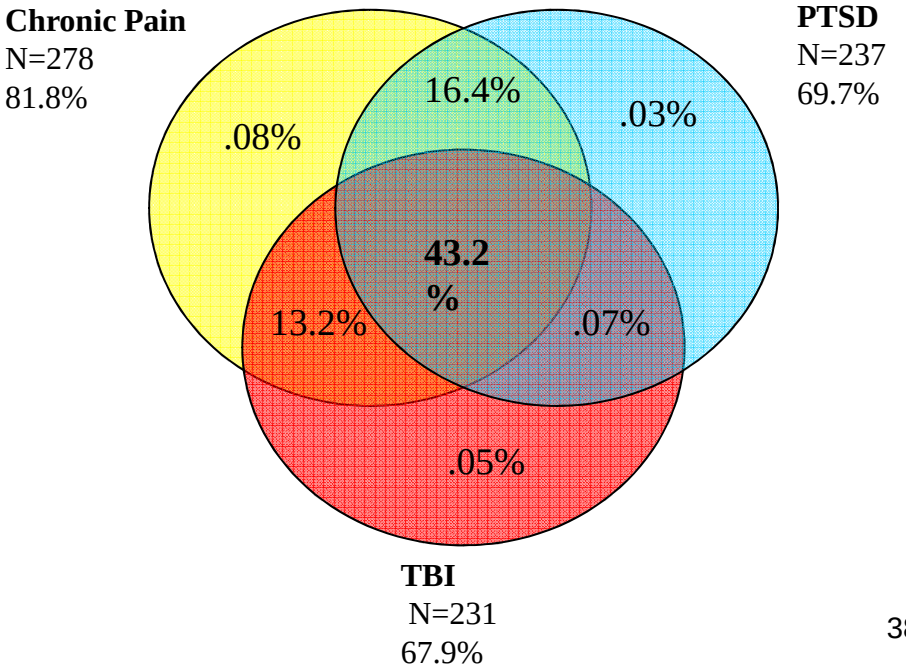
Consultation requests are answered within 12 hours (average 5 hours)

38 TBI specialists representing 14 clinical disciplines

What's Ahead for TBI CPGs in 2010

- **Review of Combat TBI First Responder CPG**
- **Sponsoring nursing guidelines for Management of Mild TBI**
- **Treatment algorithms for patients with persistent symptoms of concussion and co-occurring psychological conditions**

Figure 1. Relative distribution of the "Polytrauma Triad" in a sample of 340 OEF/OIF veterans evaluated at the VA Boston Polytrauma Network Site

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