

USASOC Neurocognitive Testing and Post – Injury Evaluation and Treatment Clinical Practice Guideline (CPG)

Note: *The intent of this CPG is to serve as general guidance for medics and medical officers. It should not supplant good clinical judgment and experience. In addition, providers should be familiar with the Joint Theater Trauma System CPG for “Management of Mild Traumatic Brain Injury (mTBI)/Concussion in the Deployed Setting”. Operational and tactical considerations may, in some instances override the CPG. This is a working document, and as we gain experience with the test and the procedures it will be modified. Send comments and suggestions to: robert.h.lutz@ahqb.soc.mil.*

1. Recognition of Injury Potential and General Principles:

A. All Soldiers who receive a head injury should be evaluated for evidence of mild Traumatic Brain Injury (mTBI). The initial evaluation should consist of a focused history and physical exam. All Soldiers with clinical signs of head trauma, symptoms of head injury, or a significant mechanism should receive a more detailed evaluation. Consider using the Military Acute Concussion Exam (MACE) as an initial screening tool as part of the decision making process.

B. The goal of this program is early identification of Soldiers with a mild injury that initially may not be readily apparent. These mild TBI injuries if not treated appropriately put the Soldier at risk for developing chronic problems or “second-impact syndrome”.

C. Those Soldiers with severe or potentially severe head-injuries are beyond the scope of this CPG. This group of Soldiers needs evacuation to a higher level of care where imaging (non-contrast head CT) and surgical capability are available. After evaluation at a higher level of care and structural brain trauma has been ruled out, these Soldiers may be returned to the unit through the medical system. At that time it is appropriate for them to be reevaluated through this CPG.

1). Criteria for Imaging: The American College of Emergency Physicians published a Clinical Policy in December, 2008, titled, “ Neuroimaging and Decisionmaking in Adult Mild Traumatic Brain Injury in the Acute Setting”. A thorough review of the available literature was examined to answer the question “which patients with mild TBI should have a noncontrast head CT scan in the ED?” The recommendations are as follows:

2). **Level A Recommendations** (generally accepted principles for patient management that reflect a high degree of clinical certainty):

- A noncontrast head CT is indicated in head trauma patients **with loss of consciousness or posttraumatic amnesia** only if one or more of the following is present: headache, vomiting, age greater than 60 years,

drug or alcohol intoxication, deficits in short term memory, physical evidence of trauma above the clavicle, posttraumatic seizure, GCS score of less than 15, focal neurologic deficit, or coagulopathy.

3). **Level B Recommendations** (recommendations for patient management that may identify a particular strategy or range of management strategies that reflect moderate clinical certainty):

- A noncontrast head CT should be considered in head trauma patients ***with no loss of consciousness or posttraumatic amnesia*** if there is a focal neurologic deficit, vomiting, severe headache, age 65 years or greater, physical signs of basilar skull fracture, GCS less than 15, coagulopathy, or a dangerous mechanism of injury (including ejection from a motor vehicle, pedestrian struck, fall from height of more than 3 feet or 5 stairs)

4). Keep in mind that these recommendations are based on studies from the civilian population. There are no studies that look at head injuries from blasts and explosions. Providers will need to maintain an index of suspicion based on the described nature of the mechanism of injury, and use that in their determination of the need for noncontrast CT of the head.

D. The “PIE’s” principle is an important framework within which to work. Keep the Soldier in “Proximity” to his unit and support network. Recognize and begin evaluation and treatment “Immediately” as soon as potential for TBI is considered. Treat the Soldier with the “Expectancy” that they are going to get better and return to duty fully recovered.

E. Education is a **very important** component of treatment. Many of the symptoms of mTBI are concerning for our Soldiers. They should be educated to understand that they are normal symptoms and the majority of them will improve with time and rest.

2. Evaluation and Disposition of Soldiers with Suspected mTBI:

A. **Initial Field Evaluation:** The purpose of the initial evaluation in the field is to determine the need for urgent evacuation. Urgent evacuation is required for those Soldiers that are exhibiting signs/symptoms of a potentially severe head injury. Signs or symptoms that indicate the presence of diffuse axonal injury, intracranial bleeding with mass effect, or penetrating head injuries include, but are not limited to:

- 1). Prolonged loss of consciousness
- 2). Progressively declining level of consciousness
- 3). Progressively declining neurological exam

- 4). Seizures
- 5). Repeated vomiting
- 6). Sensory or Motor Neurological deficit

B. Evaluation in Clinical Setting (Army Health Clinic, Aid Station, or Forward Operating Base [FOB] Clinic): Once the Soldier is removed from the field setting, a more thorough evaluation can be conducted. The goal of this evaluation is to determine the extent (or potential extent) of the injury and establish diagnostic and treatment priorities. This evaluation should consist of a detailed history, physical exam, and if indicated, imaging studies and/or neurocognitive testing. The MACE may also be used in the initial evaluation to aid in the decision making process.

1). **Injury History:** a thorough review of the history of the injury, with a focus on symptoms consistent with head injury. Some of these symptoms may be not apparent to the Soldier, but clearly recognized by teammates or other Soldiers. Consider talking with friends, supervisors, and subordinates in order to get their assessment of the Soldier's behavior. Such symptoms include:

- Headache
- Amnesia (retrograde or anterograde)
- Confusion
- Unusual behavior or emotional changes
- Irritability
- Balance problems
- Vertigo and dizziness
- Photophobia
- Decreased tolerance to noise
- Vision changes
- Lethargy
- Nausea/vomiting

2). **Physical Exam:** a thorough physical exam and neurologic exam is required when a Soldier is being evaluated for the presence of mTBI. Indications of the potential for mTBI include:

- Ruptured tympanic membranes
- Trauma to the head/neck (penetrating and non-penetrating)
- Cranial nerve deficits
- Sensory deficits
- Motor deficits
- Inability to do rapid alternating movements
- Visual field deficits
- Abnormal Mini mental status evaluation

- Abnormal Vestibular Screening Exam:
 - Inability to maintain balance
 - Persistent nystagmus
 - Tracking/convergence problems with extraocular movements

3). **Neurocognitive Testing:** USASOC Soldiers with any of the above indicators of mTBI should be evaluated using the Immediate Post-Concussion Testing and Cognitive Assessment (ImPACT) exam. This evaluation should take place no earlier than the day after the injury, and after that can be conducted at any time post-injury. Testing can be done by any trained medical officer or medic. Ideally, the Soldier will have a baseline test to compare against. If no baseline is available, comparison will be made against normative population data. Test interpretation is only to be done by a trained licensed provider. Indicators of mTBI include:

a). If Baseline Test Available: test results that show deviation outside of the reliable change index (RCI) in one or more areas of the test.

b). If No Baseline Test Available: test results with two or more scores that fall below the 25th percentile in either the Verbal Memory, Visual Memory, Reaction Time, or Processing Speed components of the test. This finding occurs in less than 13% of a normal population.

C. Diagnosis of mTBI: based on the complete evaluation (history, physical exam, and neurocognitive testing), the Soldier can be placed in one of four diagnostic categories: No Evidence of mTBI, Simple mTBI, Complex mTBI, Severe or Potentially Severe Head Injury. In addition to the clinical impression from the history and physical exam, neurocognitive testing can aid in placing the Soldier in a diagnostic category. Use the ImPACT scoring and diagnostic category criteria below as general guidance.

1). **No Evidence of mTBI;** no ImPACT subcomponent scores outside of the RCI, minimal symptoms at most.

2). **Simple mTBI;** ImPACT symptom score range below 30 and/or only one ImPACT subcomponent score outside of the RCI or two subcomponent scores below the 25th percentile (if no baseline available). These Soldiers will likely get better quickly with full resolution of symptoms in less than 10 days. Early return to duty before meeting criteria may exacerbate the injury and worsen the length and scope of symptoms.

3). **Complex mTBI;** ImPACT symptom score above 30 and two or more ImPACT subcomponent scores outside of the RCI or below the 16th percentile (if no baseline available). These Soldiers will likely take longer to recover and full resolution of symptoms may take longer than 10 days. As with Low-Risk MTBI, early return to duty before meeting criteria may exacerbate the injury and worsen the length and scope of symptoms. However, these Soldiers will take longer to heal and providers should

resist efforts to push through symptoms as this may delay recovery and increase the risk for the development of chronic post-concussive symptoms.

4). **Severe or Potentially Severe Head Injury**; evidence of more severe injury requiring imaging (if not available at your location), potential need for neurosurgical intervention, or potential for further deterioration and need for supportive care such as airway control.

3. Treatment and Disposition of Soldiers with mTBI: Disposition of Soldiers Diagnosed with mTBI: based on the complete evaluation (history, physical exam, and neurocognitive testing), the Soldier can be placed in one of four categories: Return to Duty, Light Duty, Quarters, or Evacuate to Higher Level of Care. The importance of light duty and quarters cannot be overstated. Recovery time from mTBI can be delayed if not treated properly, and the cornerstones of treatment are physical and cognitive rest. Commanders need to be educated that “light duty” includes both physical and mental light duty.

A. No Evidence of mTBI: Return to duty, no treatment indicated

B. Simple mTBI:

1). **Treatment:**

- Rest: 72 hour light duty profile.
- Headache: treat with acetaminophen (may use naproxen if no suspicion of intra-cranial hemorrhage); do not use narcotics.
- Post-Concussion Rehab: after 72 hours rest, begin at Stage 1, if tolerated. May advance rapidly as tolerated (no symptoms at completion of exercise protocol) to Stage 5. If symptoms develop during any stage, then stop exercise, and restart at previous asymptomatic stage once symptoms resolve. Balance exercises as indicated by screening.

2). **Disposition:** Light duty profile for at least 72 hours, with restrictions on both physical and cognitive work.

3). **Follow-up:** Focused provider re-evaluation every 24 hours, repeat ImPACT in 5-7 days, earlier if symptoms resolve.

C. Complex mTBI:

1). **Treatment:**

- Rest: 72 hours quarters.

- Headache: treat with acetaminophen (may use naproxen if no suspicion of intra-cranial hemorrhage); do not use narcotics.
- Post-Concussion Rehab: after 72 hours rest, begin Stage 1, if tolerated. Advance slowly, no more than one stage per day, and only if symptom free. 95% of Soldiers with 3 or more ImPACT scores outside of the RCI will not be able to return to duty within 10 days. Accelerating the rehab protocol only has the potential to worsen the injury – so advance with caution. Balance exercises as indicated by screening.

2). **Disposition:** Quarters for at least 72 hours, with both physical and cognitive rest. Soldier should maintain normal sleep/wake cycles. Follow with light duty profile until cleared to return to duty.

3). **Follow-up:** Focused provider re-evaluation every 24 hours, repeat ImPACT in 7-10 days, earlier if symptoms resolve.

D. Severe or Potentially Severe Head Injury:

1). **Treatment:** As indicated by trauma protocols.

2). **Disposition:** Evacuate per protocol to higher level of care.

4. **Return to Duty Criteria:** Recommended Return to Duty Criteria are as follows:

A. Resolution of symptoms (off medications) with standard cognitive activities required of position.

B. Tolerance of Stage 5 full exertion physical activity without symptoms (off medications).

C. Return of ImPACT score to within the RCI for each subcomponent, if a baseline test is available for comparison. If no baseline test available, then follow the trend of the examination results as the Soldiers symptoms improve. Based on normative data, 33% of the population will have at least one score less than the 25th percentile. Two scores less than the 25th percentile occurs in less than 13% of the population.

5. Failure to Improve or Progress: Providers should strongly consider evacuating Soldiers who fail to progress within 14 days, or exhibit worsening symptoms despite conservative management and should consult with the nearest neurologist for management recommendations. In addition, the potential for an acute combat stress reaction or pre-existing illness (i.e. sleep apnea) as a component of the Soldier's symptom complex should be considered.

6. Special Situations: Soldiers who perform complex tasks including (but not limited to) close quarter battle, room clearing, piloting an aircraft or any other job/position that requires split second timing and rapid visual recognition/reaction, may require further evaluation prior to being returned to duty. Check rides for pilots and shoot/no shoot decision simulations (CQB range) should be considered prior to return to full duty, particularly if there are indications from neurocognitive testing that reaction time and visual motor speed are not back to baseline (but still within the RCI).