Before initiating concussion management, complete TCCC, MACE 2, and FDA cleared structural brain injury device or tool (if available).

Initial Management up to Seven Days from Injury

1. Review MACE 2, if results are:
   a. NEGATIVE
      1) Initiate 24-hour rest\(^A\) (mandatory if deployed)
      2) Go to step 2b
   b. POSITIVE
      1) Consider using an FDA cleared concussion assessment device/tool (if available)
      2) Begin initial concussion management\(^B\)
      3) If three or more concussions in 12 months, refer to recurrent concussion evaluation\(^C\)
      4) Initiate rest\(^A\)

2. Reevaluate after 24 hours
   a. If symptom free at rest, conduct exertional testing\(^G\)
   b. If symptom free, go to step 4

3. Follow up every 24 to 48 hours for up to seven days
   a. Review MACE 2 Exam Summary or FDA cleared concussion assessment device or tool results (if available) to guide primary care and symptom cluster management\(^D\)
   b. Progress through the PCM PRA\(^E\)
      1) Go to Comprehensive Management (card 2) if not progressing as expected through PCM PRA\(^E\)
      2) Avoid any potentially concussive events
   c. Refer to Minimum Mandatory Recovery Time chart\(^H\)
   d. Consider NCAT testing\(^I\)
   e. Consider specialty consultation for any abnormal results

4. Return to duty
   a. Communicate findings to line leadership
   b. Document and code findings in health record
For use when patient not progressing through the PCM PRA

**Comprehensive Management**
*(Typically beyond one week)*

1. **Review**
   a. All relevant documentation
      (PCM PRA\(^E\), MACE 2, other tools)
   b. Progression of symptom clusters\(^D\)
   c. Focused history: current and prior concussion timeline,
      behavioral health, headache disorders
   d. If three or more concussions in 12 months,
      refer to recurrent concussion evaluation\(^C\)

2. **Manage**
   a. Conduct a comprehensive evaluation and initiation of
      Rehab PRA\(^F\)
   b. Manage symptoms using symptom cluster chart\(^D\)
   c. Follow up every 48 to 72 hours as symptoms dictate
   d. If not progressing as anticipated, consider:
      1) Specialty consultation or teleconsultation
      2) Functional assessment (physical therapy, occupational therapy)
      3) NCAT\(^I\)
      4) Neuroimaging (per provider judgment)\(^J\)

3. **Complete minimum mandatory recovery time\(^H\)**

4. **Return to duty**
   a. Communicate findings to line leadership
   b. Document and code findings in health record

**Resource Links**
- DVBIC Resources (clinical tools and patient education factsheets): [https://dvbic.dcoe.mil/resources](https://dvbic.dcoe.mil/resources)
- VA/DoD mTBI CPG: [https://www.healthquality.va.gov/guidelines/Rehab/mtbi/mTBIHomePage50821816.pdf](https://www.healthquality.va.gov/guidelines/Rehab/mtbi/mTBIHomePage50821816.pdf)

*Cards 3 to 8 of the CMT correspond to the red superscripts (\(^{A-J}\)) found on action cards 1-2.*
A. Rest
1. Rest with extremely limited cognitive activity
2. Limit physical activities to those of daily living and extremely light leisure activity
3. Avoid work, exercise, video games, reading or driving
4. Avoid any potentially concussive events
5. Avoid caffeine and alcohol

B. Initial Concussion Management
In the initial 24 hours, manage symptoms to facilitate rest and sleep
1. Aggressive headache or pain management:
   - Use acetaminophen every 6 hours, for 48 hours; after 48 hours, may use naproxen as needed. Avoid tramadol, Fioricet, and narcotics
2. Reduce environmental stimuli
3. Review current medications and sleep hygiene
4. Provide concussion education and set expectations for full recovery

C. Recurrent Concussion Evaluation
Three or more documented in 12-month span
1. Comprehensive neurological evaluation by neurologist or qualified provider
   a. Review of prior concussion history with focus on timeline or resolution of symptoms/symptom clusters
   b. Assessment of current symptoms (face-to-face interview by provider). Consider Neurobehavioral Symptom Inventory, Acute Stress Reaction Questionnaire, Balance Assessment
2. Neuroimaging per provider judgement
3. Neuropsychological assessment by psychologist
   a. Evaluate: attention, memory, processing speed and executive function
   b. Perform a psychosocial and behavioral assessment
   c. Include measure of effort
   d. Consider NCAT
4. Functional assessment by physical or occupational therapist
5. Neurologist or qualified provider determines return to duty status
<table>
<thead>
<tr>
<th>Symptom Cluster</th>
<th>Actions</th>
<th>DVBIC Clinical Recommendation</th>
<th>Referral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive (MACE 2: Q5-8 &amp; Q15-16)</td>
<td>Identify: headaches, pain, psychological health, sleep disturbance, medical side effects, migration</td>
<td>Cognitive Rehabilitation for Service Members and Veterans Following Mild to Moderate Traumatic Brain Injury (Starts treatment at &gt;6 weeks post injury)</td>
<td>Neuro-ophthalmology, Neuropsychology, Neuro-optometry, Sleep Medicine</td>
</tr>
<tr>
<td>Vestibular (MACE 2: Q11-12 &amp; Q17)</td>
<td>Identify: vestibular dysfunction, oculomotor disorder, modification of visual fields, substance use</td>
<td>Vestibular Therapy (OT/PT), Vision Therapy (OT/PT)</td>
<td>Neuro-ophthalmology, Neuropsychology, Neuro-optometry, Vision Therapy (OT/PT)</td>
</tr>
<tr>
<td>Oculomotor (MACE 2: Q14 &amp; Q17)</td>
<td>Identify: vestibular dysfunction, oculomotor disorder, modification of visual fields, modification of visual fields, substance use</td>
<td>VOMS Assessment and Management of Visual Dysfunction Associated with Mild TBI</td>
<td>Neuro-ophthalmology, Neuropsychology, Neuro-optometry, Vision Therapy (OT/PT)</td>
</tr>
</tbody>
</table>

**Concussion Management Tool**

**D. TBI Symptom Clusters**

Symptom clusters should be reevaluated regularly to assess risk of prolonged recovery. Use the MACE 2 results and symptoms to guide your treatment and management.
<table>
<thead>
<tr>
<th>Symptom Cluster</th>
<th>Actions</th>
<th>Referral Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headaches/Migraine</td>
<td>(MACE 2: Q4B) Identify: type of headache(s): (migraine, tension, cervicogenic, neuropathic), psychological health, sleep disturbances</td>
<td></td>
</tr>
<tr>
<td>Management of Headache Following Concussion/Mild Traumatic Brain Injury: Guidance for Primary Care Management in Deployed and Non-Deployed Settings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neurology: cervicogenic, other sources of neck pain, musculoskeletal, cervicogenic, neuropathic, neuromuscular, psychological health, headache, sleep disturbances, medication, side effects, neuromodulation, dysfunction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavioral Health: sleep, mood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavioral Health: Sleep Medicine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety/ Mood</td>
<td>(MACE 2: Q4G) Identify: acute stress reaction, neuroendocrine dysfunction</td>
<td></td>
</tr>
<tr>
<td>Screening Post Mild Traumatic Brain Injury</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuroendocrine Dysfunction Indications and Conditions of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavioral Health: Mood/Axiety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Migraine Headaches/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symptom Cluster: Migraine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consider: oculomotor assessment, psychological health, sleep disturbances, tension, cervicogenic, neuropathic, neuromuscular, psychological health, headache(s): (migraine, tension, cervicogenic)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuro-optometry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuro-ophthalmology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Medicine and Rehabilitation: Physical Therapy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. TBI Symptom Clusters (Continued)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
E. Progressive Return to Activity Following Acute Concussion/mTBI: Guidance for the Primary Care Manager and Rehabilitation

This clinical recommendation details how to help service members progressively return to pre-injury activity and promotes the standardization of care following a concussion.

Stages of the Progressive Return to Activity Process

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Rest</td>
<td>Symptom resolution</td>
</tr>
<tr>
<td>2.</td>
<td>Light Routine Activity</td>
<td>Introduce and promote limited effort</td>
</tr>
<tr>
<td>3.</td>
<td>Light Occupation-oriented Activity</td>
<td>Increase light activities that require a combined use of physical, cognitive and/or balance skills</td>
</tr>
<tr>
<td>4.</td>
<td>Moderate Activity</td>
<td>Increase the intensity and complexity of physical, cognitive and balance activities</td>
</tr>
<tr>
<td>5.</td>
<td>Intensive Activity</td>
<td>Introduce activity of duration and intensity that parallels the service member’s typical role, function and tempo</td>
</tr>
<tr>
<td>6.</td>
<td>Unrestricted Activity</td>
<td>Return to pre-injury activities</td>
</tr>
</tbody>
</table>

Considerations for moving from the PCM to Rehab PRA:
- Per provider judgement
- First and second concussion:
  - Recovery not progressing as anticipated
  - No progression in seven days
  - Symptoms are worsening
  - Symptomatic after exertional testing following Stage 5
- Two or more concussions:
  - If symptoms reported are > 1 (mild) on the NSI after Stage 1, Rest

F. Progressive Return to Activity Following Acute Concussion/ mTBI: Rehabilitation

The rehabilitation PRA is used when patient is symptomatic following the initial recovery period (zero to seven days).

Rehabilitation PRA daily assessment:
- NSI
- Resting heart rate
- Resting blood pressure
- Consider medications, prior medical history, and the possibility of a previously undiagnosed condition
- If pre-injury NSI > 1, use clinical judgement
## G. Exertional Testing
1. Exert to 65-85 percent of target heart rate (THR=220-age) using push-ups, sit-ups, running in place, step aerobics, stationary bike, treadmill and/or hand crank
2. Maintain this level of exertion for approximately two minutes
3. Assess for symptoms (headache, vertigo, photophobia, balance, dizziness, nausea, visual changes, etc.)
4. If symptoms/red flags exist with exertional testing, stop testing, and consult with provider

## H. Minimum Mandatory Recovery Time
- If first concussion in past 12 months: 24-hour rest period
- If second concussion in past 12 months: seven-day rest period post symptom resolution
- If third concussion in past 12 months: complete Recurrent Concussion Evaluation

## I. Neurocognitive Assessment Tool
Neurocognitive assessment tools are performance-based methods to assess cognitive functioning. The Defense Department uses Automated Neuropsychological Assessment Metrics (ANAM). Find detailed instructions to administer a post-injury ANAM at dvbic.dcoe.mil. For ANAM baseline results send requests to: usarmy.jbsa.medcom.mbx.otsg--anam-baseline@mail.mil

## J. Neuroimaging Following Mild TBI in the Non-Deployed Setting Clinical Recommendation and reference card
offers guidance with a standardized approach to neuroimaging from the acute through chronic stages following mild TBI in the non-deployed setting. (Resource link on card 2)

### Resources

**Mandatory Events Requiring Concussion Evaluation:**
1. Any service member in a vehicle associated with a blast event, collision, or rollover
2. Any service member within 50 meters of a blast (inside or outside)
3. Anyone who sustains a direct blow to the head
4. Command directed
2015 DoD Definition of Traumatic Brain Injury:
A traumatically induced structural injury 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:
- Any alteration in mental status (e.g., confusion, disorientation, slowed thinking)
- Any loss of memory for events immediately before or after injury
- Any period of loss of or a decreased level of consciousness, observed or self-reported

Initial TBI Screening Code: Z13.850
TBI Coding Sequence:
1. Primary TBI diagnostic code: S06. E L S E. Primary symptom code, if applicable: (e.g., H53.2 - diplopia)
3. Deployment status code, if applicable: (e.g., Z56.82 for deployed)
4. TBI external cause of morbidity code: (For example, Y36.290A [A- use for initial visit] for war operations involving other explosions and fragments, military personnel, initial encounter)
5. Place of occurrence code, if applicable
6. Activity code, if applicable
7. Personal history of TBI code: if applicable Z87.820

Acronym Index
ANAM: Automated Neuropsychological Assessment Metrics
BESS: Balance Error Scoring System
CPG: Clinical Practice Guideline
DVBIC: Defense and Veterans Brain Injury Center
DoD: Department of Defense
FDA: Food and Drug Administration
MACE 2: Military Acute Concussion Evaluation 2
NSI: Neurobehavioral Symptom Inventory
PCM PRA: Primary Care Management Progressive Return to Activity
Rehab PRA: Rehabilitation Progressive Return to Activity
TCCC: Tactical Combat Casualty Care
VOMS: Vestibular-Ocular Motor Screening