1 Concussion Management Tool

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 **2**b

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

2 Concussion Management Tool

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

VA/DoD mTBI CPG: https://www.healthquality.va.gov/guidelines/Rehab/mtbi/mTBICPGFullCPG50821816.pdf

Cards 3 to 8 of the CMT correspond to the red superscripts ([A-J]) found on action cards 1-2.

3 Concussion Management Tool

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[J]
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[I]
4. Functional assessment by physical or occupational therapist
5. Neurologist or qualified provider determines return to duty status

D. TBI Symptom Clusters guide treatment. Patients often present with overlapping symptoms. Symptoms should be reevaluated regularly to assess risk of protracted recovery. Use the MACE 2 results and symptoms to guide your treatment and management.

Symptom Cluster	Actions	DVBIC Clinical Recommendation	Referral Considerations
Cognitive (MACE 2: Q5-8 & Q15-16)	Identify: headaches, pain, psychological health, sleep disturbance, oculomotor dysfunction, medication side effects Consider: cognitive rest, reduction of stimuli, Neurocognitive Assessment Test (NCAT), oculomotor assessment	**Cognitive Rehabilitation** for Service Members and Veterans Following Mild to Moderate Traumatic Brain Injury (Starts treatment at >6 weeks post injury)	Sleep Medicine Oculomotor/Neuro-optometry Neuro-ophthalmology Neuropsychology Cognitive Rehabilitation
Vestibular (MACE 2: Q11-12 & Q17)	Identify: vestibular dysfunction, oculomotor dysfunction, headaches, medication side effects, psychological health, sleep disturbance, substance use Consider: modified BESS, oculomotor assessment	Assessment and Management of **Dizziness** Associated with Mild TBI	Vestibular Therapy (OT/PT) Vision Therapy (OT/PT) Audiology
Oculomotor (MACE 2: Q14 & Q17)	Identify: vestibular dysfunction, oculomotor dysfunction, medication side effects, migraine headaches, psychological health, sleep disturbances Consider: VOMS	Assessment and Management of **Visual Dysfunction** Associated with Mild Traumatic Brain Injury	Neuro-optometry Neuro-ophthalmology Vision Therapy (OT/PT)

D. TBI Symptom Clusters (Continued)

Symptom Cluster	Actions	DVBIC Clinical Recommendation	Referral Considerations
Headaches/ Migraine (MACE 2: Q4B)	Identify: type of headache(s): (migraine, tension, cervicogenic, neuropathic), psychological health, sleep disturbances Consider: oculomotor assessment	Management of **Headache** Following Concussion/Mild Traumatic Brain Injury: Guidance for Primary Care Management in Deployed and Non-Deployed Settings	Neurology Neuro-optometry Neuro-ophthalmology
Anxiety/ Mood (MACE 2: Q4C)	Identify: acute stress reaction, neuroendocrine dysfunction Consider: Providing the Acute Concussion Educational Brochure	Indications and Conditions of **Neuroendocrine Dysfunction** Screening Post Mild Traumatic Brain Injury	Behavioral Health
Sleep Disturbances (MACE 2: Q5-6 & Q15-16)	Identify: type of sleep disturbance(s): (insomnia, circadian rhythm, sleep apnea), headaches, medication side effects, neuroendocrine dysfunction, pain, psychological health	Management of **Sleep Disturbances** Following Concussion/Mild TBI: Guidance for Primary Care Management in Deployed and Non-Deployed Settings	Sleep Medicine Behavioral Health
Cervical Spine (MACE 2: Q9 & Q17)	Identify: sources of cervicogenic headaches, musculoskeletal cervicalgia, neuropathic cervicalgia, other sources of neck pain	Management of **Headache** Following Concussion/Mild Traumatic Brain Injury: Guidance for Primary Care Management in Deployed and Non-Deployed Settings	Physical Therapy Physical Medicine and Rehabilitation

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

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

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 possibilty of a previously undiagnosed condition
- If pre-injury NSI > 1, use clinical judgement

7 Concussion Management Tool

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[c]

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

Other Resources

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

PUID 4899.1.1.15
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by Defense and Veterans Brain Injury Center.
This product is reviewed annually and is current until superseded.
800-870-9244 | dvbic.dcoe.mil