

Updated Mild Traumatic Brain Injury (mTBI) Clinical Guidance

Symptom Management in Mild Traumatic Brain Injury

With the increased awareness of mild traumatic brain injury (mTBI) or concussion, many military healthcare providers find themselves treating patients without formal training in neurotrauma. Although the majority of patients with mTBI recover quickly with minimal intervention, there is a subset that develops lingering symptoms that interfere with social and occupational functioning. Following multiple provider requests for assistance in managing this patient population, the Defense and Veterans Brain Injury Center convened an interdisciplinary work group with armed services and civilian representation to evaluate the current literature regarding mTBI and in the absence of supporting literature, provide expert guidance regarding appropriate management of the symptomatic mTBI patient in the military setting. Areas of foci for this meeting were assessment, medication therapy, other treatment to include specialty referrals, and duty restrictions. Consensus-based recommendations are compiled in this report.

Assessment

The overarching goal of assessment is to identify those patients who may be at risk for traumatic brain injury (TBI), minimize the impact of secondary effects, improve treatment outcome, optimize mTBI care, and to ultimately reduce disability. Since patients with mTBI may not come to clinical attention for a variety of reasons, the purpose of assessment may vary slightly based on the timing of presentation following injury. See algorithms for Clinical Management Guidance for mTBI Acute and Sub-Acute (Attachment 1).

Acute (injury to seven days)	Sub-acute (8-90 days)/Chronic (>90days)
Injury detection	Identification of residual effects
Diagnosis	Differential diagnosis/Identification of comorbidities
Severity grading	Prognosis
Rule out neurosurgical emergency	Treatment planning
Prognosis	Operational decision-making
Treatment planning	
Operational decision-making	

Assessment is symptom triggered, therefore leading to a focused exam. Domains required during the assessment of mTBI include but are not limited to the following:

History:	Incident, mechanism, acute injury characteristics, course
Symptoms:	Systematic inventory (may be facilitated by use of Suggested Tools for Evaluation – Attachment 2)
Neurologic exam:	Cranial nerve exam (focused)
	Postural stability/vestibular exam (Dix-Hallpike maneuver, Romberg’s test)
	Visual function (gross acuity, eye movement, binocular function, visual fields, visual inattention)

Neurocognitive function:	Mental status screening, neuropsychological testing, Military Acute Concussion Evaluation (MACE)
Psychological function:	Depression, Post-Traumatic Stress Disorder (PTSD), neurobehavioral (Suggested Tools for Evaluation – Attachment 2)

Imaging studies are not necessary for all mTBI patients. The absence of pathologic signs on computed tomography (CT) does not preclude the presence of mTBI. Indications for CT scanning in the acute phase include drug or alcohol intoxication, physical evidence of trauma above the clavicles, age > 60yrs, seizure, headache, vomiting, and coagulopathy (Haydel, 2000). Structural magnetic resonance imaging (MRI) has a low incidence of positive findings in mTBI (Lewine, 2007). It is contra-indicated in patients with shrapnel and is of limited use with acute mTBI. MRI, single photon emission computed tomography (SPECT) and functional MRI (fMRI) may be more useful for patients who manifest symptoms of cognitive dysfunction after the acute phase has passed. It is recommended that advanced imaging techniques including but not limited to SPECT and fMRI be used only after consultation with a radiologist and a TBI specialist.

Medication Therapy

There is little level 1 evidence to guide pharmacologic treatment in the mTBI patient. Therefore, these recommendations are made based on available evidence and expert opinion. Concussion Management Grid chart (Attachment 3) and the Headache chart – (Attachment 4) list medication recommendations for common mTBI complaints. When considering pharmacotherapy, these principles should be considered:

- Population under consideration- mTBI patients with persistent symptoms (> seven days post-injury)
- Recognition of important premorbid/comorbid conditions or “red flags”
- “Start low and go slow” (low dose with slow titration)
- Initiate medications one at a time, allow an appropriate interval for effect, and titrate to effect
- There is a complex relationship between mTBI symptoms (sleep, headache, cognition, mood) and it is clinically reasonable that alleviating/improving one symptom may lead to improvement in other symptom clusters.

Specialty referral can be considered after failed trials of two or more medication classes at maximum tolerated dosing. In addition, specialty referral should be done immediately upon recognition of any “red flag.”

Therapy

It is strongly recommended mTBI treatment should involve an interdisciplinary team and should be guided by a comprehensive brain injury and mental health assessment. Referrals for physical therapy, occupational therapy, speech & language pathology, pharmacy, audiology/vestibular and optometry can be made at anytime. If cognitive rehabilitation is indicated, it should not be initiated until other medical issues are stabilized and pain is

adequately managed. Symptom-specific interventions may need to be modified to accommodate cognitive, sensory, or mechanical limitations of the patient. Further investigation regarding the timing and components of cognitive rehabilitation are warranted.

Novel therapy (hyperbaric oxygen, nutritional supplements) in the management of mTBI are being explored in the field as potential treatment approaches. It is the recommendation of this panel that interventions which lack sufficient empirical support, should occur only under the auspice of an Institutional Review Board (IRB) reviewed protocol. However, complementary techniques such as acupuncture may be used at the discretion of the provider and patient.

Since the acceleration/deceleration TBI literature documents increased frequency of alcohol and substance abuse in the TBI patient, it is recommended that appropriate screening be instituted for all patients diagnosed with mTBI (Suggested Tools for Evaluation – Attachment 1). Educational materials should be provided to all patients and their families about TBI and the issues related to substance abuse. Those with known alcohol or substance use problems should be referred immediately for counseling and/or treatment.

Formal neuropsychological testing is ideally done prior to the initiation of formal cognitive rehabilitation in order to guide the treatment plan. However, testing may be done anytime in assessment and management of mTBI and may be required during the course of a medical board evaluation. Neuropsychological testing may also be useful following the completion of a rehabilitation plan to evaluate outcomes. Treatment need not be delayed while awaiting neuropsychological testing.

Follow-up for the patient with mTBI is based on the individual plan of care. After initial evaluation, the asymptomatic patient should have follow-up within three to six months. This may be done by telephone. The frequency of follow-up is clinically determined to meet the individual plan of care. Symptomatic patients should be followed every two to four weeks from the time of initial contact. Symptomatic patients may be seen more frequently than two to four weeks while those who are stable may be seen less frequently. It is recognized that patients may transfer duty stations while still undergoing treatment for TBI. In such situations, the profile/limited duty or transfer of care note should clearly specify follow-up needs. Case managers need to arrange the services the patient will need for continuity of care in the community/command in which the patient will reside.

Duty Restrictions

Currently, there is variability among the Service branches in recording duty restrictions for Service members with TBI. Duty restrictions should be informed by the patient's symptoms and progressively task the individual toward return to full duty. In the sub-acute phase (>seven days), symptomatic patients should be considered for limited duty hours to facilitate brain recovery. Progressive physical activity should be encouraged and monitored to the maximum tolerance of the patient without precipitating symptoms. Restricting the work environment and activities (i.e. driving, airborne operations, weapons, working at heights, combatives) further protects the Service member from risk of secondary injury or re-exposure and helps ensure the safety and welfare of others. The stress of complex leadership

positions may also complicate or exacerbate functional deficits, and may also be considered for limitation. This facilitates TBI recovery and may promote unit cohesion.

Exertion testing should be performed when a patient with TBI with previously functionally limiting symptoms, has recovered to a point where return to duty is considered. This ensures that symptoms do not recur with physical stress. When considering return to duty, it is recommended that the following criteria be met:

- Pass a physical fitness test (PFT)
- Pass “warrior training” if needed for duty
- Have anger, depression, PTSD and other psychological health issues controlled and monitored by the primary care clinician
- Have neuropsychological testing within functional limits as determined by a neuropsychological evaluation (including attention, memory, processing speed, executive function domains and others as previous deficits warrant) if cognitive impairment was noted during the assessment and treatment of mTBI.

After the above criteria are met, it is recommended that the Service member be placed on duty restrictions that state, “returned to duty with close command monitoring, non-deployable.” The trial of duty should last 30 days with at least 20 duty days. Following successful completion of a functional duty test, return to full duty including worldwide deployment is acceptable.

For patients with persistent symptoms, return to full duty in the jobs they have performed may not be possible. Patients may need to proceed through the Medical Evaluation Board (MEB) process or they may need retraining or reclassification in order to be retained on active duty. For patients injured while serving in the National Guard or Reserves, consideration should be made to temporarily retain on active duty status to ensure they receive the care and benefits to which they are entitled. If released from duty, military/VA and civilian partner resources should be identified. MEB can be considered at six months for patients with chronic symptoms. If a patient requests MEB sooner, this request should be considered.

Educational Treatment Initiatives

Provision of TBI education early after diagnosis of mTBI has been shown to decrease symptom prevalence (Ponsford, 2002). Patient education, focused around the natural history of mTBI recovery that provides recommendations to facilitate sleep hygiene, coping strategies, stress management and avoidance of excessive alcohol and drug use would be most useful. Development and implementation of a provider education curriculum have been proposed for use throughout the Department of Defense (DoD). It is recommended that this curriculum be reviewed at least annually and updated as relevant new TBI research becomes available. Massive educational rollout activities are recommended to occur within the DoD to ensure that clinicians are adequately trained in the recognition and management of concussion/mTBI. Finally, command leadership would benefit from education regarding TBI to guide their decisions related to retention and redeployment in order to optimize force health and readiness.

Performance improvement parameters are needed to ensure the utilization of best practice and quality management. Separate consideration should be given for the educational and programmatic components. In the domain of education, patient satisfaction surveys should be included in all education tools. Providers should be given post-education assessments and continuing education credit should be offered. Program evaluation requires various performance metrics that can be measured between levels of care, service branches, and institutions. Data useful to program evaluation may include the following:

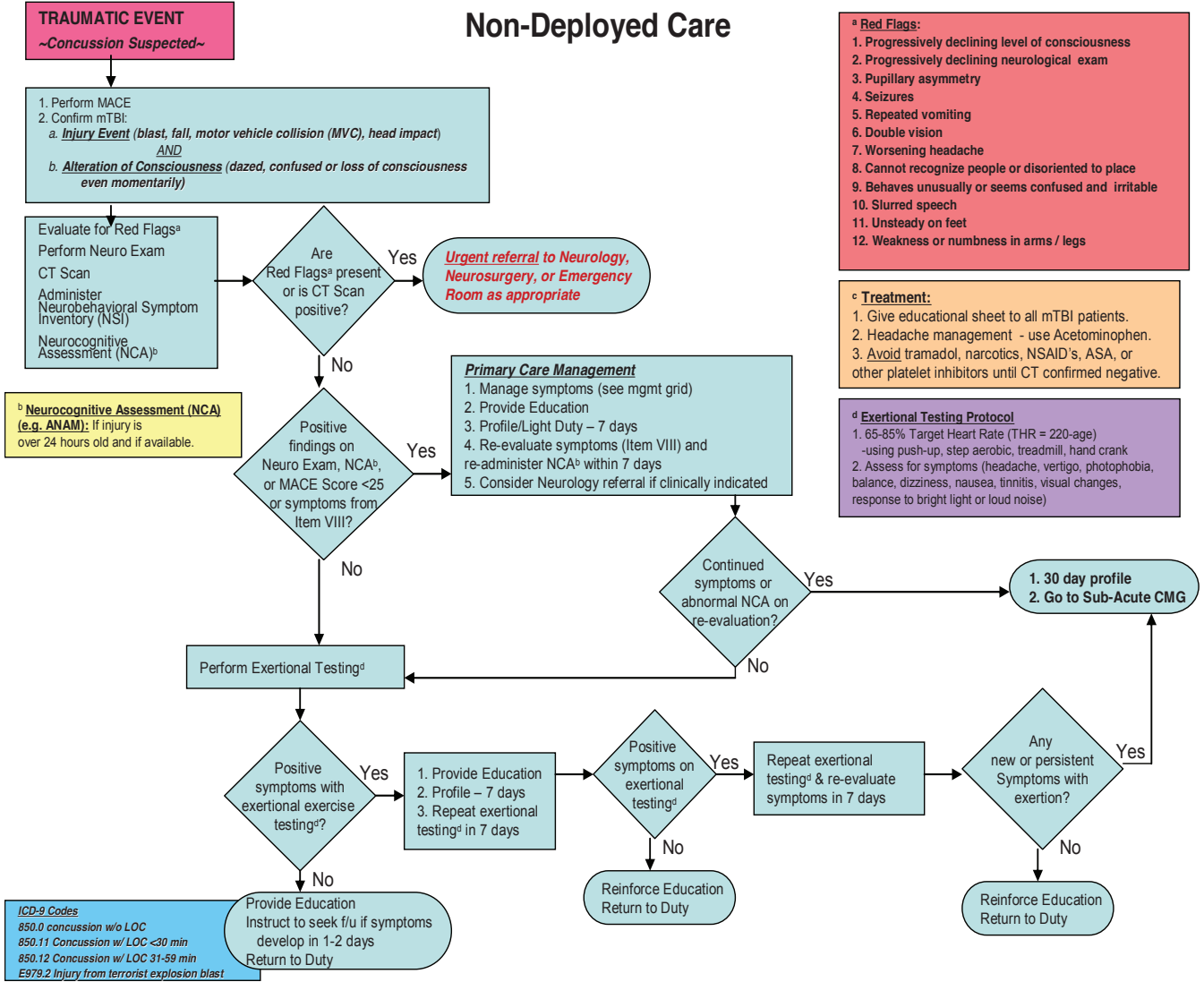
- MEB/Physical Evaluation Board (PEB) rates
- Return to duty rate (full duty/profile/days on profile)
- Patient quality of life
- Patient satisfaction
- Staff turnover
- Staff vacancies
- Access/waiting lists

The comments made in this document are general recommendations only. Attachments contain commonly used assessment tools. Other appropriate screening tools can be used. Sound clinical judgment should dictate the individual treatment plan.

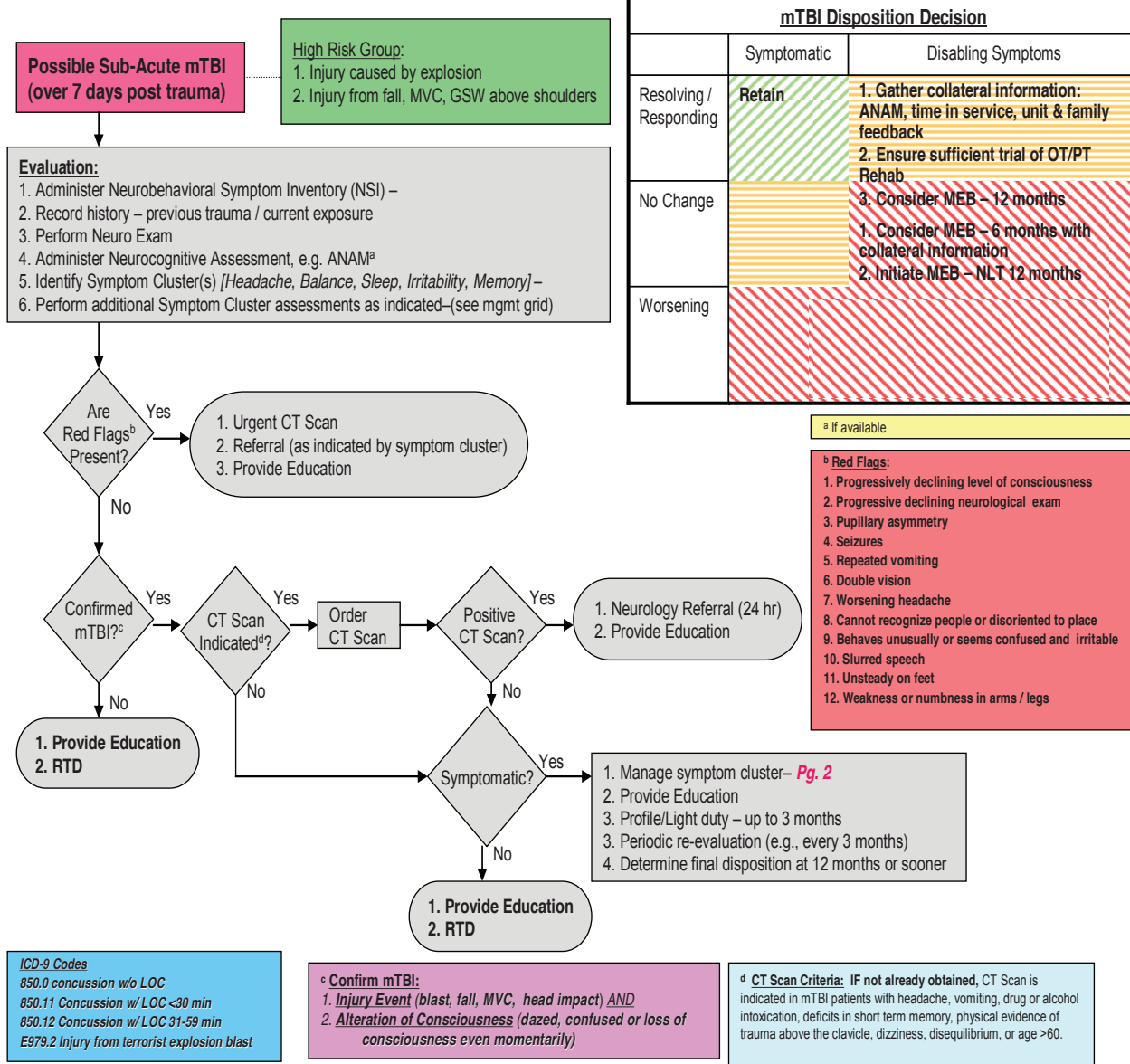
Attachment 1

Clinical Management Guidance for Mild Traumatic Brain Injury – Acute

Non-Deployed Care



Clinical Management Guideline Mild Traumatic Brain Injury – Sub-Acute



Attachment 2

Concussion Management Grid

Updated mTBI Clinical Guidance – May 8, 2008

Symptom Cluster	Presenting Symptoms or Complaints Assess frequency, severity, aggravating factors	Special Assessment related to complaint	Assessment Red Flags And Immediate Referral	Treatment Options by Symptom Cluster NOTE: Treat headache, sleep & irritability first as other symptoms often improve with pain control & rest Inclusion does not imply FDA approved use. See full prescribing information.
Headache	Headache Sensitivity to light/sound Trinitus Nausea	Examine: Neurologic exam Musculoskeletal exam including cervical spine Refer: Any abnormally- 24 hours referral to Neurology	Neurology referral Worsening headache Seizures Blackout Emergency Department (ED) Fever Stiff neck	Episodic: (pm at HA onset; up to 3 days/week); Ibuprofen 600-800 mg.; Naproxen; Triptans, compazine, Phenergan Chronic Daily Headache (Preventive)- onset ~4 weeks Propranolol 10- 240mg (BP & PTSD effects) Amiripylline or Nortriptyline 10-100mg qHS (sleep) AED's gabapentin 300-900 mg q HS to BID sodium valproate 500-1500 mg (draw levels) topiramate 25-100mg q day to BID
Vision	Blurry vision Double vision (diplopia) Difficulty reading or focusing	Examine: Fundoscopic exam, visual acuity, visual fields Consider fluorescein exam of cornea if foreign body suspected	Neurology referral Papilledema Cranial nerve deficit Optometry or ophthalmology referral Evidence of foreign body (FB)	Optometry evaluation- request binocular testing
Balance & Hearing	Dizziness Vertigo Balance difficulties Coordination problems Ringing in the ears	Examine: Dix- Hallpike Maneuver, Romberg, Cerebellar function (finger to nose, rapid alternating movement), nystagmus ENT/Audiology- otoscopic exam, bedside hearing test, audiogram if avail. Administer: consider Dizziness Handicap Inventory (DHI) normal \leq 11	Neurology referral Lateral abnormality, nystagmus, abnormal Romberg ED or emergent Neurosurgery referral CSF leak ENT referral Hemolympañum, FB, TM perforation	ENT/Audiology/Vestibular PT referral depending on local resources if Positive Dix-Hallpike- or DHI > 11 or persistent dizziness complaints
Sleep	Fatigue/Loss of energy Difficulty falling asleep Difficulty staying asleep Easily tired Nightmares/sleep walking	Administer: Epworth Sleepiness Scale, consider PSQI Examine: neck size, airway, height, weight Evaluate: sleep routine, medication/supplement use, alcohol & substance abuse, sleep activity, nightmares, frightened arousal Pittsburgh Sleep Quality Index (PSQI) – not included in the package, but available at http://www.sleep.pitt.edu	Sleep Study referral Apnea ESS-12 BMI >30	Zolpidem 5-10 mg qHS max duration 10 days Trazodone 25-50 mg qHS max dose 150 mg (sleep maintenance) Amiripylline 25 mg qHS max dose 100mg (headache benefit) Quetiapine 25 mg qHS Max dose 100mg (PTSD, nightmare benefit)
Irritability	Anger Depression Mood swings Anxiety Tension Easily overwhelmed	Administer: PCL-M Screening Questionnaire, consider PHQ-9 or other depression inventory Evaluate: specific history & symptoms: physical fighting, alcohol intake, relationship problems, suicidal, homicidal	Psychiatry/Psychology/Social Work referral Outward violence Excessive alcohol intake Suicidal ideation Homicidal ideation	Sertaline 25-50 mg qD Titrate q7-10d max dose 150mg/d Citalopram 10 mg/day titrate to max dose 40 mg/day Allow 3-4 week therapeutic trial of each drug Refer: treatment failure of two meds
Cognition	Memory loss or lapse Forgetfulness Poor concentration Decreased attention Slowed thinking Executive dysfunction	Administer: MACE if injury within 24 hours, Other neurocognitive testing as available (eg ANAM or other neuropsychological testing) Gather: Collateral information from family, command and others		Normalize sleep & nutrition Pain control Refer: Speech/language pathology Occupational therapy Neuropsychology

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Headache

