GUIDELINE KEY POINTS

General

- The management of patients who present with symptoms following a concussion/mTBI injury should focus on promoting recovery and avoiding harm
- A patient-centered approach should be used to provide the needed reassurance and motivation, since patients with prolonged symptoms are suffering, distressed, and in need of guidance, education, support, and understanding
- Currently, there are no universal standard criteria for the definition of concussion/mTBI and the diagnosis is based primarily on the characteristics of the immediate sequelae following the event
- Concussion/mTBI is a common injury, with a time-limited and predictable course. The majority of patients with concussion/mTBI do not require any specific medical treatment
- Experience in contemporary military operations suggests that substantial short-term and long-term neurologic deficits (similar to those following concussion/mTBI) can be caused by blast exposure without a direct blow to the head and may manifest in isolation or as part of polytrauma.

Natural Course of disease

- The vast majority of patients who have sustained a concussion/mTBI improve with no lasting clinical sequelae
- Patients should be reassured and encouraged that the condition is transient and full recovery is expected. The term 'brain damage' should be avoided. A risk communication approach should be applied
- The vast majority of patients recover within hours to days, with a small proportion taking longer. In an even smaller minority, symptoms may persist beyond six months to a year
- The symptoms associated with Post-Concussion Syndrome (PCS) are not unique to mTBI. The symptoms occur frequently in day to day life among healthy individuals and are also found often in persons with other conditions such as chronic pain or depression.

Return to Work /Duty Activity

- Patients sustaining a concussion/mTBI should return to normal (work/duty/school/leisure) activity post-injury as soon as possible
- A gradual resumption of activity is recommended
- If physical, cognitive, or behavioral complaints/symptoms re-emerge after returning to previous normal activity levels, a monitored progressive return to normal activity as tolerated should be recommended.

Early intervention

- Early education of patients and their families is the best available treatment for concussion/mTBI and for preventing/reducing the development of persistent symptoms
- A primary care model can be appropriate for the management of concussion/mTBI when implemented by an interdisciplinary team with special expertise.

Symptom Management

- Treatment of somatic complaints (e.g. sleep, dizziness/coordination problems, nausea, numbness, smell/taste, vision, hearing, fatigue, appetite problems) should be based upon individual factors and symptom presentation
- Headache is the single most common symptom associated with concussion/mTBI and assessment and management of headaches in individuals should parallel those for other causes of headache
- Medication for ameliorating the neurocognitive effects attributed to concussion/mTBI is not recommended
- Medications for headaches, musculoskeletal pain, or depression/anxiety must be carefully prescribed to avoid the sedating properties, which can have an impact upon a person's attention, cognition, and motor performance
- Treatment of psychiatric symptoms following concussion/mTBI should be based upon individual factors and the nature and severity of symptom presentation, and may include both psychotherapeutic and pharmacological treatment modalities
- In patients with persistent post-concussive symptoms (PPCS), which have been refractory to treatment, consideration should be given to other factors including psychiatric, psychosocial support, and compensatory/litigation.

Appendix D

Treatment of Physical Symptoms

This Appendix includes recommendations for treatment of a selected list of physical symptoms that are most common in patients presenting with symptoms following a concussion/mTBI. The recommendations were formulated based on consensus of clinical experts.

D1. Headache

Post-traumatic headaches occur acutely in up to 90% of all individuals who sustain a concussion. Post-traumatic headaches usually develop within 7 days of head trauma. The International Headache Society classification category is headaches associated with head and neck trauma. The category was established because the most frequent forms of civilian head trauma also cause injury to the cervical spinal column, spinal cord and neck musculature. Cervicogenic pain can include headache as well as neck pain. Individuals who sustain head and neck injury can have headaches in which the pain originates from both the head and the neck. Although post-traumatic headaches represent a unique category of headache, they often share features of other types of headaches. The three most common patterns of post-traumatic headaches are:

1. Tension-type headaches, including cervicogenic component
2. Migraine headaches, or
3. Combined migraine and tension-type headaches.

Table D - 1 Criteria for characterizing post-traumatic headaches as tension-like (including cervicogenic) or migraine-like based upon headache features.

	Headache type	
Headache Feature	**Tension-like(including Cervicogenic**	**Migraine-like**
Pain intensity	Usually mild-moderate	Often severe or debilitating
Pain Character	Dull, aching, or pressure. Sharp pain may be present, but is not predominant	Throbbing or pulsatile, can also be sharp/stabbing or electric-like
Duration	Usually less than 4 hours	Can last longer than 4 hours
Phono- or photo-phobia	One but not both may be present	One, or both usually present
Able to carry out routine activities /work	Usually	Usually not, or with a decreased level of participation
Location	Bilateral frontal, retro-orbital, temporal, cervical and occipital, or holocephalic	Usually unilateral and may vary in location among episodes
Nausea or malaise	Not present	Usually present
Palpable muscle tenderness or contraction	Pericranial muscles including temporalis, masseter, pterygoid, posterior neck muscle, sternocleidomastoid, splenius or trapezius	Localized muscle tenderness is not typical, muscle tenderness may be present with long duration headaches

ASSESSMENT

Physical Examination

1. Acute assessment focuses on determining if an individual has intracranial pathology as a consequence of the head injury. Include examination of the head and neck; cranial nerve examination including: test of olfaction, funduscopic evaluation, measurement of pupil size and reaction to light, and observation of eye movements. The examination also evaluates muscle strength and tone, gait and upper and lower extremity coordination. Warning signs of intracranial pathology that will require neurosurgical intervention include: drowsiness, impaired motor function (hemiparesis or hemi-ataxia), unsteady gait or inability to stand, vomiting with or without head pain, headache with valsalva maneuvers such as coughing, papilledema or pupil asymmetry of size or reactivity to light. Patients with warning signs of intracranial pathology need to have additional assessment including intracranial imaging.
2. As indicated in **Table D-1**, focal muscle contraction can be identified in some individuals with tension type headaches or cervicogenic pain.

Medication Review

3. Medication Review is required for people with headaches that have been present for more than two weeks and for individuals with frequent or daily headaches. Chronic use (particularly daily) of NSAIDs or acetaminophen (alone or combined with caffeine) particularly daily, may lead to rebound headaches that are similar to tension-type headaches in character. Headaches associated with chronic NSAID/acetaminophen usage should be addressed to a headache specialist. Excessive use or rapid withdrawal of caffeine or tobacco can also trigger headaches. Particular caution is required for individuals who have frequent headaches and who state that headaches respond only to opioid medications. Such individuals should be directed to a pain clinic or headache specialist.

Sleep

4. The lack of sleep can cause or exacerbate headaches and/or light sensitivity as well as problems with many cognitive/emotional functions. Ascertain current sleep/wake cycles and provide counseling regarding appropriate sleep hygiene (limiting use of stimulants, encouraging exercise, reducing pre-sleep stimuli from lights/noise, reducing pre-sleep fluid intake, discouraging naps). Concussion is also associated with impaired sleep; i.e., disturbed abnormal breathing patterns, or disruptions in progression of sleep cycles.

TREATMENT

See table Appendix E for suggested list of selected medications used in treatment of headache

5. Pharmacotherapy and non-pharmacologic treatments to reduce the frequency of headaches and to treat acute headaches are based upon the character of the headaches. Patients who have mixed migraine/tension-like headaches may need treatment for both headache types. Based upon currently available information, most individuals with concussion/mTBI will have improvement in their headaches during the first 3 months of treatment. Consider referring patients who do not respond to treatments to headache specialists or pain treatment programs. It is important to maintain a positive outlook and to encourage active patient ownership and involvement in the care plan. It is also important to recognize co-morbid conditions, especially sleep disorders, anxiety disorders (PTSD) and depression. Treatment of these conditions may also improve headache.

Episodic tension-type headaches

6. Episodic tension-type headaches usually respond to non-steroidal anti-inflammatory medications (NSAID) that can be obtained over-the-counter. Unfortunately, tension-type headaches associated with concussion may be resistant to medication alone. Patients may achieve better pain relief if medication treatment is coupled with other treatment modalities such as relaxation training and biofeedback. Patients should be encouraged to engage in physical therapy to exercise neck muscles and maintain appropriate range of motion. Increased physical activity may help to reduce the frequency and intensity of tension headaches. These non-pharmacologic modalities may help patients control or moderate their headaches enabling them to gain control of their pain. NSAID medications

including aspirin, ibuprofen or choline-magnesium-trisalisylate and acetaminophen are the first-line medications for treating tension headaches. The choice of an NSAID or acetaminophen depends upon individual response and severity of side effects. Aspirin is more likely to produce gastrointestinal distress and upper gastrointestinal bleeding than other NSAID medications. Acetaminophen is often the best tolerated in terms of lower likelihood to produce gastrointestinal distress. When used appropriately, side effects with acetaminophen are rare. The most serious side effect is liver damage due to large doses, chronic use or concomitant use with alcohol or other drugs that also damage the liver. Acetaminophen should be avoided in individuals with hepatitis. Choline-magnesium-trisalisylate occasionally provides a good balance of efficacy and reduced likelihood of gastrointestinal distress. Ibuprofen can also be used to treat episodic tension headaches. If patients exhibit gastrointestinal side effects, therapy with proton-pump inhibitors and histamine blockers may be considered. Pain treatment is more likely to be successful if the medication is taken at the onset of a headache rather than waiting for the headache pain to escalate.

7. *Combination medications* can be effective in treating episodic tension headaches, but persistent usage can lead to rebound headaches. Aspirin, acetaminophen, or both are often combined with caffeine or a sedative drug in a single medication. Combination drugs may be more effective than NSAIDs or acetaminophen alone. Analgesic-sedative combinations can be obtained only by prescription because they may produce dependency, or trigger addiction in vulnerable individuals. This may lead to chronic daily headache. Combinations of acetaminophen or aspirin and an opioid should be used with great caution. These drugs should not be used more than two days a week due to concern for side effects and the potential for dependency.
8. Patients who experience more than three tension headaches per week may benefit from prophylactic therapy designed to prevent tension headaches**.** Poorly controlled tension headaches may indicate that attention should be directed to physical or psychological factors that may be triggering the headaches.

Migraine Headaches

9. Medical treatment of migraine headaches includes strategies for acute interventions and headache prevention. Many patients with migraine can be effectively treated with various acute headache medications and nonpharmacologic strategies. See Appendix E for list of pharmacologic treatments that can be used to treat and prevent migraine headaches. Patients need to be aware of factors that can trigger migraines and avoid those that trigger their headaches. Headache risk factors and triggers include: sleep disruption, delaying meals, stress, and, for some people, specific foods, beverages or odors can trigger migraine attacks. Nonpharmacologic treatments are often adjunctive to acute treatment although at times and especially early in the evolution of a migraine they may be effective and may eliminate the need for pharmacologic interventions. Nonpharmacologic treatments commonly employed are relaxation, biofeedback, visualization, extracranial pressure, and cold compresses. Regular exercise, maintaining regular sleep and meal schedules are an important part of the overall treatment regimen but are more effective as preventives than as treatments.
10. Interventions to reduce headache frequency should be considered when migraine headaches occur more than once a week or any of the following criteria exist:
    a. Headache attacks that are disabling despite aggressive acute interventions
    b. Patient's desire to reduce frequency of acute attacks
    c. Headaches compromise work attendance, societal integration or daily life
11. Effective acute treatment requires that patients recognize their specific warning signs (aura) of an impending headache. A migraine headache often begins with mild to moderate pain that may be similar to the pain of a tension-type headache. As the migraine progresses, the headache includes the typical migraine features such as throbbing pain, nausea and phono- or photophobia. Acute treatment is more likely to succeed if medication is taken as soon as the patient recognizes the warning signs.
12. It is important that acute migraine treatment be used prudently to avoid inducing headaches due to medication overuse or rebound. Headaches associated with medication overuse are typically tensionlike in character. Treatment of medication overuse headaches requires stopping daily use of acute headache medication treatment, which will lead to withdrawal symptoms that include rebound

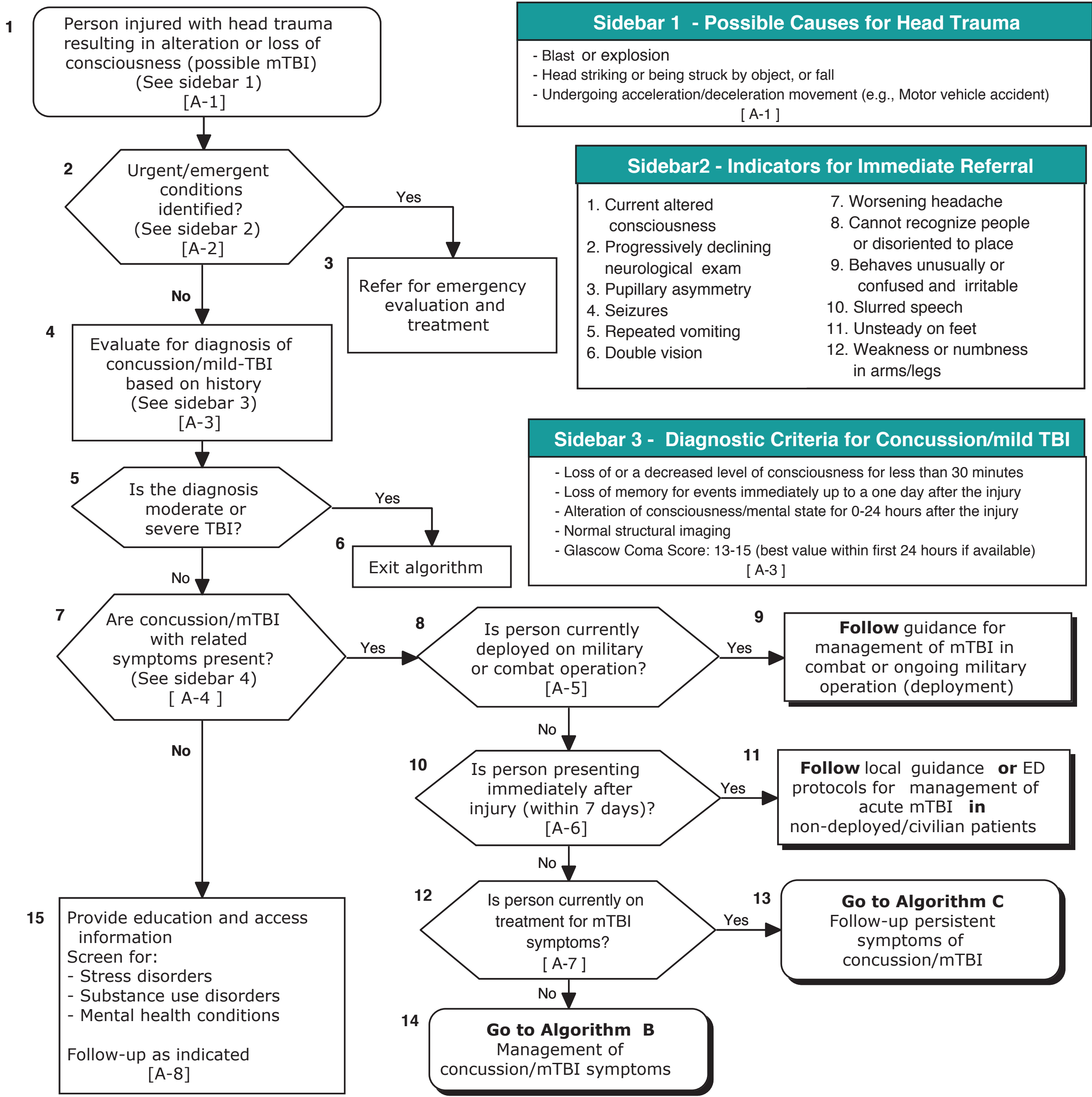
headaches. Patients can fall into a pattern of continued medication overuse to avoid rebound headaches. When patients are caught in a pattern of medication-overuse, they are usually refractory to preventive medications. In most cases, headaches improve after an analgesic washout period. It is important to educate patients that acute migraine medication treatment be limited to 3 treatments a week or less on a regular basis. A headache diary including frequency and medication history use may be useful in detecting medication overuse.

13. If acute treatment of a migraine is not effective, rescue treatment may be needed to break the migraine cycle (see **Table D-2**). If rescue therapy is required more than once a month, then the patient should receive prophylactic treatment as well as acute treatment.

Table D - 2: Rescue interventions for migraine

Intervention	**Comment**
Medications	Due to nausea medications should be administered via injection or suppository
NSAID - Ketorolac	Gastric protection against ulceration may be considered
Triptans or Ergotamines	These agents are available in parenteral formulations, nasal sprays and oral tablets. Given early, may abort migraine attack, may be ineffective for an advanced migraine attack.
Tramadol	The side effect of sedation can be useful as migraine attacks can abate with sleep
Divalproex sodium	Intravenous administration of 500mg can break a migraine
Butorphanol (Stadol)	This is available in a nasal inhalation formulation; given early may be able to abort a migraine attack
Opioids	Morphine sulfate 2-4mg or comparable dose of another parenteral opioid can be useful in breaking a migraine attack. Regular usage can lead to habituation. This class of medications is usually avoided in mTBI patients
Oxygen Inhalation	This treatment can be given in conjunction with other interventions. Oxygen is typically provided as 2-4 liters per minute via nasal prongs or mask.
Prochlorperazine	Rectal suppositories 25 mg twice daily may cause sedation
Promethazine	Rectal suppositories 12.5-25 mg every 4-6 hours as needed may cause sedation

VA/DoD Clinical Practice Guideline for Management of Concussion/mild-Traumatic Brain Injury
A: Initial Presentation



SIdebar 4 - Post-Concussion/mTBI Related Symptoms *

Physical Symptoms :	**Cognitive Symptoms** :	**Behavior/Emotional Symptoms** :
Headache, dizziness, balance disorders, nausea, fatigue, sleep disturbance, blurred vision, sensitivity to light, hearing difficulties/loss, sensitivity to noise, seizure, transient neurological abnormalities, numbness tingling	Attention, concentration, memory, speed of processing, judgment, executive control.	Depression, anxiety, agitation, irritability, impulsivity, aggression.

* Symptoms that develop within 30 days post injury

VA/DoD Clinical Practice Guideline for Management of Concussion/mild-Traumatic Brain Injury
B: Management of Symptoms

1. Person diagnosed with concussion/mTBI [B-1]
2. Complete history and physical examination,lab tests, MSE and psychosocial evaluation [B-2]
3. Clarify the symptoms [See sidebar 5] [B-3] Build therapeutic alliance [B-4]
4. Evaluate and treat co-occurring disorders or diseases (such as mood, anxiety, stress or substance use disorders)
5. Determine treatment plan [B-5]
6. Educate patient/family on symptoms and expected recovery (See sidebar 6) [B-6]
7. Provide early interventions [B-7] (See sidebar 6)
8. Are all symptoms sufficiently resolved within days?
   - Yes → 12
   - No → 9
9. Initiating symptom-based treatment [B-8] Consider case management (See sidebar 7)
10. Follow-up and reassess in 4-6 weeks [B-9]
11. Are all symptoms sufficiently resolved?
    - Yes → 12
    - No → 13
12. Follow-up as needed
    Encourage & reinforce
    Monitor for comorbid conditions
    Address:
    - Return to work/duty/activity
    - Community participation
    - Family/social issues
13. Continue on Algorithm C **Management of Persistent concussion/mTBI symptoms**

Sidebar 5: Symptom Attributes

Duration of symptom
Onset and triggers
Location
Previous episodes
Intensity and impact
Previous treatment and response
Patient perception of symptom
Impact on functioning
[B-3]

Sidebar 6: Early Intervention

- Provide information and education on symptoms and recovery
- Educate about prevention of further injuries
- Reassure on positive recovery expectation
- Empower patient for self management

[B-6]

- Provide sleep hygiene education
- Teach relaxation techniques
- Recommend limiting use of caffeine/tobacco/alcohol
- Recommend graded exercise with close monitoring

Encourage monitored progressive return to normal duty/work/activity
[B-7]

Sidebar 7: Case Management

Assign case manager to:
- Follow-up and coordinate (remind) future appointments
- Reinforce early interventions and education
- Address psychosocial issues (financial, family, housing or school/work)
- Connect to available resources

VA/DoD Clinical Practice Guideline for Management of Concussion/mild-Traumatic Brain Injury C: Follow-up Persistent Symptoms