Assessment and Management of Headache Following Concussion/ Mild Traumatic Brain Injury: Guidance for the Primary Care Manager

Introduction

Post-traumatic headache is one of the most common and persistent symptoms of TBI.[1–4] Individuals with mTBI have a higher incidence, longer duration, and higher intensity of PTH compared to those with moderate or severe TBI.[5,6]

According to the International Classification of Headache Disorders 3rd edition, PTH is classified as a secondary headache disorder attributed to traumatic injury to the head, that develops within 7 days of a head injury, or a pre-existing primary headache disorder that becomes chronic or significantly worse within 7 days of a head injury. PTH is classified as *acute* if the headache resolves within 3 months or *persistent* if the headache lasts longer.[7,8]

The most common PTH types are migraine and tension-type headache.[5,8] It is likely that mechanisms of PTH overlap with migraine and primary TTH, but trauma clouds the clinical and pathophysiological picture. PTH is likely a multifactorial process that evolves over time from the acute to the chronic phase.[9]

This clinical recommendation is designed to provide primary care managers with evidence-based best practices for the assessment and management of service members and veterans with PTH. Training on previous iterations of this clinical recommendation has been shown to reduce the number of referrals to a higher level of care, improve follow-up after initial treatment, and increase patient compliance with treatment recommendations.[10]

This is an interactive document. Please click the links in each box for detailed instructions and additional resources.

Initial Evaluation and Management of PTH

Provide Acute Concussion Management

- Complete and document MACE 2 in electronic health record following a potentially concussive event.
- Consider indications for neuroimaging or consult higher level of care.
- Ensure compliance with and manage acute headaches according to Progressive Return to Activity guidance.

For Persistent Headaches

- Consider specialty referral per PRA guidance.
- Advise patient to begin headache diary.
- Assess patient history (including co-occurring conditions).
- Conduct focused physical examination including neurological examination.
- Provide patient with Managing Headaches Following mTBI Fact Sheet.

Identify and Treat Specific Headache Type

Migraine

- Migraine Diagnosis and Clinical Features
- Migraine Treatment

Tension-type, including cervicogenic pain

- TTH Diagnosis and Clinical Features
- TTH Treatment

Other post-traumatic headache subtypes

- Other PTH Subtypes Diagnosis, Clinical Features, and Treatment

Assess for Medication Overuse Headache

Is treatment effective?

- **No** → Specialty referral
- **Yes** → Continue treatment and reassess as needed

Co-Occurring Conditions

Individuals with acute or persistent PTH often have a constellation of physical, psychological, and cognitive post-TBI symptoms. A thorough patient history should be conducted, including medication review, headache history (headache diary), and assessment for co-occurring conditions. Co-occurring conditions specific to PTH that can contribute to or exacerbate headache include sleep disturbances, anxiety, depression, PTSD, and oculomotor and vestibular dysfunction.[11–17] Anxiety and depression can also increase the risk of MOH, a headache that develops due to regular overuse of abortive medications. Headache is prevalent following mTBI and medication overuse can confound the clinical presentation and treatment of headache (e.g., worsens headache, blunts efficacy of preventive medications, transforms episodic into chronic headache).[18–21]

Timely recognition and appropriate management of these co-occurring conditions can help prevent chronic headache, treatment resistance, delayed return to duty, and increased disability.

Co-Occurring Condition	Resources
Sleep disturbances (e.g., insomnia, obstructive sleep apnea)	TBICoE Management of Sleep Disturbances Following Concussion/mTBI: Guidance for Primary Care Management
Behavioral health (e.g., anxiety, depression, PTSD)	Psychological Health Center of Excellence Clinician Resources
Oculomotor or vestibular dysfunction	TBICoE Assessment and Management of Dizziness and Visual Disturbances Following Concussion/mTBI: Guidance for the Primary Care Manager
Medication overuse headache	MOH table

MIGRAINE AND TTH DIAGNOSIS & CLINICAL FEATURES[7, 22–25]		
	Migraine (with or without aura)	**TTH (including cervicogenic pain)**
Diagnostic Criteria	ICHD-3 criteria for Migraine	• ICHD-3 Criteria for TTH • ICHD-3 Criteria for Cervicogenic Headache
Pain Intensity	Often severe or debilitating	Usually mild to moderate
Pain Character	Throbbing or pulsatile, can also be sharp, stabbing, or electric-like	• Dull, aching, or band-like pressure • Sharp pain may be present but is not predominant.
Duration	4–72 hours	Usually less than 4 hours, but can range from 30 minutes to 7 days
Location	Often unilateral and may vary in location among episodes	Typically bilateral frontal, retro-orbital, temporal, cervical, occipital, or holocephalic
Phono- or Photophobia	One or both usually present	One but not both may be present
Nausea or Vomiting	Usually present	Not present
Routine Physical Activity (e.g., walking, climbing stairs)	Aggravates symptoms	Does not aggravate symptoms
Evaluation Findings	Localized muscle tenderness is not typical, but muscle tenderness may be present with long duration headaches.	• Increased pericranial muscle tenderness is the most pronounced finding in TTH. • The number of myofascial trigger points are considerably increased in patients with TTH. • Cervical exam may reveal decreased ROM, palpable tenderness, or contraction of cervical or pericranial muscles.
Additional Features	**Migraine Prodrome:** Symptoms may include increased yawning, euphoria, depression, irritability, food cravings, constipation, or neck stiffness. As many as 77% of patients may experience prodromal symptoms that appear 24–48 hours prior to the onset of headache. **Migraine Aura:** Focal neurological symptoms (e.g., visual, auditory, or somatosensory symptoms) that develop gradually and may last for up to an hour preceding or during headache attacks. Auras occur in approximately 25% of patients.	• Migraine and TTH may be considered related conditions with shared environmental and lifestyle factors. • Cervicogenic headache should be considered if headache is unilateral or asymmetrical and mechanism of injury is consistent with whiplash or cervical involvement.

MIGRAINE HEADACHE TREATMENT[20, 26–38]

ICD-10 Code: G43.001–G43.919

Non-Pharmacologic Treatment Considerations

- Provide patient with:
  - Managing Headaches Following mTBI Fact Sheet
  - Sleep Following mTBI Fact Sheet
- Consider Prevention of MOH and provide patient with MOH Fact Sheet
- Emphasize the importance of activity modification to avoid symptom onset threshold.
- Avoid headache triggers (e.g., dietary and environmental modifications per review of headache diary).
- Aerobic exercise, progressive strength training
- Progressive muscle relaxation
- Consider referral for:
  - Acupuncture (e.g., battlefield acupuncture)
  - Neuromodulation (e.g., transcranial magnetic stimulation)
  - Behavioral health (e.g., biofeedback, CBT)
  - Physical therapy

Pharmacologic Treatment Considerations

Abortive Treatment: Limit Use To Avoid MOH

Mild to Moderate

- Ibuprofen: 400–800mg Q6H prn up to 2.4g/day
- Naproxen sodium (IR): 500–750mg Q12H prn up to 1g/day
- Acetaminophen: 500–1000mg Q4–6H prn up to 3g/day
- Aspirin: 500–1000mg Q4–6H prn up to 4g/day
- Combination analgesic/caffeine compounds: APAP 250mg/ASA 250mg/caffeine 65mg: 2 tablets once Q24H

Additional Information

- Administer early in the course of an attack.
- A large initial dose may confer greater benefit than multiple smaller doses.
- Use alternative route of administration (e.g., SubQ, intranasal) and antiemetics if concurrent nausea and vomiting.
- Oral agents can also be ineffective due to poor absorption as a result of migraine-induced gastric stasis.
- Alternative (typically prescribed by Neurology):
  - CGRP antagonists (e.g., rimegepant, ubrogepant). Consider use if triptans are contraindicated (e.g., prior heart attack or stroke), poorly tolerated, or inadequate response to ≥ 2 triptans.
  - Greater occipital nerve blocks have been shown to reduce headache intensity and frequency in migraines in patients who are refractory or have contraindications to standard medical treatments.

Moderate to Severe

Consider use of PO or IM NSAID in combination with triptan if triptan alone is not effective.

- Sumatriptan
  - PO: 50–100mg at onset, may repeat after 2 hours, up to 200mg/day
  - SubQ: 6mg at onset, may repeat after 1 hour, up to 12mg/day
  - Intranasal (soln): 20mg at onset, may repeat after 2 hours, up to 40mg/day
- Zolmitriptan
  - PO/ODT: 2.5–5mg at onset, may repeat after 2 hours, up to 10mg/day
  - Intranasal: 2.5–5mg at onset, may repeat after 2 hours, up to 10mg/day
- Rizatriptan
  - PO/ODT: 5–10mg at onset, may repeat after 2 hours, up to 20mg/day
- Ketorolac
  - IM: 30–60mg once

MIGRAINE HEADACHE TREATMENT (CONTINUED) *ICD-10 Code: G43.001–G43.919*		
Preventive Treatment (See Treatment Efficacy Criteria for preventive treatment indications)		
Medication or Supplement (Level of Evidence):	**Consider if:**	**Caution if:**
Propranolol*: 10–40mg QD in 1–4 divided doses (depending on IR or ER formulation), titrate up gradually to 40–240mg/day in 1–4 divided doses (A)	• Anxiety • Hypertension	• Depression • Dizziness • Exercise intolerance • Fatigue • Bradycardia • Hypotension • Sexual dysfunction
Topiramate: 25mg QD, titrate up in ≥ 1-week intervals in 25–50mg increments, up to 100–200mg/day in 1–2 divided doses (A)	• Chronic migraine • MOH • Exercise intolerance • Frequent migraine aura • Obesity	• Cognitive dysfunction • Anxiety or depression • Fatigue • Sensitive to side effects • Taking hormonal contraceptives
Amitriptyline*: 10–12.5mg QHS, titrate up every 2–3 weeks in 10–12.5mg increments, up to 50–100mg QHS (B)	• Insomnia • Vestibular migraine • Comorbid pain	• Cognitive dysfunction • Exercise intolerance • Fatigue • Sexual dysfunction† • Suicide risk • Sensitive to side effects
Nortriptyline*: 10–25mg QHS, titrate up in ≥ 1 week intervals in 10–25mg increments, up to 50–100mg QHS	• Amitriptyline is indicated but anticholinergic effects or sedation limit use	
Venlafaxine ER*: 37.5mg QD, titrate up weekly in 37.5mg increments, up to 75–150mg/day (B)	• Anxiety or depression • Cognitive dysfunction • Exercise intolerance • Fatigue • PTSD • Vestibular migraine	• Insomnia • Sexual dysfunction† • Suicide risk • Hypertension (> 225mg/day)
Duloxetine*: 30mg QD, titrate up to 60mg QD after 1 week	• Anxiety or depression • Cognitive dysfunction • Exercise intolerance • Fatigue • Comorbid pain	• Insomnia • Sexual dysfunction† • Suicide risk
OnabotulinumtoxinA: • Indicated for prevention of chronic migraine. • Refer to Neurology or qualified provider. (A)	• Chronic migraine • MOH • Polypharmacy • Mixed PTH phenotype (chronic migraine and TTH) • Poor tolerance to PO preventives	
CGRP Antagonists (e.g., atogepant, rimegepant, erenumab, fremanezumab) • Refer to or consult with Neurology or qualified provider.	• Contraindications, inability to tolerate, or inadequate response to an 8-week trial of two Level (A) or (B) treatments at a therapeutic dose. • Chronic migraine • MOH • Polypharmacy	• Hypertension (with erenumab) • Recent cardiovascular or cerebrovascular ischemic events (theoretical risk)

MIGRAINE HEADACHE TREATMENT (CONTINUED)		
Preventive Treatment (See Treatment Efficacy Criteria for preventive treatment indications)		
Medication or Supplement (Level of Evidence):	**Consider if:**	**Caution if:**
Candesartan: 4–8mg QD, titrate up weekly, up to 16mg/day (C)	• Cognitive dysfunction • Hypertension • Sensitive to side effects	• Hypotension • Dizziness
• Magnesium oxide: 400mg QD (equivalent to 240mg elemental magnesium), titrate up to 400mg BID (B) • Riboflavin (Vitamin B2): 400mg QD (B) • Coenzyme Q10: 100mg TID (C)	• Adjunct to pharmacotherapy desired • Patient preference for supplements • Sensitive to side effects	

* *Beta blockers and antidepressants may affect sleep. Refer to TBICoE's sleep disturbances clinical recommendation for more information.*

† *Antidepressants can cause varying levels of sexual dysfunction (venlafaxine > TCAs > duloxetine).*

(A),(B),(C) indicates level of evidence per the 2012 American Academy of Neurology/American Headache Society guidelines.[36]

TENSION-TYPE AND CERVICOGENIC HEADACHE TREATMENT[39–42]

ICD-10 Code: TTH: G44.201–G44.229, Cervicogenic: G44.86

Non-Pharmacologic Treatment Considerations

TTH

- Provide patient with:
  - Managing Headaches Following mTBI Fact Sheet
  - Sleep Following mTBI Fact Sheet
- Consider Prevention of MOH and provide patient with MOH Fact Sheet
- Emphasize the importance of activity modification to avoid symptom onset threshold.
- Avoid headache triggers (e.g., dietary and environmental modifications per review of headache diary)
- Aerobic exercise, progressive strength training, stretching, yoga
- Progressive muscle relaxation
- Consider referral for:
  - Acupuncture (e.g., battlefield acupuncture)
  - Behavioral Health (e.g., biofeedback, relaxation training, CBT)
  - Physical Therapy (e.g., dry needling)
  - Osteopathic Manipulative Treatment

Cervicogenic

- Provide patient with Managing Neck Pain Following mTBI Fact Sheet.
- Emphasize the importance of activity modification to avoid symptom onset threshold.
- Refer to Physical Therapy for evaluation and treatment of cervicogenic headache.
- Refer to Neurology or Pain Managment for cervicogenic headache refractory to Physical Therapy.
- Refer to Pain Management for severe neck pain or chronic whiplash injury.

Pharmacologic Treatment Considerations

Abortive Treatment: Limit Use To Avoid MOH

TTH

- Ibuprofen: 400–800mg Q6H prn up to 2.4g/day
- Naproxen sodium (IR): 500–750mg Q12H prn up to 1g/day
- Aspirin: 500–1000mg Q4–6H prn up to 4g/day
- Acetaminophen: 500–1000mg Q4–6H prn up to 3g/day
- Combination analgesic/caffeine compounds: APAP 250mg/ASA 250mg/caffeine 65mg: 2 tablets once Q24H

Cervicogenic

- Ibuprofen: 400–800mg Q6H prn up to 2.4g/day
- Naproxen sodium (IR): 500–750mg Q12H prn up to 1g/day
- Acetaminophen: 500–1000mg Q4–6H prn up to 3g/day

Preventive Treatment of TTH: (See Treatment Efficacy Criteria for preventive treatment indications)

Medication or Supplement (Level of Evidence):	Consider if:	Caution if:
Amitriptyline*†: 10–12.5mg QHS, titrate up every 2–3 weeks in 10–12.5mg increments, up to 50–100mg QHS (A)	• Insomnia • Comorbid pain	• Cognitive dysfunction • Exercise intolerance • Fatigue • Sexual dysfunction‡ • Suicide risk • Sensitive to side effects
Nortriptyline*: 10–25mg QHS, titrate up in ≥ 1 week intervals in 10–25mg increments, up to 50–100mg QHS	• Amitriptyline is indicated but anticholinergic effects or sedation limit use	
Mirtazepine†: 15mg QHS, may titrate up to 30mg QHS after 1 week (B)	• Depression • Insomnia	• Fatigue • Obesity • Sexual dysfunction‡ • Suicide risk
Venlafaxine ER†: 37.5mg QD, titrate up weekly in 37.5mg increments, up to 75–150mg QD (B)	• Anxiety or depression • Cognitive dysfunction • Exercise intolerance • Fatigue • PTSD	• Insomnia • Sexual dysfunction‡ • Suicide risk • Hypertension (doses > 225mg/day)

* *Combination therapy with TCAs and stress management may be superior to either therapy alone.*

† *Antidepressants may affect sleep. Refer to TBICoE's sleep disturbance clinical recommendation for more information.*

‡ *Antidepressants can cause varying levels of sexual dysfunction (venlafaxine > TCAs >> mirtazepine).*

(A),(B),(C) indicates level of evidence per the European Federation of Neurological Societies guidelines.[39]

OTHER POST-TRAUMATIC HEADACHE SUBTYPES[7, 43–47] *ICD-10 Code: Neuropathic: M79.2, TN: G50.0, ON: M54.81*			
	Headache Related to Neuropathic Pain	**Trigeminal/Occipital Neuralgia**	**Vestibular Migraine**
Diagnostic Criteria		• ICHD-3 Criteria for TN • ICHD-3 Criteria for ON	• ICHD-3 Criteria for vestibular migraine
Clinical Features	Localized, episodic pain, burning, tingling, or hyperesthesia associated with soft tissue trauma to the scalp or face	Moderate to severe, sharp, burning, tingling, or electric-like pain over affected nerve branches	Moderate to severe vestibular symptoms (e.g., vertigo, motion-induced dizziness) associated with migrainous features
Evaluation	Localized tenderness or reproduction of pain with movement or palpation	Positive Tinel sign or point tenderness over affected nerve branch	• Review headache diary for temporal association with vestibular symptoms. • Thorough neurologic examination to exclude alternative diagnosis • Nystagmus may be present during an episode of vestibular migraine; however, alternative causes should be excluded based on clinical suspicion.
Non-Pharmacologic Treatment Options	• Cold or hot compresses • Massage therapy • CBT • Medical, Chinese, or battlefield acupuncture • Modification of uniform standards if indicated (e.g., haircuts, shaving, wearing cover)	• Medical, Chinese, or battlefield acupuncture • Modification of uniform standards if indicated (e.g., haircuts, shaving, wearing cover)	

OTHER POST-TRAUMATIC HEADACHE SUBTYPES (CONTINUED) *ICD-10 Code: Neuropathic: M79.2, TN: G50.0, ON: M54.81*			
	Headache Related to Neuropathic Pain	**Trigeminal/Occipital Neuralgia**	**Vestibular Migraine**
Pharmacologic Treatment Options	**Neuropathic Pain** • Amitriptyline: 10–25mg QHS, titrate up weekly in 10–25mg increments, up to 150mg QHS • Gabapentin (IR): 100–300mg 1–3 times/day, titrate up to 300–1200mg TID • Pregabalin: 25mg QD, titrate up weekly in 25–150mg increments, up to 300–600mg/day in 2–3 divided doses • Duloxetine: 30mg QD, titrate up to 60mg QD after 1 week	**Occipital Neuralgia** • Greater occipital nerve block • Neuropathic pain agents **Trigeminal Neuralgia** Consider consultation with Neurology for medication management. • Carbamazepine: 200–400mg/day in 2–4 divided doses, titrate up over several weeks in 200mg increments to usual maintenance dose of 600–800mg/day in 2–4 divided doses; max dose 1200mg/day ▪ Patients with TN typically improve with treatment. If no improvement in 2 weeks, discontinue medication and refer. • Oxcarbazepine: 300–600mg/day in 2 divided doses, titrate up every ≥ 3 days in 300mg increments, up to 1800mg/day	• See Migraine Treatment • Triptans may be considered when headache symptoms accompany vertigo attacks or when vertigo acts as a migraine aura. • May consider vestibular suppressants; however, not typically recommended in the immediate period following mTBI
Specialty Referral	• Physical Therapy • Pain Management for chronic symptoms > 3 months • Massage Therapy	• Physical therapy with a trained provider has benefit for ON. • Neurology for percutaneous nerve blocks, medication management, or surgical intervention	• Neurology for evaluation and management of persistent symptoms • Vestibular Rehabilitation (PT or OT) for evaluation and management of patients with visual/motion triggers or functional complaints

MEDICATION OVERUSE HEADACHE[7, 19, 48–51] *ICD-10 Code: G44.4, G44.40, G44.41*	
Risk Factors	**Consider preemptive preventive therapy in patients at high risk for MOH.** • Severe or frequent headaches (≥ 7 days per month) • Migraine diagnosis • Frequent use of anxiolytics, analgesics, or sedative hypnotics • Smoking • Physical inactivity • Psychiatric conditions (e.g., anxiety, depression) especially in combination with MSK or GI complaints • Self-reported whiplash • Female sex • Sick leave of > 2 weeks in the last year
Diagnostic Criteria	• ICHD-3 Criteria for MOH • Headache occurring on 15 or more days per month in a patient with a preexisting primary headache disorder (primarily migraine or tension-type) • Regular overuse for > 3 months of one or more medications that can be taken for acute and/or symptomatic treatment of headache. • Not better accounted for by another ICHD-3 diagnosis
Clinical Features	Headaches often present upon awakening and are of pressing, tightening, or pulsating character in either a unilateral or bilateral distribution.
Prevention	• Provide patient with MOH Fact Sheet. • Limit abortive medications to < 10 days per month or ≤ 2 days per week. • Use of non-pharmacologic approaches (e.g., neuromodulation, behavioral approaches) as an adjunct to pharmacotherapy, can decrease abortive medication use and risk of MOH. • Avoid butalbital-containing analgesics and opioids.
Evaluation	• Review headache diary including use of abortive medications. • Use Medication Dependence Questionnaire-Headache (MDQ-H).
Pharmacologic Treatment Options	• Initiate or optimize preventive medication. • Discontinue or gradually taper the overused medication as tolerated and initiate an alternate abortive medication from a different class if indicated. Limit use to ≤ 2 days per week. • If additional symptomatic relief is required (e.g., frequent or severe headaches) during tapering or discontinuation, initiate bridge therapy with a long-acting NSAID (e.g., naproxen) or prednisone.
Specialty Referral	Refer to Neurology or Pain Management for discontinuation of chronic use of barbiturates, opioids, or benzodiazepines due to risk of withdrawal symptoms, including seizure.

Assessing for Treatment Efficacy

Ensuring efficacy of headache treatment is imperative as inadequately controlled headaches can result in MOH, transformation from episodic to chronic headache, delayed return to duty, and increased disability.

TREATMENT EFFICACY CRITERIA[28, 52–55]	
Abortive	**Preventive (2–3 months at a therapeutic dose)**
• Pain-free and functioning 2–4 hours after taking abortive medication • Treatment works consistently without routine headache recurrence. • Able to plan their day • Tolerates the medication side effects	Patient self-report or headache diary indicates: • ≥ 50% reduction in headache frequency from baseline • Significant decrease in attack duration or severity from baseline • Decreased abortive medication use from baseline • Decreased days of missed work from baseline • Tolerates the medication side effects
If Treatment Is Ineffective	
• Investigate causes of medication failure (e.g., lack of adherence, poor absorption). • Investigate other potential causes of headache (e.g., MOH, co-occurring conditions, headache triggers) per headache diary. • Initiate alternative first-line abortive agent. • Consider preventive therapy if abortive treatment is ineffective or: ▪ Abortive therapy is contraindicated or not well tolerated. ▪ Patient is at high risk for MOH ▪ Headaches are long-lasting (> 12 hours) or frequent (≥ 2 severe or ≥ 4 mild-moderate headaches per month). ▪ Headaches cause significant disability or diminished quality of life despite appropriate abortive treatment.	• Investigate causes of medication failure (e.g., lack of adherence, inadequate dose). • Investigate other potential causes of headache (e.g., MOH, co-occurring conditions, headache triggers per headache diary). • Switch to another first-line preventive in a different medication class.
Specialty Referral Considerations	
• Consider referral to Neurology for any of the following: ▪ Two or more preventive treatment failures ▪ Ineffective treatment after 2–3 months at a therapeutic dose ▪ Provider clinical judgment	

Disposition

Document disposition in the electronic health record and on the Patient and Leadership Guide with consideration of the functional impact of post-traumatic headache on the service member's ability to perform the mission and the risk of harm to self or others. Certain conditions and medications can affect deployability and restrict duty status. Policies and procedures are service and command specific. Consult duty and deployment standards for service member's organization when dispositioning patient.

Coding Guidance: Refer to ICD-10-CM Coding Guidance for Traumatic Brain Injury.

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