Management of Headache Following Concussion/Mild Traumatic Brain Injury

Defense and Veterans Brain Injury Center
Released February 23, 2016

Clinical Recommendation Learning Objectives

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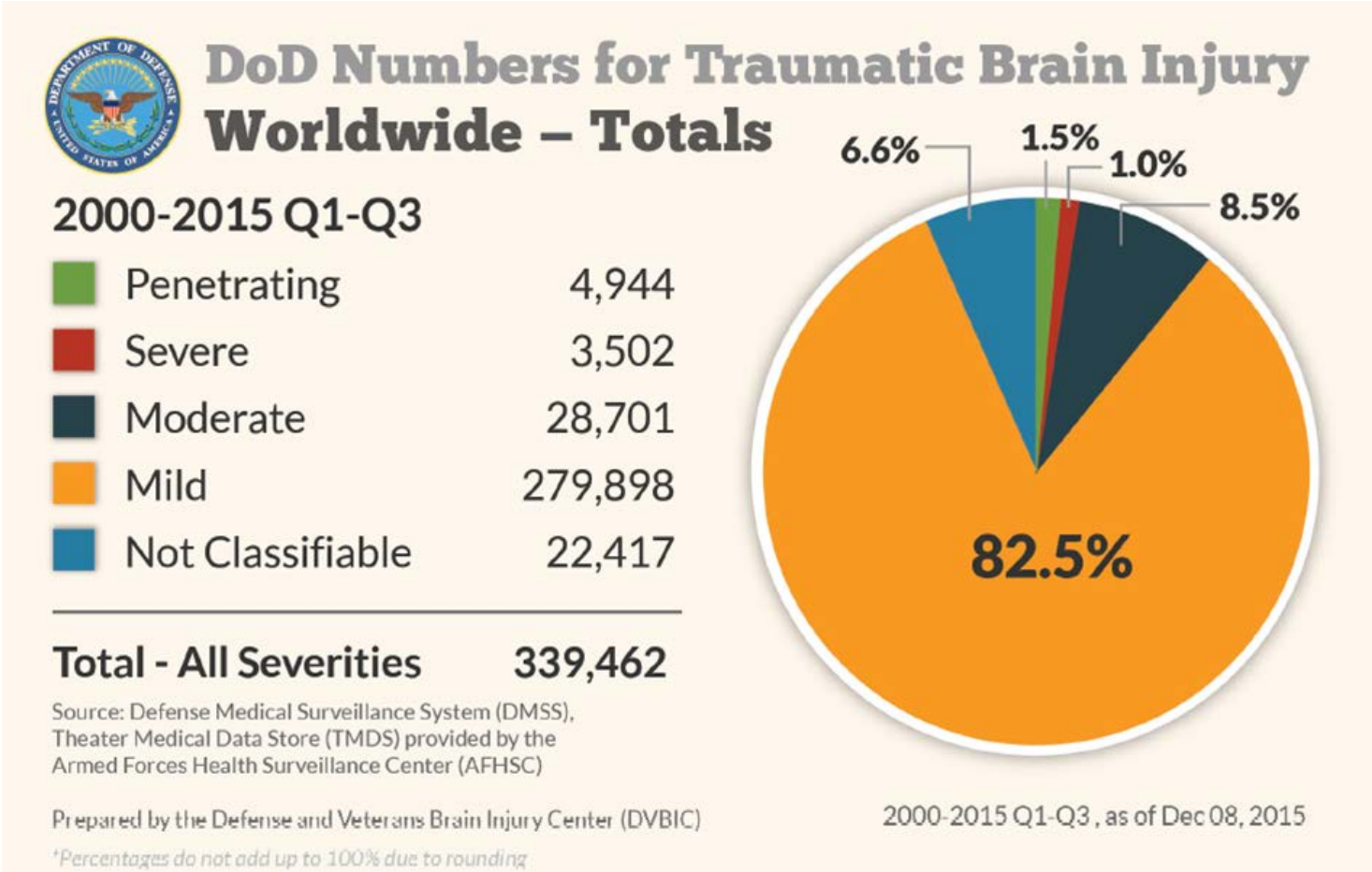
- Describe the occurrence of post-traumatic headache (PTH) following a concussion
- Distinguish between the common PTH types
- Apply methods to assess, diagnose and manage common PTH types
- Understand non-pharmacologic and pharmacologic treatments
- Use treatment guidelines for PTH in deployed and non-deployed settings

Defense Department TBI Statistics



Purpose and Scope of Clinical Recommendation

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- Headache is the most common symptom reported following a concussion
- 74 % of an OEF/OIF cohort reported PTH that occurred within 30 days of sustaining a concussion
- These recommendations were developed to provide comprehensive guidance for acute, sub-acute and persistent PTH

Purpose and Scope of Clinical Recommendation continued

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- The CR development process included:
  - Evidence reviews
  - Analysis of the applicability of current clinical practice guidelines
  - Input from a multidisciplinary expert panel
- Service-specific requirements regarding concussion or the management of PTH may exist
- Provider judgment and operational requirements supersede these recommendations when treating patients

Post-traumatic Headache (PTH)

- PTH may occur from injury to the head and also the neck or face
- A PTH diagnosis is largely dependent on the close temporal relationship between injury and headache onset
- PTH is classified as acute (<3 months) or persistent (>3 months) based upon duration of headache

Post-traumatic Headache Risk Factors

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- The most common risk factors for the development of PTH include:
  - Premorbid history of headache
  - Female gender
  - Presence of comorbid psychiatric disorders

Post-traumatic Headache Risk Factors (cont.)

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- Research suggests other risk factors include:
  - Patient's expectation of developing a headache after head injury
  - Sleep disturbances
  - Mood disturbances
  - Psychosocial stressors
  - Overuse of abortive headache medications

Post-traumatic Headache Types

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- Differentiation of headache type is important for optimal treatment. With a thorough history and review of systems, the characteristics of the specific type will emerge.
- The most common types of PTH after concussion are:
  - Migraine
  - Tension type
  - Cervicogenic
  - Headache related to neuropathic pain

General Post-traumatic Headache treatment

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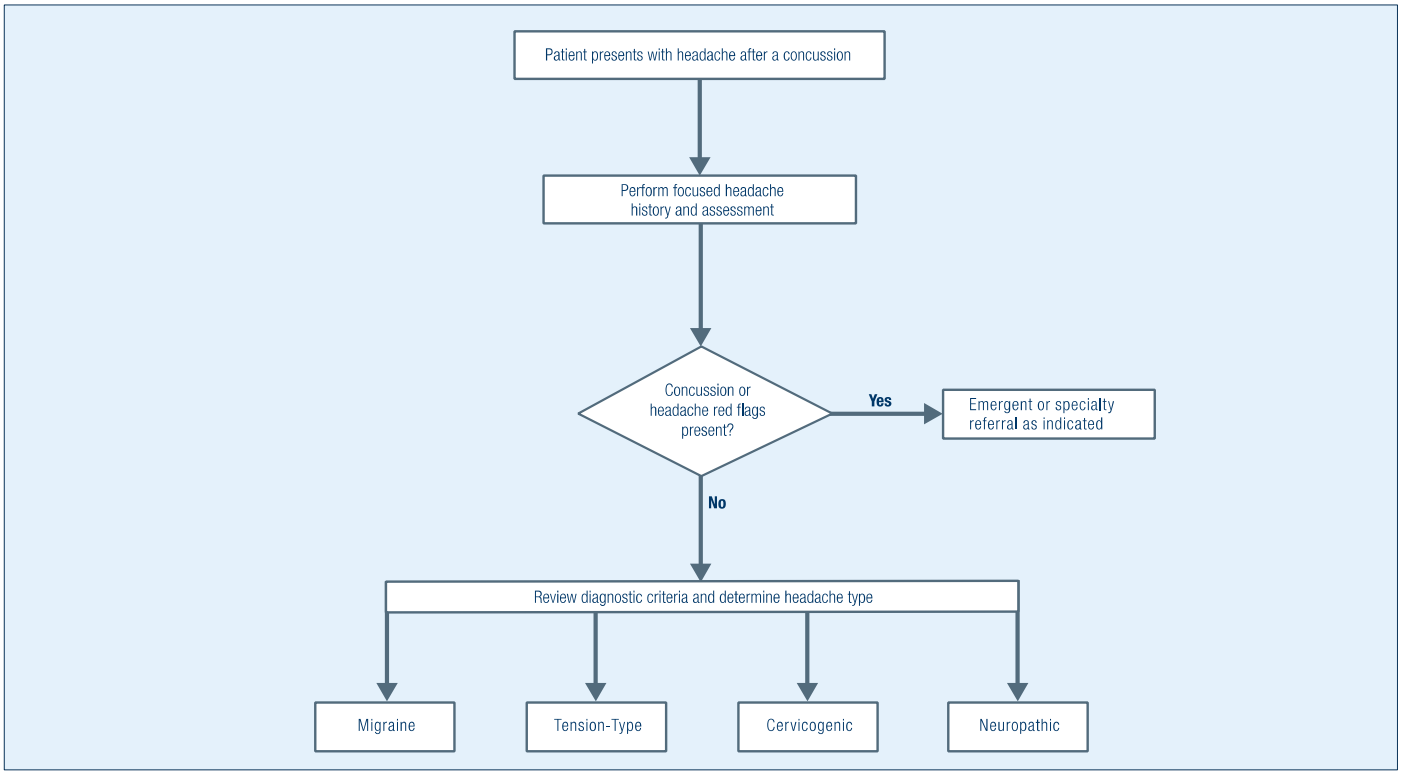
- For all types of PTH:
  - Manage headache symptoms
  - Follow both the Concussion Management Algorithm (CMA) and Progressive Return to Activity for Primary Care Manager CR if in the acute phase (recommendation available at dvbic.dcoe.mil)
  - Physical and cognitive rest are important for healing and symptom resolution
  - Avoid benzodiazepines, tramadol, opiates

Post-traumatic Headache Evaluation & Treatment Algorithm



Beginning the Algorithm

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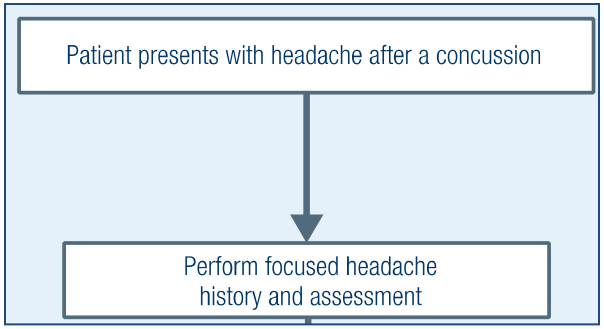
Primary care providers should evaluate whether concussion/mild TBI is a possible cause for any headache.



Remember:

- PTH typically starts within 30 days of head injury
- If prior history of headaches, the TBI could exacerbate headache frequency/severity
- Patients with PTH may not present to the medical provider for treatment until long after the headache starts

Knowledge Check Question 1

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Which of the following is a “red flag” and should prompt an immediate evaluation?

a. Any headache even though it is improving
b. Slurred speech
c. Double vision
d. Disorientation
e. All of the above
f. b, c and d only

Knowledge Check Question 1 (cont.)

Defense Health Agency

Which of the following is a "red flag" and should prompt an immediate evaluation?

a. Any headache even though it is improving
b. Slurred speech
c. Double vision
d. Disorientation
e. All of the above
f. b, c and d only

Answer: ***f. b, c, and d only***
Slurred speech, double vision and disorientation are all concussion red flags.

Perform Focused Headache History & Exam

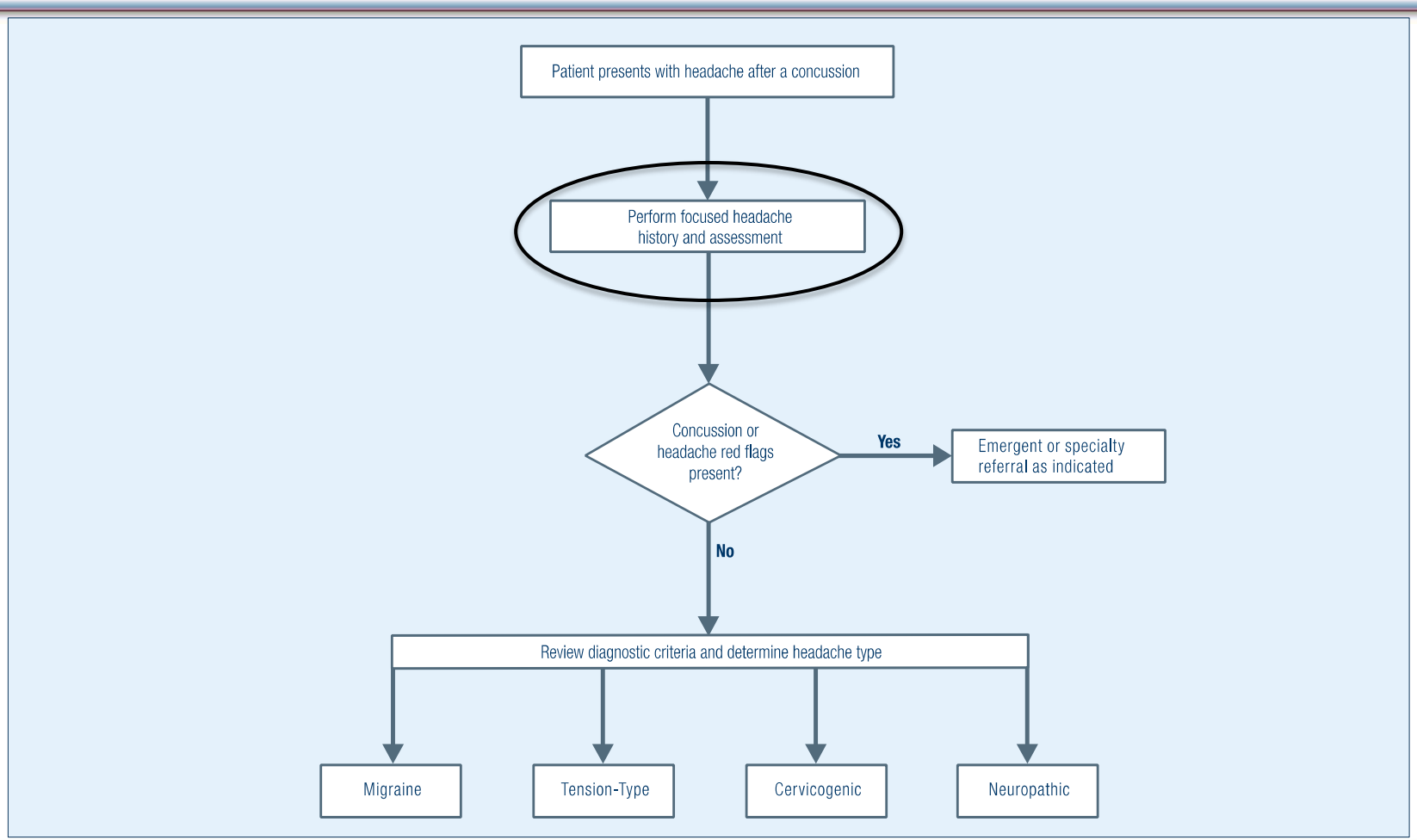

Table 1.0
Focused Headache History

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Assessment area	Examples of questions and information to collect	
Symptoms	• Persistent pain in head or neck after a concussion (Use of 0-10 scale is recommended, 1= barely present, 5= pain beginning to interfere with activity, and 10= worst imaginable pain)	
Location	• Right or left sided • Bilateral vs. unilateral • Face • Stays in one place or moves around (radiates)	• Back or on top • Forehead • Neck
Description of pain	• Throbbing/pulsating • Pressing/squeezing • Stabbing, sharp, or dull/nagging	• Pain with chewing or opening mouth • Head, face or neck tenderness • Decreased jaw movement
Frequency and duration	• Episodic or continuous • Seconds, minutes, hours, days or constant	
Associated physical symptoms	• Vision changes (blindness, blurry vision, double vision, eyelid droop, tearing, eye redness or puffiness) • Light, noise and odor sensitivity, nose blockage/discharge • Nausea, loss of appetite, hunger, bowel changes • Premonitory symptoms (fatigue, difficulty concentrating) • Neck stiffness or pain • Yawning • Pallor • Auras (visual, sensory or dysphasic speech disturbances) • Numbness or tingling around lips, arms or legs	

Table 1.0
Focused Headache History (cont.)

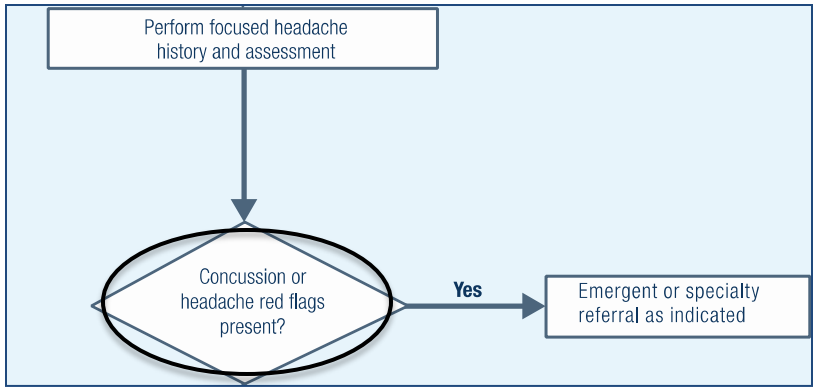
Defense Health Agency

Assessment area	Examples of questions and information to collect	
Headache history	• Previous headache diagnosis • Worsening headache • Previous head trauma or TBI	• History of temporal mandibular joint (TMJ) pain • Family history
Triggers	• Sleep (too much or too little) • Physical activity • Straining or coughing • Missed meal • Food • Pregnancy • Caffeine • Muscle tension	• Emotional stress (during or after) • Bending over • Sexual activity • Change in weather • Alcohol • Menstrual cycle • Contraceptives
Social history	• Headache interferes with family, work or school • Substance use or abuse (caffeine, alcohol, tobacco), supplement use (vitamins, etc.)	
Medication history	• Previous medications used for headache prevention and rescue - Dosage, frequency and duration - Failed medications • Current medications, how often taking rescue or preventative medications	
Comorbid conditions	• Insomnia, depression, anxiety, obstructive sleep apnea	
Questionnaires	• Patient Health Questionnaire (PHQ), Neurobehavioral Symptom Inventory (NSU), Patient Global Impression of Change (PGIC), Headache Impact Test-6 (HIT)	

Table 2.0
Focused Headache Examination

Assessment area	Examples
Head, neck and face	• Cranial nerve examination • Neck range of motion • Palpation of head and neck for trigger points or tenderness • Evaluate for papilledema
Ears, nose and throat	• Examine the ears, nares • Palpitate the face and percuss sinuses • Temporal mandibular joint (TMJ) examination
Other neurological examination	• Reflexes • Sensory testing • Romberg testing • Pronator drift • Strength testing
Mental status	• Speech fluency • Word recall

Table 3.0
Concussion Red Flags



Red flags that indicate emergency referral	
1. Progressively declining level of consciousness	8. Repeated vomiting
2. Loss of consciousness (LOC) > 5 minutes	9. Worsening headache
3. Declining neurological status	10. Pupil asymmetry
4. GCS score < 15	11. Double vision
5. Seizures	12. Slurred speech
6. Neurological deficit: motor or sensory	13. Unusual behavior
7. Cannot recognize people or disoriented to place	

Table 4.0 Headache Red Flags and Indications for Referral

Red flags specific for headaches	
Indications for emergency referral	**Indications for specialty referral**
Concussion red flags	Presence of systemic symptoms
Thunderclap headache (sudden onset)	Associated neurological symptoms
Sudden neurological deficit	Onset after age 50*
Persistent bleeding from nose, ears or scalp	Change in pattern of headache
Cranial fracture	Valsalva precipitation
Infection resulting from a penetrating injury	Postural aggravation
Cerebrospinal fluid leakage (nose or ears)	TMJ disorder
Intracranial hemorrhage on CT	ENT disorder
Papilledema	Anticoagulant therapy*

* Patients on anticoagulant therapy or over the age of 50 have an increased risk of chronic subdural hematoma. This demographic may need imaging with or without specialty referral based on the head trauma history and provider judgment. Refer to the *DVBIC CR Neuroimaging Following Mild Traumatic Brain Injury: Guidance in the Non-Deployed Setting* that is available at dvbic.dcoe.mil.

Table 5.0 Characteristics of Headache Types

	Migraine	Tension type	Cervicogenic	Related to neuropathic pain	Medication overuse
Aura	Possible (15-33%)	No	No	No	No
Duration	4-72 hours	30 minutes to 7 days	Some or all of the day	Seconds, minutes, hours	Some or all of the day
Frequency	Episodic, variable	1-15 days/ month, variable	Variable	Episodic, variable	Daily > 15 days each month
Site	Unilateral	Bilateral	Usually unilateral	Unilateral	Unilateral or bilateral
Pain characteristics	Pulsating	Pressure/ tightening	Tightening and/or burning	Burning, radiating	Pressing, tightening, pulsating
Pain severity	Moderate/severe	Mild/moderate	Mild/moderate	Moderate/severe	Mild/moderate/severe
Aggravated by movement?	Yes	No	Yes with head movement	Yes	No
Nausea/ vomiting	Yes	No	No	No	No
Photophobia/ phonophobia?	Yes	No	No	No	No

*PCM should consider the possibility of medication overuse headache (MOH) when criteria in Table 5.0 are present. Optimal treatment consists of discontinuation of the offending medications, acute treatment of withdrawal symptoms and pain, and use of analgesic medication as preventative treatment only when necessary.

Migraine Headache

- Most common type of PTH.
- International Classification of Headache Disorders-3 (beta version) provides two major subtypes for migraines:
  - With aura
  - Without aura
- Treatment is the same for both subtypes.

Table 6.0
Migraine Headache

ICD-9-CM: 346.10 (without aura)	ICD-10-CM: G43.009
ICD-9-CM: 346.00 (with aura)	ICD-10-CM: G43.109

Description:*

A. Headache attacks lasting 4-72 hours (untreated or unsuccessfully treated)
B. Headache has at least two of the following characteristics:
   1. Unilateral location
   2. Pulsating quality
   3. Moderate or severe pain intensity
   4. Aggravation by, or causing avoidance of, routine activity (e.g., walking or climbing stairs)
C. During headache at least one of the following:
   1. Nausea and/or vomiting
   2. Photophobia or phonophobia
D. May or may not be accompanied by an aura (present in 15-33 percent of patients). Most common auras are visual, other sensory, motor or speech and language

* Modified from: International Headache Society. (2013). The International Classification of Headache Disorders, 3rd edition (beta version), *Cephalalgia*, *33*(9) 629-808.

Table 7.0 Migraine Headache Pharmacologic Treatment

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Acute/Abortive Agents

Mild/moderate: Acetaminophen; NSAIDs[§] (ibuprofen, naproxen, >48 hours following concussion)
Severe: Triptans (e.g.,sumatriptan, rizatriptan, zolmitriptan); dihydroergotamine (DHE) nasal spray[§§] (pre-treat with antiemetic) Ketorolsac nasal spray[§§] or IM

Preventive Treatment

First Line: Tricyclic antidepressants (TCA) (e.g., amitriptyline, nortriptyline); antiepileptics (e.g., topiramate, valproate[§§]); beta blockers (e/g., metoprolol)
Second Line: Serotonin norepinephrine reuptake inhibitors (SNRI) (e.g., venlafexine); onabotulinumA[§§] (Botox); (referral recommended)

[§] Recent U.S. Food and Drug Administration Agency (FDA) warning cautions that NSAIDs can increase the risk of heart attack, heart failure, or stroke in patients with or without pre-existing heart disease, or risk factors for heart disease, even during the first few weeks of treatment, though the risk appears highest with longer use at higher doses. Detailed information on this topic is located at http://www.fda.gov/Drugs/DrugSafety/ucm451800.htm
[§§] These medications are not currently available in the deployed formulary; onabotulinumA is FDA approved for treatment of migraine headaches.

Tension-Type Headache Assessment and Diagnosis

- Increased scalp palpation tenderness is the most significant abnormal finding in patients with tension-type headache
- Tenderness can be elicited by small rotating movements and a firm pressure over the head and neck muscles
- Tenderness is typically present between headaches

Table 8.0
Tension-Type Headache

ICD-9-CM: 339.1	ICD-10-CM: G44.209

Description:*

A. Episodes of headache, typically bilateral, pressing or tightening in quality, of mild to moderate intensity, lasting minutes to days
B. Pain does not worsen with routine physical activity and is not associated with nausea, but photophobia or phonophobia may be present
C. Occurring for 1-15 days per month.

* Modified from: International Headache Society. (2013). The International Classification of Headache Disorders, 3rd edition (beta version). *Cephalalgia, 33*(9), 629-808.

Table 9.0 Tension-Type Headache Non-Pharmacologic Treatment*

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Education on lifestyle changes (headache management fact sheet available at dvbic.dcoe.mil)	
▪Sleep hygiene ▪Exercise ▪Hydration ▪Progressive return to activity ▪Caffeine intake ▪Physical therapy	▪Stress management ▪Acupuncture ▪Relaxation training ▪Cognitive behavioral therapy (CBT) ▪Biofeedback ▪Massage

*Nicholson, R. A., Buse, D. C., Andrasik, F., & Lipton, R. B. (2011, February). Nonpharmacologic treatments for migraine and tension-type headache: how to choose and when to use. *Current Treatment Options in Neurology*, 13(1), 28-40. Penzien, D. B., & Taylor, F. R. (2014, May). Headache toolbox. Behavioral and other nonpharmacologic treatments for headache. *Headache*, 54(5), 955-6.
Campbell, J. K., Penzien, D. B., Wall, E. M., & the U.S. Headache Consortium. (2009). Evidenced-Based Guidelines for Migraine Headache: Behavioral and Physical Treatments. Retrieved from: http://tools.aan.com/professionals/practice/pdfs/gl0089.pdf. Bell, K. R., Hoffman, J., & Watanabe, H. (2014, April). Headaches after traumatic brain injury. *Archives of Physical Medicine and Rehabilitation*, 95(4), 793-4.

Table 10.0 Tension-Type Headache Pharmacologic Treatment

Acute/Abortive Agents

First line: Acetaminophen; NSAIDs[§]
Second Line: Acetaminophen/caffeine compounds

Preventive Treatment

Selective serotonin reuptake inhibitors (SSRI) (e.g., parovetine, citalopram); Serotonin norepinephrine reuptake inhibitors (SNRI) (e.g., venlafexine); tricyclic antidepressants (TCA) (e.g., amitriptyline, nortriptyline);); tetracyclic antidepressants (e.g., mirtazapine)

[§] U.S. Food and Drug Administration Agency (FDA) warning cautions that NSAIDs can increase the risk of heart attack, heart failure, or stroke in patients with or without pre-existing heart disease, or risk factors for heart disease, even during the first few weeks of treatment, though the risk appears highest with longer use at higher doses. Detailed information on this topic is located at http://www.fda.gov/Drugs/DrugSafety/ucm451800.htm

Knowledge Check Question 2

Which of the following interventions is NOT considered a reasonable first-line intervention for acute tension-type headache?

a. Acetaminophen

b. Sleep hygiene education

c. Naproxen

d. Tramadol

Knowledge Check Question 2 (cont.)

Defense Health Agency

Which of the following interventions is NOT considered a reasonable acute first-line intervention for tension-type headache?

a. Acetaminophen

b. Sleep hygiene education

c. Naproxen

d. Tramadol

Answer: ***d. Tramadol***

Tramadol, benzodiazepines and narcotics should be avoided after TBI.

Table 11.0
Cervicogenic Headache

ICD-9-CM: 732.2	ICD-10-CM: G44.841

Description:*

A. Headache caused by a disorder of the cervical spine or soft tissue of the neck. Usually, but not always, associated neck pain
B. Headache has developed on temporal relation the head trauma
C. Cervical range of motion is reduced
D. Headache is made significantly worse by neck movement

* Modified from: International Headache Society. (2013). The International Classification of Headache Disorders 3rd edition (beta version). *Cephalalgia, 33*(9), 629-808.

Cervicogenic Headache Physical Exam

- Physical exam findings may include:
  - Reduced range of cervical motion
  - Headache pain on only one side
  - Provocation of headache by digital pressure on neck muscles
  - Posterior to anterior radiation of pain with head movement (Headache Classification Committee of the International Headache Society, 2013)

Table 12.0 Cervicogenic Headache Treatment

Acute/Abortive Agents

First Line: NSAIDs[§]
Second Line: Muscle relaxants if cervical spasms; trigger point injection (referral recommended)

Preventive Treatment

Antiepileptics (e.g., gabapentin, topiramate); tricyclic antidepressants (TCA) (e.g., amitriptyline, nortriptyline); serotonin norepinephrine reuptake inhibitors (SNRI) (e.g., venlafexine)

[§] U.S. Food and Drug Administration Agency (FDA) warning cautions that NSAIDs can increase the risk of heart attack, heart failure, or stroke in patients with or without pre-existing heart disease, or risk factors for heart disease, even during the first few weeks of treatment, though the risk appears highest with longer use at higher doses. Detailed information on this topic is located at http://www.fda.gov/Drugs/DrugSafety/ucm451800.htm

Headache Related to Neuropathic Pain Diagnosis and Assessment

- Complex chronic pain usually accompanied by soft tissue injury to the scalp or face
- Pain out of proportion to injury
- Burning, tingling type of pain
- Decreased sensation in the affected area

Headache Related to Neuropathic Pain Physical Exam

Defense Health Agency

Findings on physical exam include:

- Signs of nerve injury detected during neurologic exam
- Pain may be elicited by palpation of face or scalp, especially over previous laceration or bruise
- May be associated with movement

Table 13.0 Headache Related to Neuropathic Pain

ICD-9-CM: 792.2	ICD-10-CM: 792

Description:*

A. Pain associated with soft-tissue injury of the scalp or face
B. May have superimposed lancinating component and may also be burning, deep, and aching
C. There may be local tingling and numbness, hyperesthesia, hyperalgesia, allodynia (pain due to non-noxious stimulus) or hyperpathia (particularly unpleasant, exaggerated pain response)
D. Symptoms are long-lasting, typically persisting after resolution of the primary cause

* Modified from: International Headache Society. (2013). The International Classification of Headache Disorders, 3rd edition (beta version). *Cephalalgia, 33*(9), 629-808.

Table 14.0 Headache Related to Neuropathic Pain Treatment

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Non-pharmacologic treatment

- Relaxation therapy
- Physical therapy
- Acupuncture
- Cognitive behavioral therapy (CBT)
- Massage therapy

Pharmacologic treatment[§§§]

Acute/Abortive Agents

First Line: Acetaminophen or NSAIDs
Second Line: Antiepileptics (e.g., gabapentin, topiramate); tricyclic antidepressants (TCA) (e.g., amitriptyline, nortriptyline)

Preventive Treatment

Antiepileptics (e.g., gabapentin); TCA) (e.g., amitriptyline, nortriptyline)

[§§§] Attal, N., Cruccu, G., Baron, R., Haanpää, M., Hansson, P., Jensen, T.S., Nurmikko, T. & European Federation of Neurological Societies. (2010). EFNS guidelines on the pharmacological treatment of neuropathic pain: 2010 revision. *European Journal of Neurology* 17(9), 1113-e88. U.S. Food and Drug Administration Agency (FDA) warning cautions that NSAIDs can increase the risk of heart attack, heart failure, or stroke in patients with or without pre-existing heart disease, or risk factors for heart disease, even during the first few weeks of treatment, though the risk appears highest with longer use at higher doses.

Medication-Overuse Headache

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Characterized as a headache that:

- Is present for 15 or more days/month
- Occurs when medications for the treatment of headaches are used at a higher than recommended dose or for longer than recommended time (i.e., more than three months)

Treatment for Medication-overuse Headache (MOH) is discontinuing the offending medication.

- Use of other medications to manage withdrawal symptoms is controversial

Case Study

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- Cpl. Jones is a 22-year-old Marine who sustained a fall 14 days ago in garrison
- Cpl. Jones lost consciousness for 5 seconds and experienced 15 seconds of post-traumatic amnesia; also, noted immediate headache with pain rating 5/10, nausea and balance problems
- PMHx: Previous headaches

Case Study (cont.)

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- Jones sought immediate medical attention, was diagnosed with a concussion and rested for his mandatory 24 hours
- His provider released him to return to pre-injury activity levels 3 days post injury
- It is now 10 days post injury and he presents to sick call today for primary complaint of headaches

Case Study (cont. 2)

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- Jones reports intermittent headaches that last for 5 hours if no medications are taken; headaches are helped a little by ibuprofen
- Headaches are aggravated by physical activity (i.e. PT, recreational sports)
- The character of the headache is throbbing/pulsating; pain is a 5/10 and located on the right side; some nausea with the headaches; denies photophobia or phonophobia with the headaches

Case Study Question 1

Defense Health Agency

All of the following are appropriate steps to take in your follow up evaluation today of CPL Jones EXCEPT:

a. Administer neurobehavioral symptom inventory

b. Palpate head and neck for trigger points or tenderness

c. Order a contrast MRI

d. Complete a neurological examination

Case Study Question 1 (cont.)

Defense Health Agency

All of the following are appropriate steps to take in your follow up evaluation today of CPL Jones EXCEPT:

a. Administer neurobehavioral symptom inventory

b. Palpate head and neck for trigger points/tenderness

c. Order a contrast MRI

d. Complete a neurological examination

Answer: ***c. Order a contrast MRI***

Initial case information does not have any red flags necessitating neuroimaging. Complete full work up prior to determining need for the appropriate type of neuroimaging.

Case Study Question 2

Defense Health Agency

Based on the clinical information provided, what type of headache is Cpl. Jones most likely experiencing?

a. Tension-type

b. Migraine

c. Cervicogenic

d. Neuropathic

Case Study Questions 2 (cont.)

Defense Health Agency

What type of headache does Cpl. Jones have?

a. Tension type

b. Migraine

c. Cervicogenic

d. Neuropathic

Answer*:* ***b. Migraine***
Jones has unilateral, throbbing (pulsating) headaches with nausea that last five or more hours.

Case Study Question 3

Defense Health Agency

What is the most appropriate management plate for Jones' PTH?

a. Provide education on identification and avoidance of headache triggers

b. Review information on environmental stimulus control and sleep hygiene

c. Prescribe NSAID

d. All of the above

Case Study Question 3 (cont.)

Defense Health Agency

What would be the most appropriate management plate for CPL Jones PTH?

a. Provide education on identification and avoidance of headache triggers

b. Review information on environmental stimulus control and sleep hygiene

c. Prescribe NSAID

d. All of the above

Answer: ***d. All of the above*** are nonpharmacologic and first line pharmacologic treatments to initially address Migraine type PTH.

Summary

- Headache is the most common symptom after a concussion
- The four types of PTH are migraine, tension-type, cervicogenic and headache related to neuropathic pain
- Manage PTH by identifying the headache type it most closely resembles
  - Examples of effective non-pharmacologic treatment include sleep hygiene, physical therapy and relaxation
  - Examples of effective symptomatic pharmacologic treatment include non-narcotic pain medicine and triptans

Resources: Clinical Support Tools

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Access provider training materials, quick reference cards and patient educational materials can at:

dvbic.dcoe.mil

Patient information on TBI is also available at:

dvbic.dcoe.mil/aheadforthefuture

Resources: Patient Apps

Mindfulness Coach

Concussion Coach

Breathe2Relax

- Developed by National Center for Telehealth & Technology, a Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury center
- Available for free for Apple and Android devices