

# Understanding Headache among Veterans and the Role of the VHA Headache Centers of Excellence (HCoE) Program



Spotlight on Pain Management  
HSR&D Cyberseminar  
03.05.2019



**Jason J. Sico, MD, MHS, FAHA, FAAN, FACP, FANA**

Director, HCoE Research & Evaluation Center and HCoE Clinical Center

VA Connecticut Healthcare System

Associate Professor of Neurology and Internal Medicine

Yale School of Medicine

# Outline

- Review our current understanding of headache within the Veterans Health Administration (VHA)
- Highlight recent advances in headache medicine
- Provide an overview of how the Headache Centers of Excellence (HCoE) Program came to pass
- Discuss the core and emerging areas within the HCoE Research/Evaluation Center

# Outline

- Review our current understanding of headache within the Veterans Health Administration (VHA)
- Highlight recent advances in headache medicine
- Provide an overview of how the Headache Centers of Excellence (HCoE) Program came to pass
- Discuss the core and emerging areas within the HCoE Research/Evaluation Center

# Case Presentation

Veteran is a 24-year-old right-handed gentleman with past medical history significant for at least three traumatic brain injuries (TBIs) secondary to blast waves from improvised explosive devices (IEDs), presenting for evaluation of headache.

He reports that his first, more severe type of headache began soon after returning home from deployment 15-months ago, though at least two TBIs were associated with headaches soon after the injury.

His second type of headache began more than 6-months ago.

# Case Presentation

	Headache 1	Headache 2
Frequency	1-2 times/week	daily
Duration	One hour if treated; 5 hours if untreated	Continuous
Location	Right temporal	Holocranial
Quality	Pounding	Aching
Intensity	7-8/10	2-3/10
Triggers	Decreased sleep	None
Associated features	Nausea, vomiting, photophobia, phonophobia, osmophobia	None
Prodrome	No visual aura	No visual aura
Dysautonomia	Absent	Absent
Debilitating	Yes	No
Medication Responses	Minimally responsive to over-the-counter agents; partially responsive to sumatriptan tablets	Not responsive to over-the-counter agents or sumatriptan; worse when

# Case Presentation

**Table 1.—The Mnemonic SNOOP<sup>4</sup> and Causes of Secondary Headache That Are Important to Exclude**

Mnemonic Item	Signs, Symptoms	Main Underlying Problems
Systemic signs and symptoms	Fever, rigors, weight loss, anorexia	Infection, such as meningitis, brain abscess, HSV encephalitis, sphenoid sinusitis, HIV infection; worrisome for underlying primary or metastatic malignancy
Neurologic signs and symptoms	Any focal symptoms not clearly explainable as aura; new-onset seizures with or without headache also require work-up	Fixed focal deficits most worrisome but fluctuating; concern for tumor, stroke, subdural hematoma, epidural hematoma, AVM, vasculitis, CNS infection, and demyelinating disease
Onset after age 50 y	New headache type with advanced age (before age 5 y is also a concern)	Vasculitis, such as temporal arteritis. Increased risk of tumor and subdural hematoma after minor trauma with advanced age
Onset suddenly	Rapid onset; if <60 sec, called <i>thunderclap headache</i>	Most worrisome for subarachnoid hemorrhage, which must be excluded Also worrisome for reversible cerebral vasoconstriction, pituitary apoplexy, arterial dissection, cerebral venous thrombosis
Previous or progressive headaches	Abrupt or sudden change in pattern or rapidly progressive intensity or frequency	Worrisome for tumor, subacute infection, vascular problems such as AVM, aneurysm, acute or chronic subdural hematoma, vasculitis
Precipitated by Valsalva maneuver	Also new-onset headaches associated with cough, exertion, or sexual activity	Worrisome for underlying vascular lesion in a large percentage of patients, spontaneous CSF leaks, posterior fossa lesions, Chiari malformation, and other, rare primary headache types (eg, primary cough headache)
Positional	Headache precipitated by laying down <b>or</b> by standing up (these 2 types represent different differentials)	Headache when laying down, worrisome for increased intracranial pressure, tumor, obstruction of CSF, or IIH (previously known as <i>pseudotumor cerebri</i> ). Headache with standing; worrisome for spontaneous CSF leak
Papilledema	Indicates elevated intracranial pressure	Tumor, IIH, central venous thrombosis, intracerebral hemorrhage, orbital causes, trauma

Data from Dodick<sup>4</sup> and De Luca and Bartleson.<sup>8</sup>

AVM = arteriovenous malformation; CNS = central nervous system; CSF = cerebrospinal fluid; HIV = human immunodeficiency virus; HSV = herpes simplex virus; IIH = idiopathic intracranial hypertension.

# Case Presentation

**Table 1.—The Mnemonic SNOOP<sup>4</sup> and Causes of Secondary Headache That Are Important to Exclude**

Mnemonic Item	Signs, Symptoms	Main Underlying Problems
Systemic signs and symptoms	Fever, rigors, weight loss, anorexia	Infection, such as meningitis, brain abscess, HSV encephalitis, sphenoid sinusitis, HIV infection; worrisome for underlying primary or metastatic malignancy
Neurologic signs and symptoms	Any focal symptoms not clearly explainable as aura; new-onset seizures with or without headache also require work-up	Fixed focal deficits most worrisome but fluctuating; concern for tumor, stroke, subdural hematoma, epidural hematoma, AVM, vasculitis, CNS infection, and demyelinating disease
Onset after age 50 y	New headache type with advanced age (before age 5 y is also a concern)	Vasculitis, such as temporal arteritis. Increased risk of tumor and subdural hematoma after minor trauma with advanced age
Onset suddenly	Rapid onset; if <60 sec, called <i>thunderclap headache</i>	Most worrisome for subarachnoid hemorrhage, which must be excluded Also worrisome for reversible cerebral vasoconstriction, pituitary apoplexy, arterial dissection, cerebral venous thrombosis
Previous or progressive headaches	<u>Abrupt or sudden change in pattern or rapidly progressive intensity or frequency</u>	Worrisome for tumor, subacute infection, vascular problems such as AVM, aneurysm, acute or chronic subdural hematoma, vasculitis
Precipitated by Valsalva maneuver	Also new-onset headaches associated with cough, exertion, or sexual activity	Worrisome for underlying vascular lesion in a large percentage of patients, spontaneous CSF leaks, posterior fossa lesions, Chiari malformation, and other, rare primary headache types (eg, primary cough headache)
Positional	Headache precipitated by laying down <b>or</b> by standing up (these 2 types represent different differentials)	Headache when laying down, worrisome for increased intracranial pressure, tumor, obstruction of CSF, or IIH (previously known as <i>pseudotumor cerebri</i> ). Headache with standing; worrisome for spontaneous CSF leak
Papilledema	Indicates elevated intracranial pressure	Tumor, IIH, central venous thrombosis, intracerebral hemorrhage, orbital causes, trauma

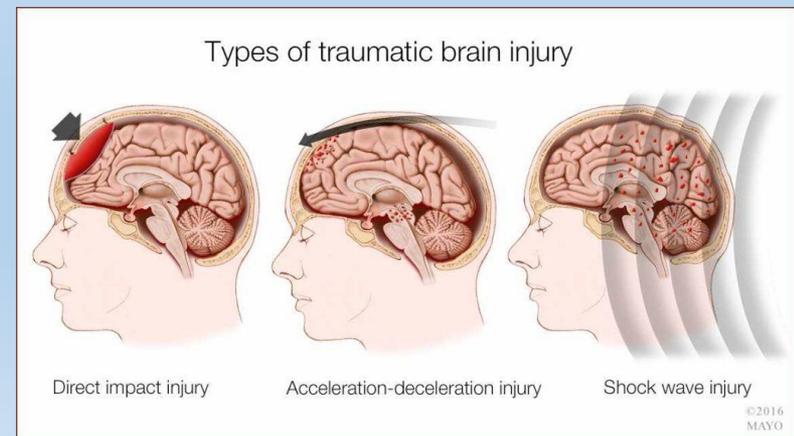
Data from Dodick<sup>4</sup> and De Luca and Bartleson.<sup>8</sup>

AVM = arteriovenous malformation; CNS = central nervous system; CSF = cerebrospinal fluid; HIV = human immunodeficiency virus; HSV = herpes simplex virus; IIH = idiopathic intracranial hypertension.

# Traumatic Brain Injury (TBI)

A structural or functional injury resulting from the action of external forces on the head, due to:

- striking the head with or the head striking an object
- penetration of the head by a foreign body
- forces generated from blasts or explosions
- other forces



TREATMENTS

# Pentagon Shelves Blast Gauges Meant To Detect Battlefield Brain Injuries

December 20, 2016 · 5:06 AM ET

Heard on Morning Edition



JON HAMILTON

*“The majority of exposures were not from improvised explosive devices, as you might expect...the culprit was usually blast-intensive weapons systems like recoilless rifles, shoulder-fired rockets, artillery and mortars...”*

*“A service member on the training range may experience 30 to 300 exposures per day multiple days per week...”*



# VA/DoD TBI Severity Classification

TBI: “An alteration in brain function, or other evidence of brain pathology, caused by an external force.”

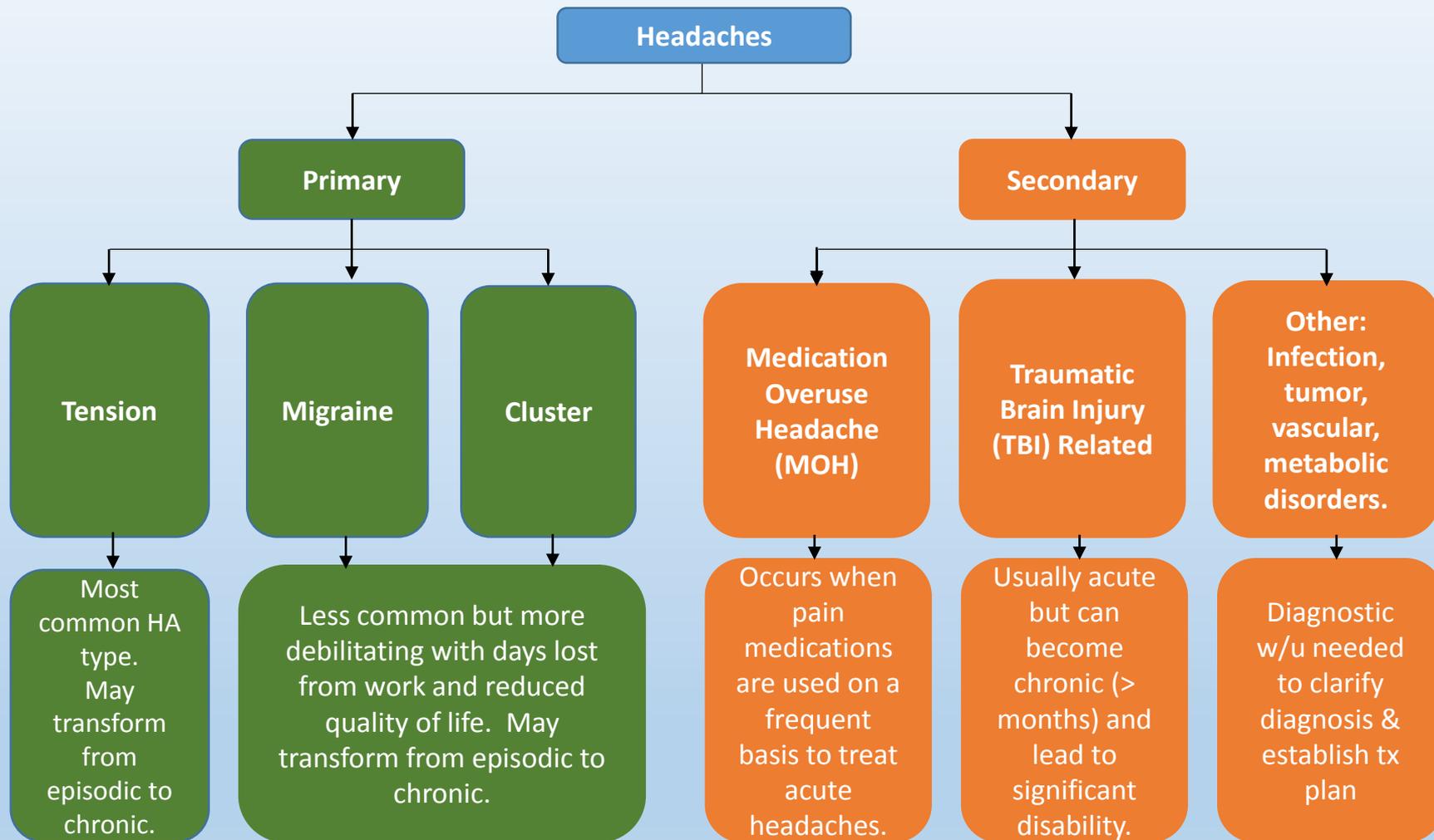
**Table 1. Classification of TBI Severity**

<b>(If a patient meets criteria in more than one category of severity, the higher severity level is assigned)</b>			
<b>Criteria</b>	<b>Mild</b>	<b>Moderate</b>	<b>Severe</b>
Structural imaging	Normal	Normal or abnormal	Normal or abnormal
Loss of Consciousness (LOC)	0-30 min	>30 min and <24 hours	>24 hours
Alteration of consciousness/ mental state (AOC)*	up to 24 hours	>24 hours; severity based on other criteria	
Posttraumatic amnesia (PTA)	0-1 day	>1 and <7 days	>7 days
Glasgow Coma Scale (GCS) (best available score in first 24 hours)**	13-15	9-12	<9

\*Alteration of mental status must be immediately related to the trauma to the head. Typical symptoms would be looking and feeling dazed and uncertain of what is happening, confusion, and difficulty thinking clearly or responding appropriately to mental status questions, and being unable to describe events immediately before or after the trauma event.

\*\*In April 2015, the DoD released a memorandum recommending against the use of GCS scores to diagnose TBI. See the memorandum for additional information.

# Headache Classification





IHS CLASSIFICATION ICHD-3

# Persistent Headache Attributed to Traumatic Injury to the Head

## Diagnostic criteria:

- A. Any headache fulfilling criteria C and D
- B. Traumatic injury to the head<sup>1</sup> has occurred
- C. Headache is reported to have developed within 7 days after one of the following:
  1. the injury to the head
  2. regaining of consciousness following the injury to the head
  3. discontinuation of medication(s) impairing ability to sense or report headache following the injury to the head
- D. Headache persists for >3 months after its onset
- E. Not better accounted for by another ICHD-3 diagnosis<sup>2</sup>.

## Notes:

1. Traumatic injury to the head is defined as a structural or functional injury resulting from the action of external forces upon the head. These include impact between the head and an object, penetration of the head by a foreign body, forces generated from blasts or explosions, and other forces yet to be defined.
2. When headache following head injury becomes persistent, the possibility of 8.2 *Medication-overuse headache* needs to be considered.

## Comments:

The stipulation that headache must be reported to have developed within 7 days is somewhat arbitrary (see Introduction above). Compared to longer intervals, a 7-day interval yields diagnostic criteria with higher specificity for 5.2 *Persistent headache attributed to traumatic injury to the head* (ie, stronger evidence of causation) but a correlative loss of sensitivity. Further research is needed into whether or not a different interval might be more appropriate. In the meantime, Appendix criteria for A5.2.1.1 *Delayed-onset persistent headache attributed to moderate or severe traumatic injury to the head* and A5.2.2.1 *Delayed-onset persistent headache attributed to mild traumatic injury to the head* may be used when the interval between injury and headache onset is greater than 7 days.



IHS CLASSIFICATION ICHD-3

# Persistent Headache Attributed to Traumatic Injury to the Head

## Diagnostic criteria:

- A. Any headache fulfilling criteria C and D
- B. Traumatic injury to the head<sup>1</sup> has occurred
- C. Headache is reported to have developed within 7 days after one of the following:
  1. the injury to the head
  2. regaining of consciousness following the injury to the head
  3. discontinuation of medication(s) impairing ability to sense or report headache following the injury to the head
- D. Headache persists for >3 months after its onset
- E. Not better accounted for by another ICHD-3 diagnosis<sup>2</sup>.

## Notes:

1. Traumatic injury to the head is defined as a structural or functional injury resulting from the action of external forces upon the head. These include impact between the head and an object, penetration of the head by a foreign body, forces generated from blasts or explosions, and other forces yet to be defined.
2. When headache following head injury becomes persistent, the possibility of 8.2 *Medication-overuse headache* needs to be considered.

## Comments:

The stipulation that headache must be reported to have developed within 7 days is somewhat arbitrary (see Introduction above). Compared to longer intervals, a 7-day interval yields diagnostic criteria with higher specificity for 5.2 *Persistent headache attributed to traumatic injury to the head* (ie, stronger evidence of causation) but a correlative loss of sensitivity. Further research is needed into whether or not a different interval might be more appropriate. In the meantime, Appendix criteria for A5.2.1.1 *Delayed-onset persistent headache attributed to moderate or severe traumatic injury to the head* and A5.2.2.1 *Delayed-onset persistent headache attributed to mild traumatic injury to the head* may be used when the interval between injury and headache onset is greater than 7 days.



IHS CLASSIFICATION ICHD-3

# Persistent Headache Attributed to Traumatic Injury to the Head

## Diagnostic criteria:

- A. Any headache fulfilling criteria C and D
- B. Traumatic injury to the head<sup>1</sup> has occurred
- C. Headache is reported to have developed within 7 days after one of the following:
  1. the injury to the head
  2. regaining of consciousness following the injury to the head
  3. discontinuation of medication(s) impairing ability to sense or report headache following the injury to the head
- D. Headache persists for >3 months after its onset
- E. Not better accounted for by another ICHD-3 diagnosis<sup>2</sup>.

## Notes:

1. Traumatic injury to the head is defined as a structural or functional injury resulting from the action of external forces upon the head. These include impact between the head and an object, penetration of the head by a foreign body, forces generated from blasts or explosions, and other forces yet to be defined.
2. When headache following head injury becomes persistent, the possibility of 8.2 *Medication-overuse headache* needs to be considered.

## Comments:

The stipulation that headache must be reported to have developed within 7 days is somewhat arbitrary (see Introduction above). Compared to longer intervals, a 7-day interval yields diagnostic criteria with higher specificity for 5.2 *Persistent headache attributed to traumatic injury to the head* (ie, stronger evidence of causation) but a correlative loss of sensitivity. Further research is needed into whether or not a different interval might be more appropriate. In the meantime, Appendix criteria for A5.2.1.1 *Delayed-onset persistent headache attributed to moderate or severe traumatic injury to the head* and A5.2.2.1 *Delayed-onset persistent headache attributed to mild traumatic injury to the head* may be used when the interval between injury and headache onset is greater than 7 days.



IHS CLASSIFICATION ICHD-3

# Persistent Headache Attributed to Traumatic Injury to the Head

## Diagnostic criteria:

- A. Any headache fulfilling criteria C and D
- B. Traumatic injury to the head<sup>1</sup> has occurred
- C. Headache is reported to have developed within 7 days after one of the following:
  1. the injury to the head
  2. regaining of consciousness following the injury to the head
  3. discontinuation of medication(s) impairing ability to sense or report headache following the injury to the head
- D. Headache persists for >3 months after its onset
- E. Not better accounted for by another ICHD-3 diagnosis<sup>2</sup>.

## Notes:

1. Traumatic injury to the head is defined as a structural or functional injury resulting from the action of external forces upon the head. These include impact between the head and an object, penetration of the head by a foreign body, forces generated from blasts or explosions, and other forces yet to be defined.
2. When headache following head injury becomes persistent, the possibility of 8.2 *Medication-overuse headache* needs to be considered.

## Comments:

The stipulation that headache must be reported to have developed within 7 days is somewhat arbitrary (see Introduction above). Compared to longer intervals, a 7-day interval yields diagnostic criteria with higher specificity for 5.2 *Persistent headache attributed to traumatic injury to the head* (ie, stronger evidence of causation) but a correlative loss of sensitivity. Further research is needed into whether or not a different interval might be more appropriate. In the meantime, Appendix criteria for A5.2.1.1 *Delayed-onset persistent headache attributed to moderate or severe traumatic injury to the head* and A5.2.2.1 *Delayed-onset persistent headache attributed to mild traumatic injury to the head* may be used when the interval between injury and headache onset is greater than 7 days.



IHS CLASSIFICATION ICHD-3

# Persistent Headache Attributed to Traumatic Injury to the Head

## Diagnostic criteria:

- A. Any headache fulfilling criteria C and D
- B. Traumatic injury to the head<sup>1</sup> has occurred
- C. Headache is reported to have developed within 7 days after one of the following:
  1. the injury to the head
  2. regaining of consciousness following the injury to the head
  3. discontinuation of medication(s) impairing ability to sense or report headache following the injury to the head
- D. Headache persists for >3 months after its onset
- E. Not better accounted for by another ICHD-3 diagnosis<sup>2</sup>.

## Notes:

1. Traumatic injury to the head is defined as a structural or functional injury resulting from the action of external forces upon the head. These include impact between the head and an object, penetration of the head by a foreign body, forces generated from blasts or explosions, and other forces yet to be defined.
2. When headache following head injury becomes persistent, the possibility of 8.2 *Medication-overuse headache* needs to be considered.

## Comments:

The stipulation that headache must be reported to have developed within 7 days is somewhat arbitrary (see Introduction above). Compared to longer intervals, a 7-day interval yields diagnostic criteria with higher specificity for 5.2 *Persistent headache attributed to traumatic injury to the head* (ie, stronger evidence of causation) but a correlative loss of sensitivity. Further research is needed into whether or not a different interval might be more appropriate. In the meantime, Appendix criteria for A5.2.1.1 *Delayed-onset persistent headache attributed to moderate or severe traumatic injury to the head* and A5.2.2.1 *Delayed-onset persistent headache attributed to mild traumatic injury to the head* may be used when the interval between injury and headache onset is greater than 7 days.



IHS CLASSIFICATION ICHD-3

# Delayed-onset Persistent Headache Attributed to Traumatic Injury to the Head

## Diagnostic criteria:

- A. Any headache fulfilling criteria C and D
- B. Traumatic injury to the head has occurred, fulfilling both of the following:
  - 1. associated with none of the following:
    - loss of consciousness for >30 minutes
    - Glasgow Coma Scale (GCS) <13
    - post-traumatic amnesia lasting >24 hours
    - altered level of awareness for >24 hours
    - imaging evidence of a traumatic head injury such as skull fracture, intracranial haemorrhage and/or brain contusion
  - 2. associated, immediately following the head injury, with one or more of the following symptoms and/or signs:
    - transient confusion, disorientation or impaired consciousness
    - loss of memory for events immediately before or after the injury
    - two or more other symptoms suggestive of mild traumatic brain injury:
      - nausea
      - vomiting
      - visual disturbances
      - dizziness and/or vertigo
      - gait and/or postural imbalance
      - impaired memory and/or concentration
- C. Headache is reported to have developed between 7 days and 3 months after all of the following:
  - 1. the head injury
  - 2. regaining of consciousness following the head injury (when applicable)
  - 3. discontinuation of medication(s) impairing ability to sense or report headache following the head injury (when applicable)
- D. Headache persists for >3 months after its onset
- E. Not better accounted for by another ICHD-3 diagnosis.



# Delayed-onset Persistent Headache Attributed to Traumatic Injury to the Head

## Diagnostic criteria:

- A. Any headache fulfilling criteria C and D
- B. Traumatic injury to the head has occurred, fulfilling both of the following:
  - 1. associated with none of the following:
    - loss of consciousness for >30 minutes
    - Glasgow Coma Scale (GCS) <13
    - post-traumatic amnesia lasting >24 hours
    - altered level of awareness for >24 hours
    - imaging evidence of a traumatic head injury such as skull fracture, intracranial haemorrhage and/or brain contusion
  - 2. associated, immediately following the head injury, with one or more of the following symptoms and/or signs:
    - transient confusion, disorientation or impaired consciousness
    - loss of memory for events immediately before or after the injury
    - two or more other symptoms suggestive of mild traumatic brain injury:
      - nausea
      - vomiting
      - visual disturbances
      - dizziness and/or vertigo
      - gait and/or postural imbalance
      - impaired memory and/or concentration
- C. Headache is reported to have developed between 7 days and 3 months after all of the following:
  - 1. the head injury
  - 2. regaining of consciousness following the head injury (when applicable)
  - 3. discontinuation of medication(s) impairing ability to sense or report headache following the head injury (when applicable)
- D. Headache persists for >3 months after its onset
- E. Not better accounted for by another ICHD-3 diagnosis.



IHS CLASSIFICATION ICHD-3

# Persistent Headache Attributed to Whiplash

## Description:

Headache of more than 3 months' duration caused by whiplash.

## Diagnostic criteria:

- A. Any headache fulfilling criteria C and D
- B. Whiplash<sup>1</sup>, associated at the time with neck pain and/or headache, has occurred
- C. Headache developed within 7 days after the whiplash
- D. Headache persists for >3 months after its onset
- E. Not better accounted for by another ICHD-3 diagnosis<sup>2</sup>.

## Notes:

1. Whiplash is defined as sudden and inadequately restrained acceleration/deceleration movements of the head with flexion/extension of the neck. Whiplash may occur after either high or low impact forces.
2. When headache following whiplash becomes persistent, the possibility of 8.2 *Medication-overuse headache* needs to be considered.



IHS CLASSIFICATION ICHD-3

# Medication-Overuse Headache (MOH)

## Previously used terms:

Drug-induced headache; medication-misuse headache; rebound headache.

## Coded elsewhere:

Patients with a pre-existing primary headache who, in association with medication overuse, develop a new type of headache or a significant worsening of their pre-existing headache that, in either case, meets the criteria for 8.2 *Medication-overuse headache* (or one of its subtypes) should be given both this diagnosis and the diagnosis of the pre-existing headache. Patients who meet criteria for both 1.3 *Chronic migraine* and 8.2 *Medication-overuse headache* should be given both diagnoses.

## Description:

Headache occurring on 15 or more days/month in a patient with a pre-existing primary headache and developing as a consequence of regular overuse of acute or symptomatic headache medication (on 10 or more or 15 or more days/month, depending on the medication) for more than 3 months. It usually, but not invariably, resolves after the overuse is stopped.

## Diagnostic criteria:

- A. Headache occurring on  $\geq 15$  days/month in a patient with a pre-existing headache disorder
- B. Regular overuse for  $>3$  months of one or more drugs that can be taken for acute and/or symptomatic treatment of headache<sup>1,2,3</sup>
- C. Not better accounted for by another ICHD-3 diagnosis.



IHS CLASSIFICATION ICHD-3

# Medication-Overuse Headache (MOH)

## Previously used terms:

Drug-induced headache; medication-misuse headache; rebound headache.

## Coded elsewhere:

Patients with a pre-existing primary headache who, in association with medication overuse, develop a new type of headache or a significant worsening of their pre-existing headache that, in either case, meets the criteria for 8.2 *Medication-overuse headache* (or one of its subtypes) should be given both this diagnosis and the diagnosis of the pre-existing headache. Patients who meet criteria for both 1.3 *Chronic migraine* and 8.2 *Medication-overuse headache* should be given both diagnoses.

## Description:

Headache occurring on 15 or more days/month in a patient with a pre-existing primary headache and developing as a consequence of regular overuse of acute or symptomatic headache medication (on 10 or more or 15 or more days/month, depending on the medication) for more than 3 months. It usually, but not invariably, resolves after the overuse is stopped.

## Diagnostic criteria:

- A. Headache occurring on  $\geq 15$  days/month in a patient with a pre-existing headache disorder
- B. Regular overuse for  $>3$  months of one or more drugs that can be taken for acute and/or symptomatic treatment of headache<sup>1,2,3</sup>
- C. Not better accounted for by another ICHD-3 diagnosis.

# Case Presentation

## Diagnoses:

1. Persistent headache attributed to traumatic injury to the head
2. Persistent headache attributed to whiplash
3. Medication-overuse headache

# Case Presentation

What else should we know about post-traumatic headache?

What are the evidence-based treatments for him?

What other considerations are there in his treatment plan?

# Characteristics of Post-Traumatic Headache

- Majority phenotypically are similar to migraine without aura, but can resemble any primary headache disorder type (e.g., cluster headache, tension-type headache)
- Average number of headache days/month = 17-27
- Associated with sleep disorders and PTSD

# Ongoing and Completed Studies about Headache among Military Personnel

- 46 studies in total
- 12 interventional studies; 33 noninterventional studies
- Headache types studied:
  - Headache related to TBI: 29 studies
  - Posttraumatic headache: 20 studies
  - Migraine headache: 3 studies
  - Tension-type headache: 1 study
  - Other secondary headache: 5 studies
  - Multiple headache types and/or general headache: 18 studies
- Number of sites:
  - Multisite: 6
  - Single site: 25
- Number of participants: large range (0 to 111,018)
  - In interventional studies, ranged from 0 to 300 (average 91)

# Ongoing and Completed Studies about Headache among Veterans

- 33 Studies in total
- 18 interventional studies; 15 non-interventional studies
- Headache Types Studied:
  - Headache related to TBI: 21 studies
  - Post-traumatic headache: 15 studies
  - Migraine: 5
  - Multiple headache types and/or general headache: 11
- Number of sites:
  - Multisite: 9 studies
  - Single site: 20 studies
- Number of participants: large range (1 to 56,300)
  - In interventional studies, ranged from 1 to 300 (average 124)

# Headache among Veterans and Military Personnel

- Posttraumatic Headache (PTH) occurs in up to 92% of military personnel who have sustained mild TBI and is associated with Chronic Daily Headaches.
  - **Musculoskeletal Pain and Headache in the Active Duty Military Population: An Integrative Review.**
- The prevalence of chronic daily headache (CDH) in returning U.S. soldiers after a deployment-related concussion is 20%, or 4- to 5-fold higher than that seen in the general U.S. population.
  - **Chronic daily headache in U.S. soldiers after concussion.**
- Patients with a continuous headache have almost 4 times the odds of a medically related discharge/retirement compared to patients without such a headache.
  - **Staying in service with posttraumatic headache: A retrospective cohort study of patient outcome.**

# Headache among Veterans and Military Personnel

- Headache Burden has not improved over time up to 11 years after Deployment-related-TBI (D-TBI). The process initiated by the D-TBI that relates to the headache has a prolonged effect up to and beyond 11 years.
  - **Headache Prevalence at 4-11 Years After Deployment-Related Traumatic Brain Injury in Veterans of Iraq and Afghanistan Wars and Comparison to Controls: A Matched Case-Controlled Study**

## Headache Frequency

- Chronic Daily Headache ( $\geq 15$  days/mo)
  - TBI  $\rightarrow 44\%$
  - Non-TBI  $\rightarrow 7\%$
- Frequent Headache (10-14 days/mo)
  - TBI  $\rightarrow 33\%$
  - Non-TBI  $\rightarrow 13\%$
- Infrequent or No Headache ( $<9$  days/mo)
  - TBI  $\rightarrow 23\%$
  - Non-TBI  $\rightarrow 80\%$

## Headache Severity

- Severe or disabling  $\geq 2$  days per week
  - TBI  $\rightarrow 54\%$
  - Non-TBI  $\rightarrow 16\%$

# Headache among Veterans and Military Personnel

- **Headaches after concussion in US soldiers returning from Iraq or Afghanistan**
- 19.6 % - deployment-related concussion
  - 98 % of those have headache
  - 38 % - post-traumatic headache
  - 27 % - chronic daily headache
- Most frequent phenotype: Migraine (58%)
- 78% used medication for relief
- High level of disability
  - 37% reported interference with duty performance
  - Higher number of sick call visits compared with non-traumatic headache

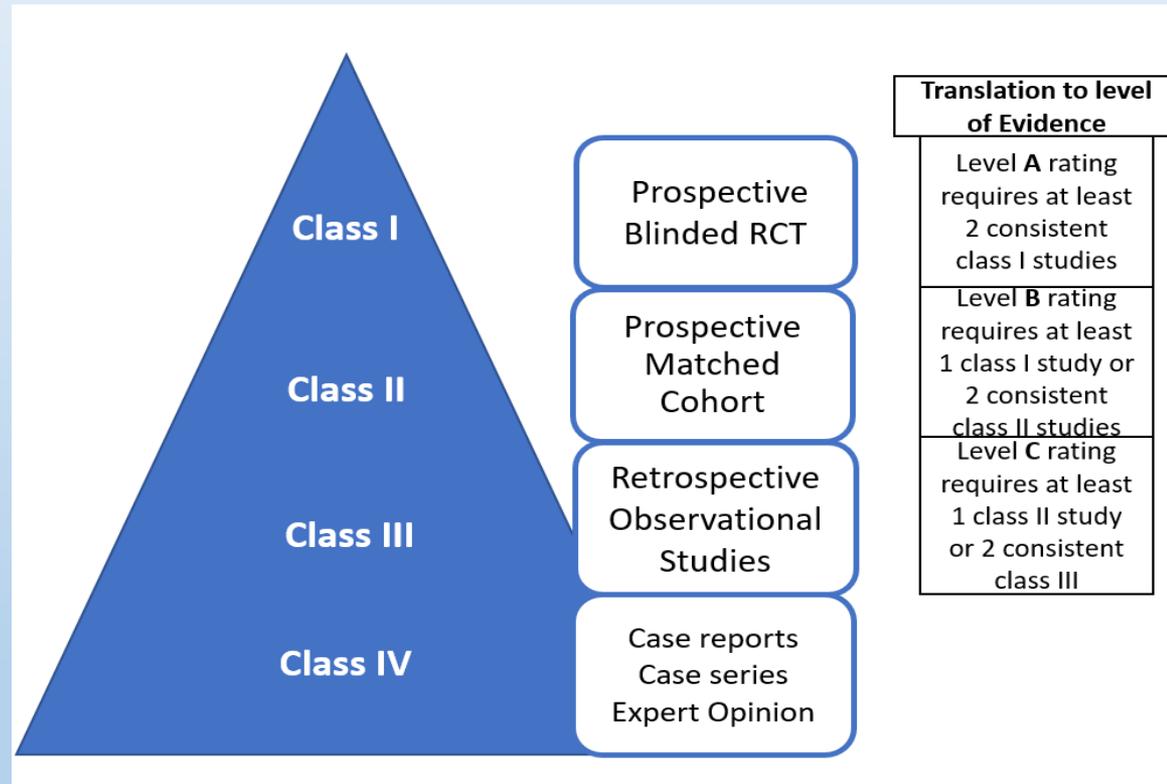
# Headache among Veterans

- FY2017 (all VHA facilities)
  - All encounters → 393,778
  - First-ever encounter for headache → 210,986
- Where are Veterans seen for their headache?
  - Primary Care → 74.9% (all) and 72.1% (first-ever)
  - Neurology → 14.2% (all) and 17.5% (first-ever)
  - TBI/Polytrauma → 4.5% (all) and 5.1% (first-ever)
  - Pain Clinic → 2.7% (all) and 2.3% (first-ever)

# Systematic Review of Interventions for Post-traumatic Headache

Thomas K. Watanabe, MD, Kathleen R. Bell, MD, William C. Walker, MD, Katherine Schomer, MA

- Watanabe et al (2012), reviewed 812 articles looking at PTH as primary outcome:
  - No class 1 studies / only 1 class 2 study
- Conclusions
  - No strong evidence from clinical trials available to direct treatment of PTHA.
  - Guidelines offered for PTHA management based on primary headache categories & treatments.



# Post-Traumatic Headache: ‘Gap in Knowledge’



VA/DoD CLINICAL PRACTICE GUIDELINE FOR  
THE MANAGEMENT OF CONCUSSION-MILD  
TRAUMATIC BRAIN INJURY

“Selection of pharmacologic and non-pharmacologic treatments for post-traumatic headaches is based upon the character of the headaches. There are no medications specific to the treatment of post-traumatic headaches.”



“TBI and the sequelae of post-traumatic headache can be a disabling condition that interferes with adjustment of our military servicemen back into society. Research efforts in the clinical sciences is greatly needed to both fill gaps in knowledge and understand what are the best medications for TBI-associated headache.”

There are no FDA-approved treatment  
of Post-Traumatic Headache

# Characteristics of Primary Headaches

## Tension-Type

- Location: Bilateral
- Severity: mild to mod
- Duration: 30 min to 7 days
- May have light or sound sensitivity
- No aura
- No nausea/vomiting
- Near equal gender prevalence

## Migraine

- Location: Unilateral
- Severity: Mod to severe
- Duration: > 4 hr untreated
- Light & sound sensitivity
- Nausea/vomiting
- Aura common
- Patient's usual response: minimizing mvt & exertion
- More common in females

## Cluster

- Location: Unilateral orbital or retroorbital
- Severity: severe to extremely severe
- Duration: <3 hrs if untreated
- Rarely light sensitivity
- Rarely has aura
- Rarely has nausea/vomiting
- More common in males

# Headache Treatment

Neurology<sup>®</sup>

**Evidence-based guideline update: Pharmacologic treatment for  
episodic migraine prevention in adults : Report of the Quality  
Standards Subcommittee of the American Academy of Neurology  
and the American Headache Society**

S.D. Silberstein, S. Holland, F. Freitag, et al.

*Neurology* 2012;78;1337

DOI 10.1212/WNL.0b013e3182535d20

**Table 1** Classification of migraine preventive therapies (available in the United States)

Level A: Medications with established efficacy ( $\geq 2$ Class I trials)	Level B: Medications are probably effective (1 Class I or 2 Class II studies)	Level C: Medications are possibly effective (1 Class II study)	Level U: Inadequate or conflicting data to support or refute medication use	Other: Medications that are established as possibly or probably ineffective
Antiepileptic drugs	Antidepressants/SSRI/SSNRI/TCA	ACE inhibitors Lisinopril	Carbonic anhydrase inhibitor	Established as not effective
Divalproex sodium	Amitriptyline	Angiotensin receptor blockers	Acetazolamide	Antiepileptic drugs
Sodium valproate	Venlafaxine	Candesartan	Antithrombotics	Lamotrigine
Topiramate	$\beta$ -Blockers	$\alpha$ -Agonists	Acenocoumarol	Probably not effective
$\beta$ -Blockers	Atenolol <sup>a</sup>	Clonidine <sup>a</sup>	Coumadin	Clomipramine <sup>a</sup>
Metoprolol	Nadolol <sup>a</sup>	Guanfacine <sup>a</sup>	Picotamide	Possibly not effective
Propranolol	Triptans (MRM <sup>b</sup> )	Antiepileptic drugs	Antidepressants SSRI/SSNRI	Acebutolol <sup>a</sup>
Timolol <sup>a</sup>	Naratriptan <sup>b</sup>	Carbamazepine <sup>a</sup>	Fluvoxamine <sup>a</sup>	Clonazepam <sup>a</sup>
Triptans (MRM <sup>b</sup> )	Zolmitriptan <sup>b</sup>	$\beta$ -Blockers	Fluoxetine	Nabumetone <sup>a</sup>
Frovatriptan <sup>b</sup>		Nebivolol	Antiepileptic drugs	Oxcarbazepine
		Pindolol <sup>a</sup>	Gabapentin	Telmisartan
		Antihistamines	TCA's	
		Cyproheptadine	Protriptyline <sup>a</sup>	
			$\beta$ -Blockers	
			Bisoprolol <sup>a</sup>	
			Ca++ blockers	
			Nicardipine <sup>a</sup>	
			Nifedipine <sup>a</sup>	
			Nimodipine	
			Verapamil	
			Direct vascular smooth muscle relaxants	
			Cyclandelate	

# Headache Treatment

Neurology®

**Evidence-based guideline update: NSAIDs and other  
complementary treatments for episodic migraine prevention in  
adults : Report of the Quality Standards Subcommittee of the  
American Academy of Neurology and the American Headache  
Society**

S. Holland, S.D. Silberstein, F. Freitag, et al.

*Neurology* 2012;78;1346

DOI 10.1212/WNL.0b013e3182535d0c

**Table 1** Classification of migraine preventive therapies (available in the United States)

Level A: Medications with established efficacy ( $\geq 2$ Class I trials)	Level B: Medications are probably effective (1 Class I or 2 Class II studies)	Level C: Medications are possibly effective (1 Class II study)	Level U: Inadequate or conflicting data to support or refute medication use	Other: Medications that are established as possibly or probably ineffective
Herbal preparations, vitamins, minerals, and other	NSAIDs	NSAIDs	NSAIDs	Probably not effective
Petasites	Fenoprofen <sup>a</sup>	Flurbiprofen <sup>a</sup>	Aspirin	Leukotriene receptor antagonist
	Ibuprofen <sup>a</sup>	Mefenamic acid <sup>a</sup>	Indomethacin <sup>a</sup>	Montelukast
	Ketoprofen <sup>a</sup>	Herbal preparations, vitamins, minerals, and other	Herbal preparations, vitamins, minerals, and other	
	Naproxen <sup>a</sup>	Co-Q10	Omega-3	
	Naproxen sodium <sup>a</sup>	Estrogen	Other	
	Herbal preparations, vitamins, minerals, and other	Antihistamine	Hyperbaric oxygen	
	Magnesium	Cyproheptadine		
	MIG-99 (feverfew)			
	Riboflavin			
	Histamines			
	Histamine SC			

Abbreviation: NSAID = nonsteroidal anti-inflammatory drug.

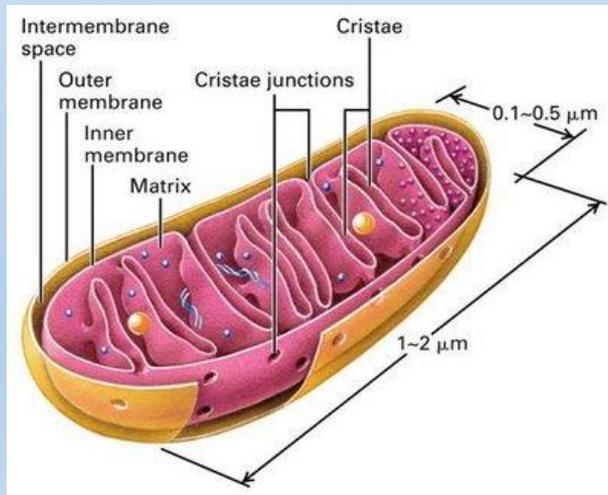
<sup>a</sup> Indicates classification based on original guideline and new evidence not found for this report.



Petasites/Butterbur  
(*Asteraceae petasites*)



Feverfew (*Tanacetum parthenium*)



# Headache Prophylaxis: General Guidance

- More than 2 headaches/month
- Less frequent headaches but more prolonged (<2 days' duration) or severe leading to substantial disability
- Refractory to abortive treatment
- Therapies for acute attacks are intolerable, contraindicated, or overused (>2/week)
- Migraine associated with prolonged aura or hemiplegic migraine

# Headache Prophylaxis: General Guidance

- Initiate the chosen drug at a low dose and titrate up (usually every 2-4 weeks) until benefits occur or side effects prevent any further increase in dose. Long-acting formulations may improve compliance
- A 2- to 3-month trial is needed to assess the efficacy of a regimen
- After 1 year, try to withdraw the drug, even if it has been effective.
- Use a drug that may benefit any comorbid conditions the patient has
- Prophylaxis should be monotherapy whenever possible. Combinations of drugs have not shown substantial benefit except in some patients with multiple comorbid conditions

# Lifestyle Triggers that Exacerbate Headaches

Headache diary can be helpful to identify Headache Triggers or MOH

Long term headache/migraine management depends on identifying and managing “triggers.”

	<b>Stress</b>	Reduce by deep breathing, relaxation, meditation, yoga, exercise
	<b>Mood Disorders</b>	Address with counseling and/or medications, exercise
	<b>Sleep Patterns</b>	Evaluate restless sleep, snoring, sleep apnea
	<b>Inactivity</b>	Increase activity/exercise to at least 20 minutes a day
	<b>Pain Medications</b>	Keep use to less than 2x week for any reasons
	<b>Blood Pressure</b>	Monitor at least q6 mo. If hypertensive, treat to recommended goal range, encourage exercise
	<b>Caffeine</b>	Keep to 1 cup of coffee a day or less
	<b>Diet</b>	Avoid skipping meals. Common triggers: aged cheeses, processed meats, red wine, artificial sweeteners. Drink plenty of H2O

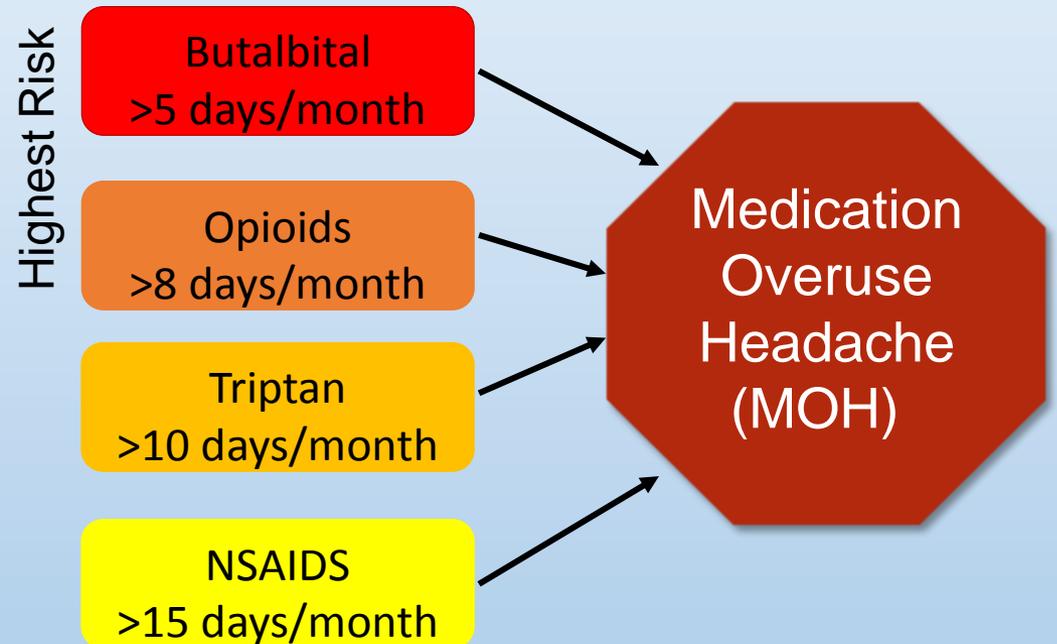
# Common Non-Pharmacologic Therapies with Evidence to Support Use in Headaches

Lifestyle approaches can be used alone or in combination with medications to reduce the frequency and intensity of chronic headaches.

	<b>Biofeedback</b>	EMG biofeedback: decrease muscle tension Temperature biofeedback: reduce nervous system arousal	Level A for tension-type headaches
	<b>Relaxation Training</b>	Relaxed state is reached by using a series of muscle exercises and controlled breathing	Level C for tension-type headache
	<b>Cognitive Behavioral Therapy</b>	Helps pts identify unique behavioral risk/trigger factors for HA & develop strategies to minimize impact of triggers	Level C for tension-type headache
	<b>Physical Therapy</b>	Posture, ergonomics, flexibility, strengthening. Modalities.	Level C for tension-type headache
	<b>Acupuncture</b>	Frontal: LI-4; ST-44, GB 14 Temporal-Parietal: ST-8, TF-3, GB-41 Occipital: GB-20, SI -3	Level C for tension-type headache
Level of evidence: A = Established as effective; B= Probably effective; C=Possibly effective			

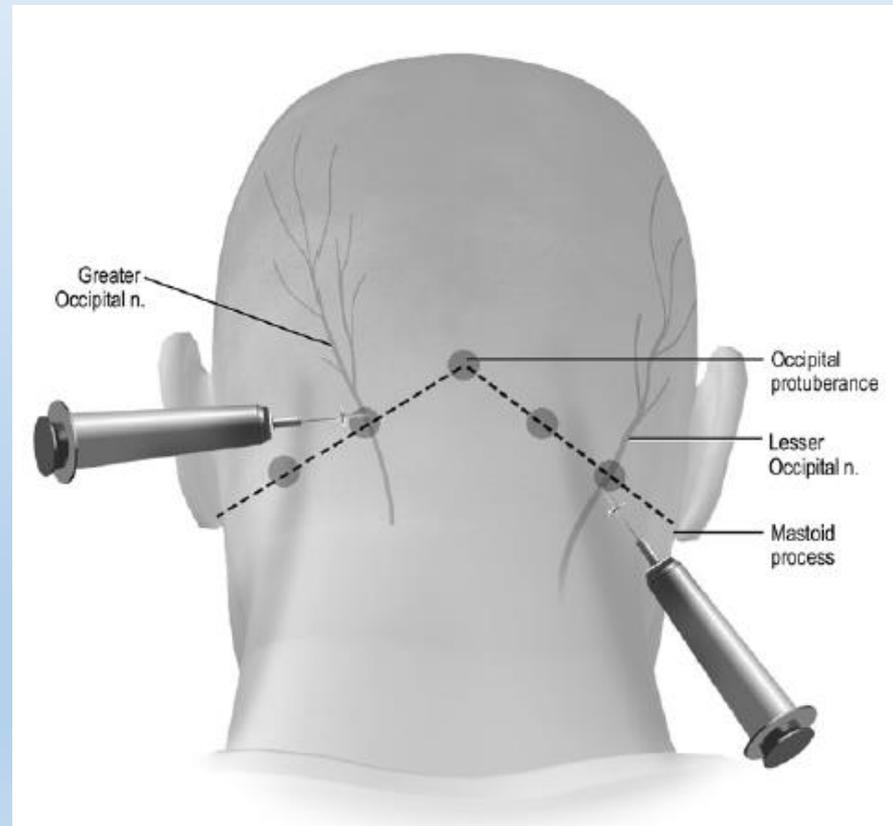
# Medication Overuse Headaches (MOH)

- Develop secondary to use of medications for the acute treatment of headaches.
- Medication overuse headache (MOH) is seen in 19%–42% of PTHA patients and may contribute to chronicity
- Most medications that are used for acute treatment of headaches can cause MOH, but the frequency of use which results in MOH can vary between different medications.
- MOH are more commonly seen in patients with migraine, but can occur in patients with tension and cluster type headaches.
- **Using opioids for non headache purposes, like low back pain, can cause MOH in patients with a history of migraine headaches.**



# Pain Procedures

- Generally low risk. Avoids side effect and compliance issues of medications.
- Botox injections
- Nerve Blocks
- Trigger point injections
- Radiofrequency ablation
- Acupuncture



# Outline

- Review our current understanding of headache within the Veterans Health Administration (VHA)
- Highlight recent advances in headache medicine
- Provide an overview of the Headache Centers of Excellence (HCoE) Program
- Discuss the core and emerging areas within the HCoE Research/Evaluation Center

# Outline

- Review our current understanding of headache within the Veterans Health Administration (VHA)
- **Highlight recent advances in headache medicine**
- Provide an overview of how the Headache Centers of Excellence (HCoE) Program came to pass
- Discuss the core and emerging areas within the HCoE Research/Evaluation Center

# Advances in Headache



## FDA Approves Third of New Migraine Drugs

By Deborah Brauser

Sept. 28, 2018 -- The FDA has approved the third of a new type of drug to prevent migraine headaches in adults.

Galcanezumab-gnlm (*Emgality*) targets calcitonin gene-related peptide (CGRP), a molecule that's produced in nerve cells of the brain and spinal cord. The FDA approved two other CGRP drugs for migraine -- erenumab (*Aimovig*) and fremanezumab-vfrm (*Ajovy*) -- earlier this year.

In a news release, drugmaker Eli Lilly and Co. says the injectable drug will be available to patients "shortly after approval."

"I have lived with migraine for more than 30 years, and I have experienced firsthand the impact it has on your life, including the ability to perform daily activities," Jill Dehlin, chairwoman of the Patient Leadership Council of the National Headache Foundation, said in the same release. "Those of us living with migraine have spent years hoping for new treatment options, and I am thankful for the efforts by researchers, investigators, and clinical trial patients who have helped make this possible."

# Advances in Headache



GammaCore (nVNS) Vagus Nerve Stimulator



Cerena/Spring Transcranial Magnetic Stimulator



Cefaly



# Advances in Headache



GammaCore (nVNS) Vagus Nerve Stimulator



Cerena/Spring Transcranial Magnetic Stimulator



Cefaly



# Advances in Headache



GammaCore (nVNS) Vagus Nerve Stimulator



Cerena/Spring Transcranial Magnetic Stimulator



Cefaly



# Advances in Headache



# Outline

- Review our current understanding of headache within the Veterans Health Administration (VHA)
- **Highlight recent advances in headache medicine**
- Provide an overview of the Headache Centers of Excellence (HCoE) Program
- Discuss the core and emerging areas within the HCoE Research/Evaluation Center

# Outline

- Review our current understanding of headache within the Veterans Health Administration (VHA)
- Highlight recent advances in headache medicine
- **Provide an overview of how the Headache Centers of Excellence (HCoE) Program came to pass**
- Discuss the core and emerging areas within the HCoE Research/Evaluation Center

# History of the HCoE Program



# History of the HCoE Program

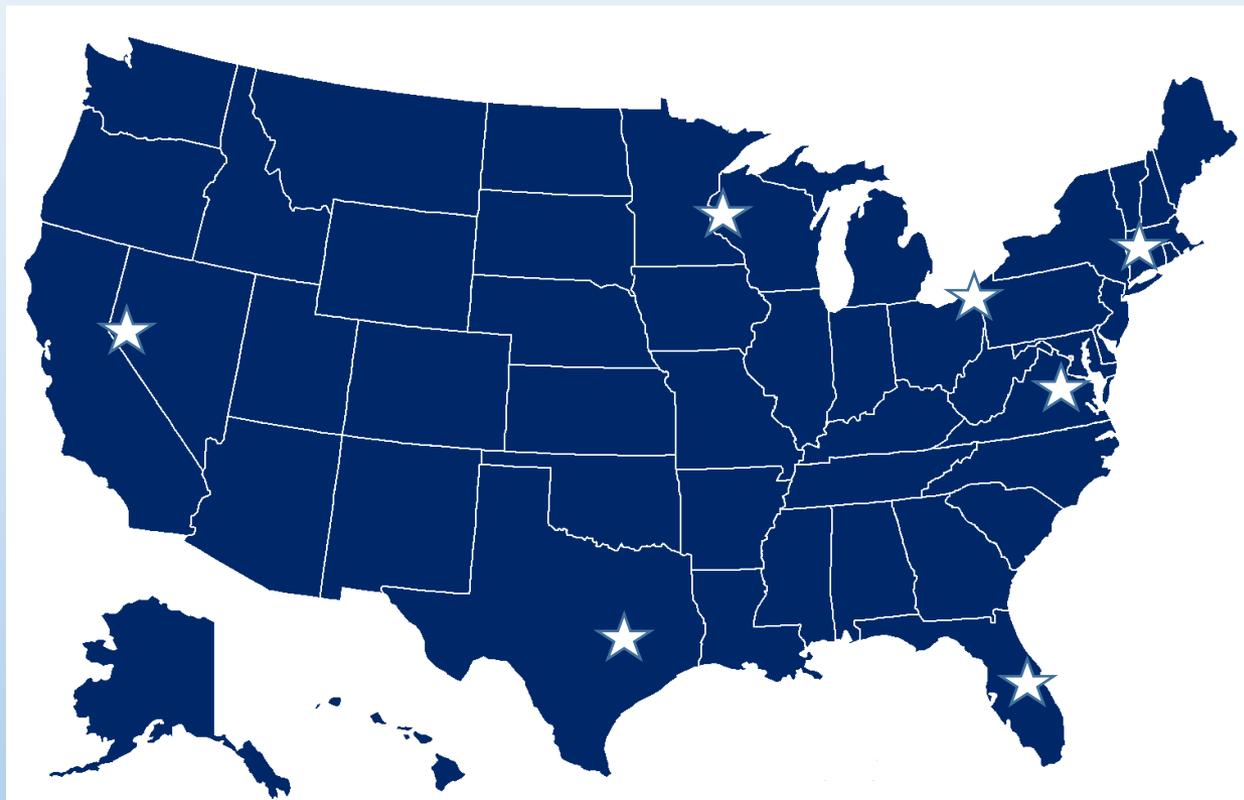
## MILITARY CONSTRUCTION, VETERANS AFFAIRS, AND RELATED AGENCIES APPROPRIATION BILL, 2018

*Headache Disorders Centers of Excellence.*—The Committee recognizes that over 350,000 veterans sustained traumatic brain injury [TBI] during the Global War on Terror and that chronic migraine/post-traumatic headache is the signature symptom of TBI. The Committee is concerned that veterans with chronic migraine/post-traumatic headache often do not receive specialty care, and that only three VA-affiliated physicians are certified with training in Headache Medicine by the United Council for Neurological Subspecialties. The Committee recognizes the importance of VA centers of excellence and the need for VA Headache Centers of Excellence. The Committee provides \$10,000,000 for the creation of at least five headache centers to be placed at the existing sites for polytrauma and traumatic brain injury [TBI] or at locations that the Secretary sees fit.

# VA Headache Centers of Excellence

## *Approved by Senate Appropriations Committee*

“The Committee recognizes that over 350,000 veterans sustained traumatic brain injury [TBI] during the Global War on Terror and that chronic migraine/post-traumatic headache is the signature symptom of TBI.”



Public Law 115-141 (Military Construction, Veterans Affairs, and Related Agencies Appropriation Act, 2018; Division J of the Consolidated Appropriations Act, 2018)

Designated 7 medical centers to develop a HCoE: 5 Polytrauma Rehabilitation Centers & associated programs in Neurology & Pain Medicine (Richmond, Tampa, San Antonio, Palo Alto, & Minneapolis), Polytrauma Network Site at Cleveland VA Medical Center & VA Connecticut Healthcare System.

# HCoE Strategic Plan

## Clinical Care

- Provide clinical guidance (CPG) for medication/device use
- Develop Standardized Assessment and Outcome metrics
- Define network of care - Telehealth Protocol

## Education

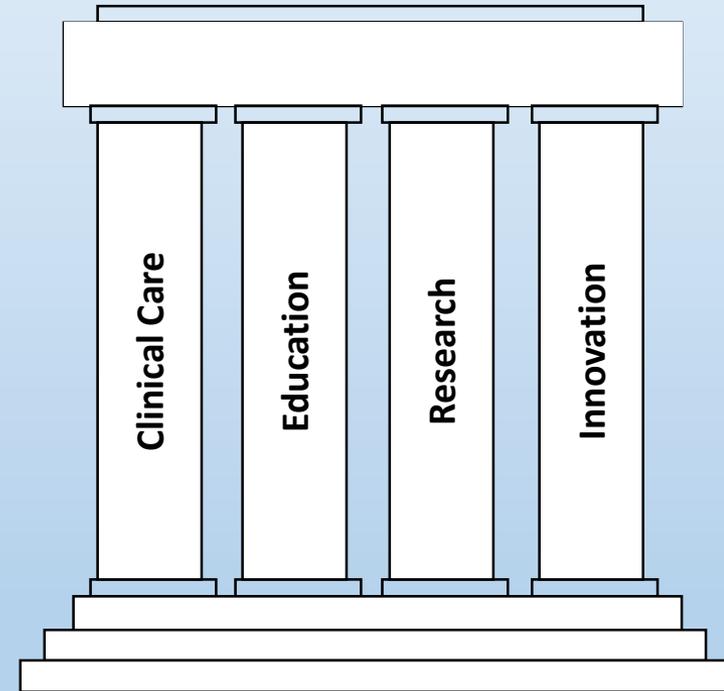
- Training Providers- Standardize educational resources
- Facilitate Board and Specialty Certification opportunities
- Define core elements of behavioral education for Veterans with

## Research

- Define the scope (incidence, prevalence, phenotypes)
- Develop reporting and data collection structure
- Review existing studies provide gap analysis

## Innovation

- Develop the process & mechanism by which HCOE serve as clearing house for emerging technologies and treatment



# Outline

- Review our current understanding of headache within the Veterans Health Administration (VHA)
- Highlight recent advances in headache medicine
- **Provide an overview of how the Headache Centers of Excellence (HCoE) Program came to pass**
- Discuss the core and emerging areas within the HCoE Research/Evaluation Center

# Outline

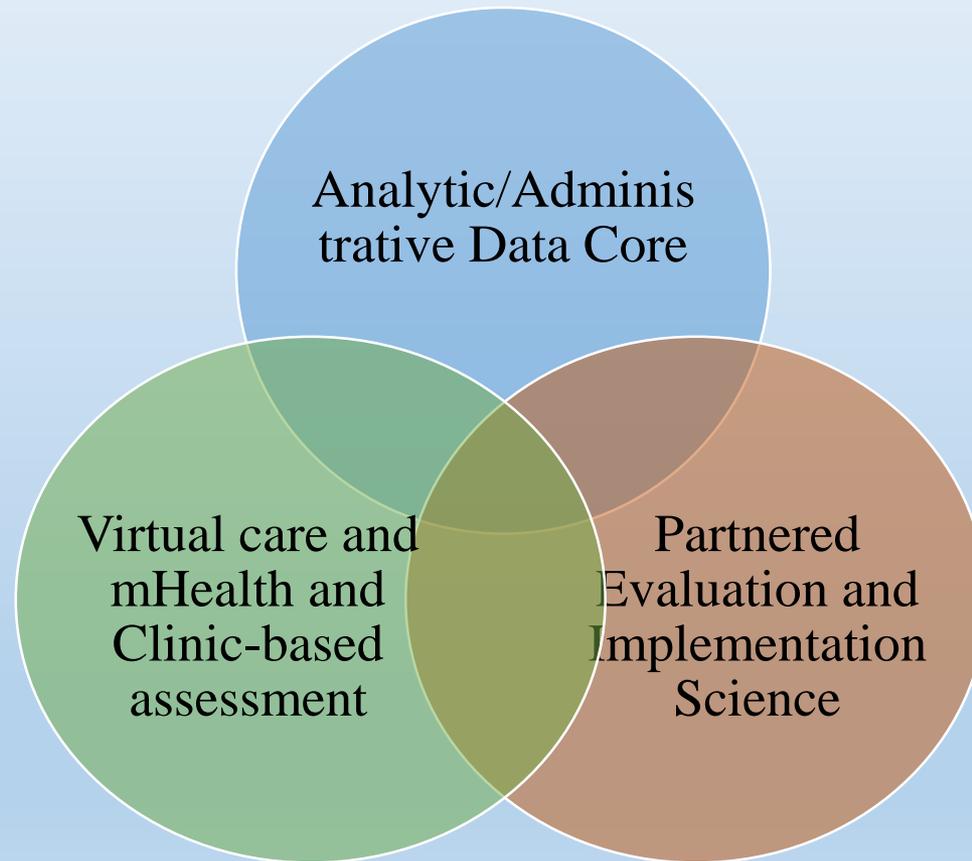
- Review our current understanding of headache within the Veterans Health Administration (VHA)
- Highlight recent advances in headache medicine
- Provide an overview of how the Headache Centers of Excellence (HCoE) Program came to pass
- Discuss the core and emerging areas within the HCoE Research/Evaluation Center

# HCoE Research and Evaluation Center Cores

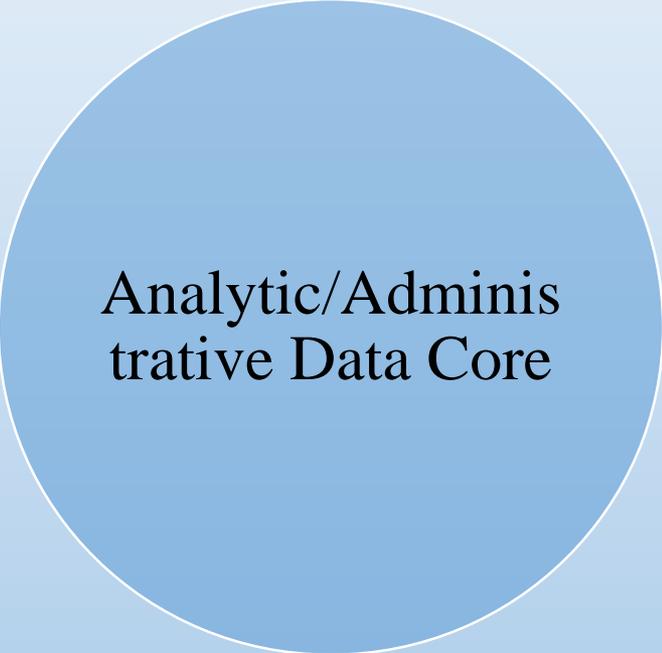
HCoE Evaluation Center will focus on the following areas:

1. Defining the scope of headache throughout VHA
2. Developing a reporting and data collection structure to aggregate results and demonstrate the impact of the HCoE program
3. Conducting qualitative interviews to: (a) understand the burden of headache, and; (b) inform the implementation and evaluation of the implementation of the HCoE program
4. Completing a gap analysis related to headache among Veterans

# HCoE Evaluation Center Cores



# HCoE Evaluation Center Cores

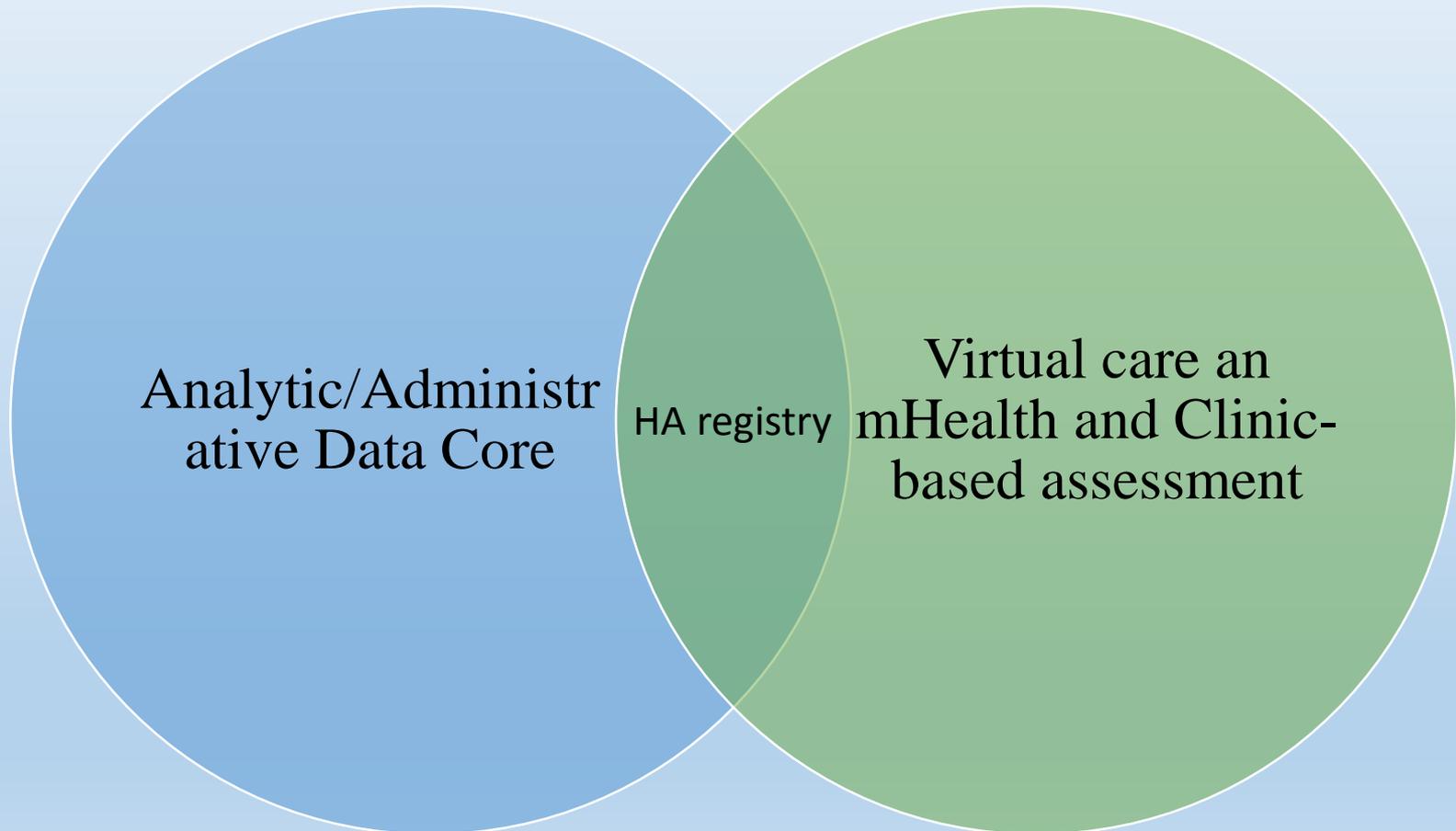


Analytic/Administrative Data Core

## Exemplar proposed projects:

1. Incidence and prevalence of headache disorders within VHA
2. Role of comorbidities and psychosocial risk factors in post traumatic headache
3. Current state of headache management in VHA
4. Identification of “hot spots” of headache management

# HCoE Evaluation Center Cores



# HCoE Evaluation Center Cores

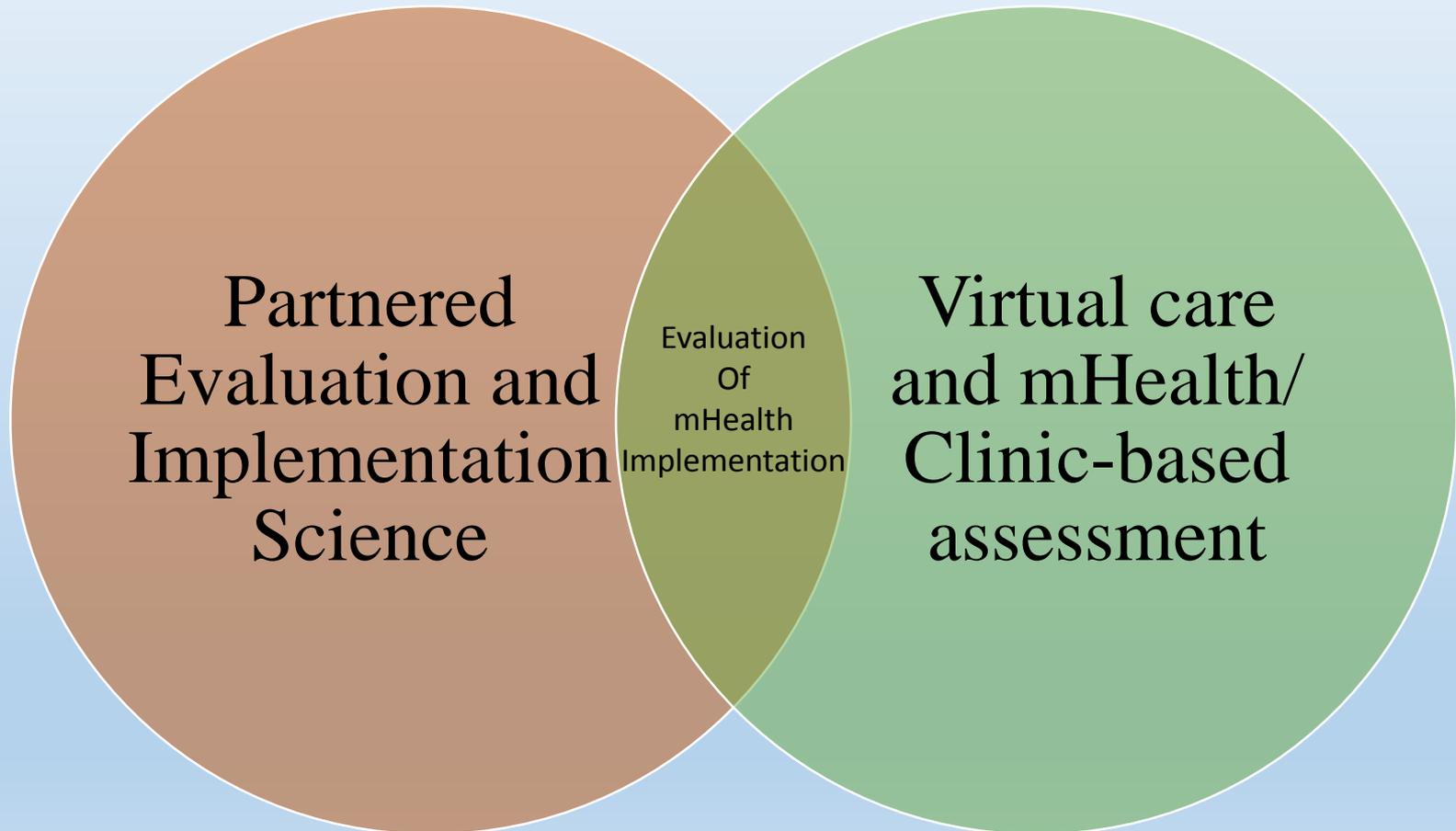


Virtual  
care/mHealth  
and Clinic-  
based  
assessment

## Exemplar proposed projects:

1. Use of an iOS Headache app and evaluation of its utility
2. Headache forecasting
3. The impact of Virtual Care (e.g., VA Video Connect) on headache days
4. Development of a standardized headache eConsult

# HCoE Evaluation Center Cores



# HCoE Evaluation Center Cores



Partnered  
Evaluation  
Implementation  
Science

## Exemplar proposed projects:

1. Evaluating the implementation of mHealth
2. Examining the implementation strategies used within HCoEs
3. Incorporating patient perspective into HCoE implementation
4. Incorporating non-VA headache medicine expert opinion into HCoE implementation

# HCoE Evaluation Center Cores



## Clinical Trials

### Exemplar proposed projects:

1. Erenumab for the treatment of chronic post-traumatic headache
2. Comparative effectiveness of neuromodulatory devices in treating chronic post-traumatic headache
3. CBT and tele-CBT for headache

# HCoE Evaluation Center Cores



Genomics

## Exemplar proposed projects:

1. Identifying genetic phenotypes of headache disorders
2. Genetic differences between headache disorders and related conditions (PTHA vs mTBI without PTHA vs PTSD)
3. Genetic differences in treatment response

*Thank  
you!*

Any questions?

Jason.Sico@va.gov