

**LIMBIC-CENC Clinical Care Monograph Version 2**

**E. TBI, Pain, and Opioid Therapy**

from LIMBIC-CENC Knowledge Translation Center (LIMBICTM)

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**Key Findings**

1. **TBI, Pain and Deployment**. LIMBIC-CENC researchers have identified that deployed Service Members were more likely to have diagnoses of back pain and headache, while non-deployed personnel were more likely to have diagnoses of other musculoskeletal pain.1 The most common types of pain among Service Members and Veterans with mTBI were headaches/migraines, back pain, and arm, leg, and/or joint pain.2 Headache risk increases with more lifetime mTBIs and reaches 78% prevalence with 3 or more mTBIs.3
2. **TBI, Pain and Mediating Health Conditions**. LIMBIC-CENC researchers have identified little evidence that Service Members’ and Veterans’ mTBI history is directly related to their chronic pain; rather, PTSD, anxiety, depression, insomnia, arthritis, and extracranial injuries are more directly related to chronic pain.2 Given the linkage between TBI and development and response to mental health conditions however, TBI must still be considered. Veterans’ neuroimaging data indicate that chronic pain is associated with decreased functional connectivity in select brain networks that mediate pain. Veterans PTSD symptom severity, history of deployment TBI, and sleep quality predicted pain-related interference with day-to-day functional activities.4 TBI, PTSD and depression diagnoses were associated with Veteran chronic pain disability ratings.5
3. **MTBI and Pain Phenotypes**. Service Members’ and Veterans’ with a mTBI history who are Female sex, Black racial identity, Hispanic/Latino ethnicity, and younger age may have a higher risk of headache.3 Baseline pain scores were generally higher in Veterans with mild TBI and five preliminary pain phenotypes were identified: (a) simple low impact stable pain, (b) complex low impact stable pain, (c) complex low impact worsening pain, (d) complex moderate impact worsening pain, and (e) complex high impact stable pain.5
4. **TBI, Pain and Opioid Treatment**. Opioid prescribing patterns for pain management did not appear to differ for Veterans with or without TBI.7, 8 About 80% of Service Members and Veterans with pain initially received at least one non-opioid therapy.7 About 20% of Service Members and Veterans with TBI and pain received short-term opioid therapy, while only 3% received long-term opioid therapy.7 About 90% of Veterans with TBI treated with long-term opioid therapy had moderate to extreme levels of pain, PTSD symptoms, sleep disturbance, and suicidal ideation.7 Similarly,Service Members and Veterans with mTBI in the ‘complex moderate impact pain with worsening’ and ‘complex high impact pain’ phenotypes had significantly higher probabilities for use of psychotropics, opioids, and interventional pain than those with no TBI.6

**Clinical Impact**

* **Chronic Pain as a Complex, Multidimensional Condition**. LIMBIC-CENC findings demonstrate that chronic pain has a myriad of causes and contributing factors, with the role of isolated mTBI being minimal. Mental health conditions have a stronger relationship to chronic pain than mTBI history. Given the complexity and overlap of chronic pain symptoms with other comorbid mental health conditions, and the interactions between TBI and the development and response to mental health conditions, Service Members and Veterans with mTBI will benefit most from a comprehensive assessment and holistic treatment approach that includes multimodal pain management. Modulation of brain networks through biofeedback or other means to reduce pain and improve brain function seems an appealing treatment approach, however more research is needed to formulate clinical recommendations.
* **CPGs Recommend Against Prescribing Opioids to Veterans.** Opioid prescribing patterns did not differ between Veterans with or without TBI. Only 3% of Veterans with TBI in the VHA were treated long-term with opioids, which provides evidence of strong adherence with VA-DOD Pain CPG recommendations.
* **TBI and Pain Phenotypes**. LIMBIC-CENC research will further develop and validate TBI and pain phenotypes using the PLS longitudinal data to better incorporate contributing mental health factors that can lead to the development of personalized pain rehabilitation programs that are tailored to the nuances of each Veterans pain profile.

**Primary Knowledge Translation Products**

* LIMBIC-CENC provides a repository of information on [Pain and TBI for SMs, Vs, and Families](https://www.limbic-cenc.org/for-service-members-and-veterans-with-tbi/pain-and-tbi-veterans/) and [Pain and TBI for Clinicians](https://www.limbic-cenc.org/for-tbi-clinicians/pain-and-tbi-clinicians/).
* The [Abstract Veterans TBI Health and Outcomes Podcasts](https://www.limbic-cenc.org/for-service-members-and-veterans-with-tbi/the-abstract-veterans-tbi-health-and-outcomes-podcasts/) provides evidence-informed and real world patient, family and clinician perspectives on assessing and self-managing TBI and pain.

**TBI, Pain and Opioid Therapy References**

1. Hoot MR, Levin HS, Smith AN, Goldberg G, Wilde EA, Walker WC, Eapen BC, Nolen T, Pugh NL. Pain and chronic mild traumatic brain injury in the US military population: a Chronic Effects of Neurotrauma Consortium study. Brain Inj 2018;32(10):1169-1177. doi: 10.1080/02699052.2018.1482427. PMID: 29883191.
2. O’Neil ME, Carlson KF, Holmer HK, Ayers CK, Morasco BJ, Kansagara D, Kondo K. Chronic Pain in Veterans and Servicemembers with a History of Mild Traumatic Brain Injury: A Systematic Review [Internet]. Washington (DC): Department of Veterans Affairs (US); 2020 Aug. PMID: 33400450.
3. Walker WC, Clark SW, Eppich K, Wilde EA, Martin AM, Allen CM, Cortez MM, Pugh MJ, Walton SR, Kenney K. Headache among combat-exposed veterans and service members and its relation to mild traumatic brain injury history and other factors: a LIMBIC-CENC study. Front Neurol. 2023 Sep 20;14:1242871. doi: 10.3389/fneur.2023.1242871. PMID: 37808506; PMCID: PMC10552781.
4. Ord AS, Lad SS, Shura RD, Rowland JA, Taber KH, Martindale SL: Pain interference and quality of life in combat veterans: Examining the roles of posttraumatic stress disorder, traumatic brain injury, and sleep quality. Rehabil Psychology 2021;66(1):31. doi:10.1037/rep0000333
5. Seal KH, Bertenthal D, Barnes DE, Byers AL, Strigo I, Yaffe K: Chronic Effects of Neurotrauma Consortium Study Group. Association of Traumatic Brain Injury with Chronic Pain in Iraq and Afghanistan Veterans: Effect of Comorbid Mental Health Conditions. Arch Phys Med Rehabil. 2017 Aug;98(8):1636-1645. doi: 10.1016/j.apmr.2017.03.026. PMID: 28455190
6. Song K, Wang CP, McGeary DD, Jaramillo CA, Eapen BC, Amuan M, McGeary CA, Potter JS, Pugh MJ. Five-year Pain Intensity and Treatment Trajectories of Post-9/11 Veterans With Mild Traumatic Brain Injury. J Pain. 2020;21(9-10):1005-1017. doi: 10.1016/j.jpain.2019.12.009. PMID: 31981717; PMCID: PMC7375016.
7. Bertenthal D, Yaffe K, Barnes DE, Byers AL, Gibson CJ, Seal KH, & CENC Consortium Study Group: Do postconcussive symptoms from traumatic brain injury in combat veterans predict risk for receiving opioid therapy for chronic pain?. Brain Injury 2018:32(10), 1188–1196. <https://doi.org/10.1080/02699052.2018.1493535>
8. Seal KH, Bertenthal D, Barnes DE, Byers AL, Gibson CJ, Rife TL, Yaffe K & CENC Study Group: Traumatic brain injury and receipt of prescription opioid therapy for chronic pain in Iraq and Afghanistan veterans: Do clinical practice guidelines matter?. The Journal of Pain: Official Journal of the Amer Pain Soc 2018:19(8), 931–941. <https://doi.org/10.1016/j.jpain.2018.03.005>

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