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

Introduction

Sleep disturbances are commonly associated with concussion or mild traumatic brain injury (mTBI) in the acute, sub-acute, and chronic recovery stages. The prevalence of sleep disorders is higher among individuals with mTBI compared to the general population.[1,2] The most common sleep disorders associated with mTBI include insomnia, obstructive sleep apnea (OSA), circadian rhythm sleep-wake disorders (CRSWD), restless legs syndrome (RLS), and parasomnias.[3,4] Evidence is lacking regarding the prevalence of shift work disorder (SWD) and insufficient sleep syndrome (ISS) in mTBI; however, these disorders are included in this recommendation because they are common in the military population and could impede recovery from mTBI. Addressing sleep early after mTBI is imperative to promoting recovery and preventing chronic mTBI symptoms.[5,6]

Step 1: Focused Sleep Assessment

As part of a sleep history, primary care managers (PCMs) should consider asking the following screening questions to identify sleep disorders after mTBI.

Contributing Factors *(See Step 3)*

- Have you ever received treatment for a sleep disorder? Have you ever had a sleep study? If so, when, where, and what was the result?
- Have you had any recent stressful events that may be affecting your sleep? (e.g. familial changes, financial stress, safety concerns)
- Do you nap during the day? If so, how frequently, for how long, and at what time of day?
- Are you now or have you ever received treatment for a psychological health condition, such as depression, anxiety, substance use disorder, or post-traumatic stress disorder (PTSD) or a medical condition, such as chronic pain?
- Have you had any recent changes to your medications, including over the counter medications or supplements?
- How many caffeinated or "energy" beverages do you consume per day? How many alcoholic beverages do you consume per week?

Excessive Daytime Sleepiness

- Do you have difficulty staying awake during the day?
- **Do you have any concerns about your ability to drive, operate machinery, or carry a weapon safely?***

Note: Excessive daytime sleepiness with increased sleep need is common in the immediate and acute stages of mTBI and typically improves by following a structured approach for gradual return to baseline activity. Guidelines for treatment and return to activity in the acute stage following mTBI can be found in the TBICoE Progressive Return to Activity Clinical Recommendation. If excessive daytime sleepiness persists beyond 2–4 weeks following mTBI, other underlying etiologies should be thoroughly investigated (e.g. insomnia, obstructive sleep apnea, circadian rhythm sleep-wake disorder, pain, depression).

Insomnia *(pg. 4)*

- Do you have difficulty falling asleep or staying asleep?
- How long does it take you to fall asleep?
- How many times do you wake up throughout the night?

Obstructive Sleep Apnea *(pg. 5)*

- Do you snore or stop breathing/gasp during sleep or have you been told you do?
- Do you feel well-rested in the morning?

Insufficient Sleep Syndrome *(pg. 6)*

- On average, how many hours do you sleep per night? Consider work days versus days off.
- Do you feel like you get an adequate amount of sleep? If not, why?

Restless Legs Syndrome *(pg. 6)*

- Do you have an urge to move and/or discomfort in your legs that is keeping you awake at night?

Circadian Rhythm Sleep-Wake Disorders *(pg.7)*

- If you have the opportunity to sleep on your own schedule, do you feel well rested?
- Has there been a recent change in your sleep patterns? (e.g. shift work, deployment)

Parasomnias *(pg. 8)*

- Do you have nightmares?
- **Do you or your sleeping partner notice unusual or troubling events during sleep?*** (e.g. sleepwalking, verbalizations, purposeful movements)

***Positive response may indicate a Red Flag and requires further investigation** *(see Step 2)*.

Step 2: Rule Out Red Flags

If any of the following Red Flags are detected during the focused sleep assessment, immediate referral is indicated.

Red Flag	Referral
Psychological symptoms with concern for danger to self or others	Psychological Health/ Emergency Department
Sleep behaviors that are potentially injurious to self or others (e.g. sleepwalking, dream enactment behaviors)	Sleep Medicine
Inability to stay awake or subjective sleepiness while driving, operating machinery, or handling weapons*	Sleep Medicine
*Concerns regarding the patient's ability to stay awake may warrant assessment with the Epworth Sleepiness Scale.	

Step 3: Consider Contributing Factors

Maladaptive sleep behaviors, comorbid conditions, and certain medications can exacerbate or cause sleep disturbances, complicating the presentation and diagnosis of sleep disorders. Emphasis should be placed on a multidisciplinary treatment approach and communication among the care team.

Addressing Maladaptive Sleep Behaviors: Healthy Sleep Practices
The American Academy of Sleep Medicine and Sleep Research Society recommend at least 7 hours of sleep on a regular basis to promote optimal health[7]
Avoid stimulants such as caffeine, nicotine, and energy drinks at least 6 hours before bedtime
Avoid alcohol within 2 hours of bedtime due to negative impact on sleep architecture
Exercise regularly, but avoid exercising within 2 hours of bedtime
Limit large/heavy meals and excessive fluid close to bedtime
Promote a sleep friendly environment: minimize noise and light and maintain a cool but comfortable temperature
Avoid use of smart-phones and other light emitting devices within 2 hours of bedtime (light suppresses melatonin synthesis and secretion); use the night setting/blue light filter on devices when available
Use bedroom only for sleep and intimacy
Get exposure to natural light every morning
Limit naps to ≤ 30 minutes in length and ≥ 7 hours prior to desired sleep time
Healthy sleep practices are broadly applicable and should be encouraged after mTBI but are not a stand-alone treatment for any specific sleep disorder.

mTBI Comorbidities Implicated in Sleep Disturbances
Post-Traumatic Stress Disorder
Generalized Anxiety Disorder
Panic Disorder
Major Depressive Disorder
Adjustment Disorder
Substance Abuse Disorder
Attention Deficit Hyperactivity Disorder
Headaches
Chronic pain
Cognitive complaints
Seizure disorder
Endocrine abnormalities (e.g. hypopituitarism, hypothyroidism, adrenal insufficiency)
Providers should consider early referral in patients with pre-existing sleep and/or psychological health conditions.

Medications and Supplements that Can Interfere with Sleep	
Activating	Antidepressants, beta-adrenergic drugs used to treat asthma, stimulants (amphetamine), glucocorticoids, caffeine, nicotine
Sedating/ exacerbate sleep apnea	Sedating antidepressants, sedative-hypnotics, benzodiazepines, opioids, barbiturates, antipsychotics, antiepileptics, diphenhydramine, alcohol
Precipitate/ exacerbate restless legs syndrome	Antidepressants, dopamine-blocking antiemetics (metoclopramide), antipsychotics, diphenhydramine, pseudoephedrine, caffeine
Precipitate/ exacerbate nightmares	Antidepressants and sedative-hypnotics (upon initiation and discontinuation), dopaminergic agents (pramipexole, amphetamine, methylphenidate), lipophilic beta blockers (metoprolol, propranolol), withdrawal from: alcohol, benzodiazepines, barbiturates
Precipitate/ exacerbate dream enactment behaviors	Antidepressants, withdrawal from: alcohol, benzodiazepines, barbiturates
If polypharmacy is present, particularly multiple psychoactive medications, consider priority referral to the prescribing psychological health provider.	

Step 4: Diagnosis and Management

Pages 4-8 present diagnostic criteria, relevant assessments, treatment options, and referral considerations for the most relevant sleep disorders after mTBI:

- Insomnia
- Obstructive Sleep Apnea
- Insufficient Sleep Syndrome
- Restless Legs Syndrome
- Circadian Rhythm Sleep-Wake Disorders
- Parasomnias

Step 5: Disposition

Consider the functional impact of sleep disorders and medications on the service member's ability to perform the mission and risk of harm to self or others. Certain conditions and/or medications can impact deployability and restrict duty status. Policies and procedures are service and command specific. Refer to appropriate prescribing specialist and consult duty and deployment standards for your organization when dispositioning patient.

Insomnia [G47.0_]

Insomnia is the most common sleep disturbance in the mTBI population.[8]

Short-term: Symptoms present < 3 months[9] (often occurs in response to an identifiable stressor [e.g. mTBI])

Chronic: Symptoms occur at least 3 times/week and persist for at least 3 months[9]

Diagnostic Criteria

Diagnostic criteria A–D must be met:

A. One or more of the following:
1. Difficulty initiating sleep
2. Difficulty maintaining sleep
3. Waking up earlier than desired
4. Resistance to going to bed on appropriate schedule
5. Difficulty sleeping without parent or caregiver intervention

B. One or more of the following related to nighttime sleep difficulty:
1. Fatigue/malaise
2. Attention, concentration, or memory impairment
3. Impaired social, family, occupational, or academic performance
4. Mood disturbance/irritability
5. Daytime sleepiness
6. Behavioral problems (e.g. hyperactivity, impulsivity, aggression)
7. Reduced motivation/energy/initiative
8. Proneness for errors/accidents
9. Concerns about or dissatisfaction with sleep

C. The reported sleep/wake complaint cannot be explained purely by inadequate opportunity (i.e. enough time is allotted for sleep) or inadequate circumstances (i.e. environment is conducive to sleep)

D. The sleep disturbance and associated daytime symptoms are not solely due to another current sleep, medical, or mental disorder, or medication/substance use[9]

Evaluation

- **Insomnia Severity Index (ISI)**[10,11]

Scoring Criteria:
> 14: Clinical insomnia
> 11: Clinical insomnia in mTBI[12]

Treatment Recommendations

- **Non-Pharmacologic** (preferred)
  - **Cognitive Behavioral Therapy for Insomnia (CBT-I) or Brief Behavioral Treatment for Insomnia (BBTI):**[13-15] see mobile resources for "Path to Better Sleep" and "CBT-I Coach" if a qualified provider is not available
  - Review Healthy Sleep Following Concussion/mTBI with patient*
  - Auricular acupuncture with seed and pellet[16]
- **Pharmacologic**
  - Sleep maintenance:
    - *Doxepin*: 3–6mg 30 min prior to bedtime for 14–28 days
  - Sleep onset & maintenance:[17]
    - *Eszopiclone*: 1mg at bedtime for 14 days
    - *Zolpidem*: 5mg at bedtime for 14 days
  - Sleep onset:
    - *Zaleplon*: 5–10mg at bedtime for 14 days**
- **Additional treatment options**
  - *Melatonin* (high quality): 1–5mg (3mg usual dose) 60–90 min before bedtime

Referral Criteria

- Refer to a qualified CBT-I or BBTI provider
- Refer to Sleep Medicine if insomnia symptoms persist beyond a 2–4 week medication trial
- Consider early Sleep Medicine referral in patients with pre-existing sleep condition
- Consider early Psychological Health referral in patients with a comorbid psychological health condition

*Use only in conjunction with other appropriate interventions, such as CBT-I or BBTI, and not as a stand-alone treatment for insomnia.[18,19]

**Zaleplon: consider using this short-acting agent rather than longer acting agents in operational environments with unpredictable sleep-wake schedules (can be administered up to 4 hours before the anticipated wake time).[20,21]

Precautions & Contraindications

Benzodiazepine Receptor Agonists (BZRAs)

- **Benzodiazepines—Contraindicated following TBI:** Use may impede neuronal recovery and negatively impact cognitive function.[22]
- **Nonbenzodiazepines** (e.g. eszopiclone, zaleplon, zolpidem)
  - **FDA Boxed Warning:** Serious side effects including death due to complex sleep behaviors such as sleepwalking or sleep driving. Contraindicated in patients who previously experienced complex sleep behaviors. Behaviors can occur at the lowest dose, after just one dose, and with or without concomitant alcohol or other CNS depressants. (Zolpidem may have higher risk of complex sleep behaviors).[23]
  - **Caution:**
    - As individuals with TBI have a higher reported rate of parasomnias, use of these medications should be minimized/used with caution in this population.
    - May interfere with cortical plasticity,[24] and long-term use (>30 days) can result in tolerance, dependence or abuse.
    - Carry a risk of next-day psychomotor impairment. This risk is increased at higher doses, if taken with less than a full night of sleep (7–8 hours), and with longer acting agents (e.g. eszopiclone). Avoid use in irregular/unpredictable sleep-wake schedules/environments.
    - Zolpidem has more CNS adverse effects (e.g. somnolence, hallucinations) reported compared to eszopiclone,[25] and zolpidem has been implicated in more emergency department visits (e.g. falls, head injuries) than any other psychiatric medication.[26]

Anticholinergics—Caution: Minimize use within 3 months of TBI due to risk of cognitive impairment. **Note**: Doxepin is a TCA with anticholinergic activity at doses ≥ 25mg. Conversely, low dose doxepin is selective for H1 receptors, and no to very minimal anticholinergic side effects have been reported.[27]

Obstructive Sleep Apnea (OSA) [G47.33]

OSA is estimated to occur in one-third or more of service members with a history of TBI.[28-30]
An increased prevalence of OSA with comorbid insomnia has also been noted in the military population.[31,32]

Diagnostic Criteria

- Polysomnography (PSG) reported Apnea-Hypopnea Index (AHI) ≥ 5 per hour of sleep plus one or more of the following:
  1. Daytime sleepiness, fatigue, insomnia, or other symptoms leading to impaired sleep-related quality of life
  2. Waking up with breath-holding, gasping, or choking
  3. Witnessed snoring [R06.83], breathing interruptions, or both during sleep

OR

- PSG reported AHI ≥ 15 per hour of sleep regardless of the presence of associated symptoms[9]

Evaluation

- **STOP-BANG Questionnaire*[34]**
- **Physical Exam: Typically normal in Active Duty Service Member**[35,36]

-Overweight (BMI > 25kg/m^2)
-Neck circumference: ≥ 16” female; ≥ 17” male
-Excessive oropharyngeal tissue (Mallampati classification)[37]
-Retrognathia[38]

Treatment Recommendations

- Treatment to be initiated and managed by Sleep Medicine and typically includes: Continuous Positive Airway Pressure (CPAP) therapy, oral appliance therapy (mandibular advancement devices [MADs])
- Review CPAP Adherence Pearls**
- Behavioral modifications: weight loss, alcohol avoidance, smoking cessation

Referral Criteria

- See below for referral based on STOP-BANG screening results*
- Ensure follow-up with Sleep Medicine 4 weeks after therapy initiation, then at least annually

*Recommended STOP-BANG Interpretation for Service Members and Veterans

OSA Risk	Scoring	Interpretation
Low	0–2 Yes responses	Refer to Sleep Medicine ONLY if other diagnostic criteria (e.g. daytime sleepiness) or conditions associated with OSA (e.g. chronic insomnia, mood disorders [depression], PTSD, cognitive dysfunction, chronic opioid use, cardiovascular, cerebrovascular, or pulmonary disease)[33] are present
Intermediate	3–4 Yes responses	Refer to Sleep Medicine
High	5–8 Yes responses	
High	≥ 2 Yes to the STOP questions & BMI >35 kg/m^2	
High	≥ 2 Yes to the STOP questions & neck circumference ≥17” male or ≥16” female	
High	≥ 2 Yes to the STOP questions & male gender	

**CPAP Adherence Pearls

1. Desensitization strategies: wear positive airway pressure (PAP) mask while watching TV/relaxing at night for several nights prior to connecting to the machine. Patients with comorbid PTSD may also benefit from prazosin therapy.
2. Appropriate use of inhaled nasal steroids for indicated conditions such as chronic nasal congestion due to rhinitis or nasal polyps. (Use in the absence of these conditions has not been shown to improve PAP adherence).[39]
3. Educational, behavioral, and supportive interventions (e.g. CBT, motivational interviewing, and education on CPAP benefits and OSA risks) can improve adherence.[40,41]

Deployment/Remote Duty Station Considerations

Portable treatment options: MADs, expiratory positive airway pressure (EPAP) devices, and portable PAP machines

Treatment options for suspected OSA without access to Sleep Medicine: Non-supine positional therapy, such as tennis ball on the back or an alarm device when supine,[42] (may be appropriate in younger patients with supine disease who have mild OSA and are not obese);[43] inhaled nasal steroids for chronic congestion; discontinuation of sedating medications; behavioral modifications

Insufficient Sleep Syndrome (ISS) [F51.12]

Insufficient sleep syndrome is prevalent in the military population due to unique stressors (e.g. high operational tempo)[44] and should be considered in patients presenting with depression, fatigue, and lethargy. Symptoms can often be misattributed to insomnia; however, patients with insufficient sleep syndrome will fall asleep rapidly given the opportunity.

Diagnostic Criteria	Evaluation	Treatment Recommendations
Diagnostic criteria 1–6 must be met: 1. Daily periods of irrepressible need to sleep or daytime lapses into sleep 2. Sleep time is usually shorter than expected for age 3. Curtailed sleep pattern present most days for ≥ 3 months 4. Sleep time is curtailed by measures, such as an alarm clock, and sleep time is longer when these measures are not used, such as on weekends or vacations 5. Extension of total sleep time results in resolution of sleepiness symptoms 6. Symptoms and signs are not better explained by a CRSWD or other current sleep, medical, or mental disorder, or medication/substance use or withdrawal[9]	• AASM Sleep Diary[45]	• **Non-Pharmacologic** - Lifestyle or shift work modifications to allow for sufficient sleep time - Review Healthy Sleep Following Concussion/mTBI with patient • **Pharmacologic** - None recommended
	Referral Criteria	
	• Refer to Sleep Medicine if unresponsive to treatment	

Restless Legs Syndrome (RLS) [G25.81]

Diagnostic Criteria	Evaluation	Treatment Recommendations
Essential diagnostic criteria (all must be met): 1. Urge to move the legs (sometimes arms) that is usually associated with uncomfortable and unpleasant sensations 2. Symptoms start or become worse with rest or inactivity 3. At least partial relief of symptoms occurs with physical activity 4. Symptoms only occur or are worse in the evening or at night 5. Symptoms are not solely explained by another medical or behavioral condition (e.g. myalgia, venous stasis, leg edema, arthritis, leg cramps, positional discomfort, habitual foot tapping) • Specifier for clinical significance of RLS: Symptoms cause significant distress or impairment in important areas of functioning due to impact on sleep, energy, daily activities, behavior, cognition, or mood[46]	• **Labs:** Iron panel with Ferritin	• **Non-Pharmacologic** - Warm compresses to affected area - Weighted blanket - Compression stockings at night • **Pharmacologic** - If ferritin level ≤ 75mcg/L: *Ferrous sulfate* 325mg (65mg elemental iron) in combination with *Vitamin C* 100–200mg, twice daily[47] - *Gabapentin*: 100mg-300mg 2 hours prior to bedtime; increase dose every 1–2 weeks until symptom relief, up to 1.2–1.8g/day[48-50] - *Gabapentin enacarbil* (sustained release): 600mg once daily at ~5pm
	Referral Criteria	
	• Refer to Sleep Medicine if unresponsive to treatment	

Precautions

Caution: Dopaminergic agents (e.g., pramipexole, ropinirole) are not recommended in TBI population due to the potential to precipitate/exacerbate parasomnias and behavioral disturbances such as impulse control.

Circadian Rhythm Sleep-Wake Disorder (CRSWD) [G47.20]

Symptoms of CRSWDs are often misattributed to insomnia.[51,52]

Diagnostic Criteria

The following general criteria must be met, as well as the subtype criteria below:

1. Chronic or recurrent disrupted sleep-wake pattern due to misalignment (extrinsic) or malfunction (intrinsic) of the circadian system as evidenced by sleep diary and (if possible) actigraphy monitoring for 7–14 (work and free) days
2. Insomnia, excessive daytime sleepiness, or both
3. Symptoms cause clinically significant distress or impairment in important areas of functioning
4. Symptoms are present for ≥ 3 months
5. The sleep-wake disturbance is not better explained by another current sleep, medical, or mental disorder, or medication/substance use[9]

CRSWD Subtype Criteria	Evaluation	Treatment Recommendations	Referral Criteria
Delayed Sleep-Wake Phase Disorder [G47.21] -Delay (≥ 2 hours) in the timing of habitual sleep period compared to conventional or required sleep-wake times -Unlike insomnia, when allowed to adhere to preferred sleep-wake schedule, patients will report improved sleep quality/quantity	•AASM Sleep Diary[45] •Actigraphy	•**Non-Pharmacologic** - Strategically timed short wavelength blue light (~480nm) therapy[53,54] and avoidance of light prior to bedtime •**Pharmacologic** - *Melatonin* (high quality): 0.5-5mg (usual dose: 3mg) 1–2 hours before bedtime[55]	•Refer to Sleep Medicine if inadequate response to initial treatment after 8 weeks •Consider comorbid depression and referral to Psychological Health
Shift Work Disorder [G47.26] -Reduction in total sleep time associated with a reoccurring work schedule that overlaps with the usual time for sleep; also consider poor sleep hygiene	•AASM Sleep Diary •Actigraphy •Consider impact of light exposure if possible	•**Non-Pharmacologic** - Strategically Timed Naps: ≤ 30 minutes in length ≥ 7 hours prior to desired sleep time •**Pharmacologic** - *Melatonin* (high quality): 0.5–3mg 30 minutes before bedtime[56]	•Refer to Sleep Medicine if inadequate response to initial treatment after 4 weeks
Irregular Sleep-Wake Rhythm Disorder [G47.23] -No major sleep period and at least 3 irregular sleep periods during a 24 hour timeframe	•AASM Sleep Diary •Actigraphy	•Treatment to be initiated and managed by Sleep Medicine	•Refer to Sleep Medicine •Consider comorbid depression and referral to Psychological Health

Precautions

Blue Light Therapy Precaution: Inaccurate timing can worsen sleep issues; avoid prior to desired bedtime. Use no more than 2 hours before patient's desired wake time. **Refer to Sleep Medicine for guidance on proper use.**

Parasomnias

Parasomnias: A category of sleep disorders that involve undesirable physical events or experiences that occur while falling asleep, sleeping, or waking from sleep. Parasomnias can be precipitated/exacerbated by sleep deprivation or fragmentation, both common after mTBI.

Diagnostic Criteria	Treatment Recommendations	Referral Criteria
Confusional Arousals 1. Episodes of mental confusion or disoriented behavior during an arousal or awakening from sleep 2. Behaviors include nonsensical verbalizations and non-purposeful movements 3. Patients typically have no memory of the event • Most commonly caused by unhealthy sleep practices	• **Non-Pharmacologic** - Provide reassurance on the benign nature - Review Healthy Sleep Following Concussion/mTBI with patient; emphasize abstaining from alcohol	• None indicated • Consider referral to Sleep Medicine if symptoms persist
Sleepwalking [F51.3] 1. Begins as a confusional arousal followed by ambulation from bed 2. Slow and quiet ambulation, occasionally with more agitated behaviors 3. Patients typically have no memory of the event	• **Non-Pharmacologic** - Create safe bedroom environment, to include locking doors and securing weapons - Sleep separately from bed partner if risk of injury	• Immediate Referral to Sleep Medicine
Sleep Paralysis 1. Partial or complete temporary inability to move or call out, often accompanied by hallucinations 2. Vivid and frightening visual, tactile, or auditory hallucinations 3. Occurs upon awakening or falling asleep 4. Patients are able to recall the event • Patients may report event as a nightmare	• **Non-Pharmacologic** - Provide reassurance on the benign nature - Review Healthy Sleep Following Concussion/mTBI with patient	• None indicated • Consider referral to Sleep Medicine only if symptoms persist or cause significant distress
Trauma Related Nightmares (TRN) 1. Recurrent dysphoric, well-remembered dreams with vivid, distressing content that is related to a traumatic event(s)[57] 2. Results in disturbed, fragmented sleep • Nightmares are often underreported by military personnel and are associated with increased suicidal ideation. Patients may report insomnia symptoms due to attempts to avoid sleep and/or frequent awakenings.[57,58]	• **Non-Pharmacologic** - Review Healthy Sleep Following Concussion/mTBI with patient - Imagery Rehearsal Therapy (refer to Psychological Health) • **Pharmacologic** -*Prazosin*: **Proper titration required***	• Refer to Psychological Health as nightmares may be secondary to PTSD[59,60] • If no response to prazosin by 8 weeks, consider referral to Sleep Medicine
REM Sleep Behavior Disorder (RBD) [G47.52] 1. Repeated episodes of dream enactment behaviors including vocalization and/or *purposeful* body movements (e.g. fighting or struggling) 2. Episodes occur during REM sleep as determined by PSG or clinical history of dream enactment behaviors 3. PSG shows REM sleep without atonia 4. The sleep disturbance is not better explained by another sleep disorder, mental disorder, medication or substance abuse[9] • Patients are typically able to recall the event **Trauma Associated Sleep Disorder** is a novel parasomnia similar to RBD. In addition to symptoms seen in RBD, there is an inciting traumatic experience, clinical features of trauma related nightmares, and sympathetic activation (tachycardia, night sweats).[61,62]	• **Non-Pharmacologic** - Create safe sleep environment to include locking doors and securing weapons - Sleep separately from bed partner if risk of injury	• Immediate Referral to Sleep Medicine

*Prazosin Titration

Initially 1mg at bedtime; after 2–3 days increase dose to 2mg; titrate dose by 1–5mg every 7 days up to max 10mg/day in females and 15mg/day in males

Typical effective adult dosing range: 4–8mg (most patients require greater than 5mg/night)

Note: While evidence is equivocal, prazosin has demonstrated benefit in the active duty population.[63-68]

Additional Resources

Patient Handout

Healthy Sleep Following Concussion/mTBI

Assessment Tools

1. Epworth Sleepiness Scale
2. Insomnia Severity Index

Mobile Resources

The DHA and VA provide several free apps that may help you improve your sleep:

1. **Cognitive Behavioral Therapy for Insomnia (CBT-I) Coach**: Includes a sleep diary that can help you pinpoint behaviors that are contributing to your sleep problems; also provides interactive exercises to learn how to adopt positive sleep habits and guide you through progressive muscle relaxation
2. **Mindfulness Coach**: Provides nine different guided mindfulness exercises and strategies for overcoming challenges to mindfulness practice
3. **Breathe2Relax**: Provides instruction on diaphragmatic "belly" breathing, which helps lower stress and reduce anxiety; graphics, animation, narration, and videos lead you through several breathing exercises
4. **Tactical Breather**: Provides guided breathing instruction to gain control over heart rate, emotions and concentration, during stressful situations
5. **Path to Better Sleep**: Delivers the core components of CBT-I, takes advantage of natural sleep rhythms to improve sleep, and includes personalized sleep diary, sleep scheduling, and relaxation exercises
6. **VA/DoD Clinical Practice Guideline for the Management of Chronic Insomnia Disorder and Obstructive Sleep Apnea**

This clinical recommendation represents a review of currently published literature and expert contributions from clinical subject matter experts representing the academic, research and civilian sectors; the uniformed services; the Defense Health Agency; and the Department of Veterans Affairs. Provider judgment and operational requirements may supersede any recommendation for an individual patient.

Additional information and resources can be found on the TBICoE website: Health.mil/TBICoE

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Acknowledgements—Expert Work Group Members

Department of Defense

- Jennifer Bell, M.D., Psychological Health Center of Excellence (Internal Medicine)
- Lt Col Matthew Brock, MC, USAF, M.D., San Antonio Military Health System (Neurology/Sleep Medicine)
- LTC Vincent Capaldi, II, MC, USA, Sc.M., M.D., FAPA, FACP, Walter Reed Army Institute of Research (Internal Medicine, Psychiatry/Sleep Medicine)
- Jesse Dedrick Jr., FNP-BC, Intrepid Spirit Center, Carl R. Darnall Army Medical Center, Fort Cavazos
- CPT Kristopher Hasenhauer, MC, USA, PA-C, SOCOM
- William Highlander, M.D., Warrior Concussion Clinic, Naval Medical Center Portsmouth (Neurology/Sleep Medicine)
- Daniel Kim, LCSW, Intrepid Spirit Center, Naval Hospital Camp Pendleton (Clinical Social Worker, Behavioral Insomnia Therapist)
- Robert Koffman, M.D., MPH, National Intrepid Center of Excellence, Walter Reed National Military Medical Center (Psychiatry)
- COL Christopher Lettieri, MC, USA, M.D., FACP, FCCP, FAASM, Uniformed Services University, (Internal Medicine/Critical Care Medicine/Pulmonary Disease/Sleep Medicine)
- COL Vincent Mysliwiec, MC, USA, M.D., FAASM, San Antonio Military Health System (Internal Medicine/Critical Care Medicine/Pulmonary Disease/Sleep Medicine)
- Maj Matthew Puderbaugh, MC, USAF, DO, Minnesota Air National Guard (Physical Medicine and Rehabilitation)
- LCDR Rebecca Rausa, MSC, USN, PA-C, Joint Expeditionary Base-Little Creek
- COL Brian Robertson, MC, USA, M.D., FAAP, FACAAI, Walter Reed National Military Medical Center (Allergy & Immunology, Pediatrics/Sleep Medicine)
- Christopher Spevak, M.D., MPH, JD, Walter Reed National Military Medical Center (Preventive Medicine/Addiction Medicine, Anesthesiology/Pain Medicine)
- LCDR Kent Werner Jr., MC, USN, M.D., PhD., Walter Reed National Military Medical Center (Neurology/Sleep Medicine)

Department of Veterans Affairs

- Laura Bajor, DO, James A. Haley Veterans' Hospital (Psychiatry)
- Risa Nakase-Richardson, PhD., FACRM, James A. Haley Veterans' Hospital (Neuropsychologist)
- Marc Silva, PhD., James A. Haley Veterans' Hospital (Neuropsychologist)

Civilian or Academic Settings

- Megan Ehret, PharmD, MS, BCPP, Associate Professor, Dept. of Pharmacy Practice and Science, University of Maryland School of Pharmacy
- Gena Glickman, PhD., Assistant Professor of Psychiatry and Neuroscience, Uniformed Services University (Neuroscientist)
- Michael Jaffee, M.D., FAAN, FANA, Vice-Chair, Dept. of Neurology, University of Florida College of Medicine (Psychiatry, Neurology/Brain Injury Medicine, Sleep Medicine)
- Christine Mac Donald, PhD., Associate Professor, Dept. of Neurological Surgery, University of Washington School of Medicine (Neuroscientist)
- Una McCann, M.D., Professor, Dept. of Psychiatry and Behavioral Sciences, John Hopkins University School of Medicine (Psychiatry)
- Emerson Wickwire, PhD., ABPP, Associate Professor of Psychiatry and Medicine, University of Maryland School of Medicine (Clinical Psychologist, Behavioral Sleep Medicine Specialist)

TBICoE Core Work Group Members

- Gary McKinney, DHSc, CBIS (Government Lead)
- Stephanie Maxfield-Panker, PhD
- Inbal Eshel, M.A., CCC-SLP
- Amanda Gano, PA-C
- Joanne Gold, PharmD, BCGP
- Stacey Harcum, MPH, M.S., OTR/L
- Jessica Bock, DHSc, MS, PA-C
- Donald Marion, MSc, M.D. (Neurosurgeon)
- Miriam Roth, M.S., PA-C
- Keith Stuessi, M.D., (Family Medicine/Sports Medicine)
- Edison Wong, M.D., M.S. (Physical Medicine and Rehabilitation)