

Addressing sleep disorders after traumatic brain injury

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Disorders of sleep are some of the most common problems experienced by patients after traumatic brain injury (TBI). It is important to recognize and treat these problems early to allow for optimal cognitive recovery, but because they are so common, the importance of treating them is often underestimated. In this special issue of *NeuroRehabilitation* scientists address the interplay of sleep and TBI with the aim of improving both diagnosis and treatment of these problems.

TBI is a significant cause of disability in the United States and worldwide. An estimated 1.6 to three million TBIs occur in the U.S. each year. Insomnia, fatigue, and sleepiness are the most frequent patient complaints following TBI, and patients with [sleep disturbances](#) have been found to have longer inpatient hospital stays, higher cost of rehabilitation, and higher rates of functional disability. Studies have shown that minimizing sleep-wake cycle disturbance is associated with improvement in fatigue levels, mood, and cognitive functioning and decreased levels of anxiety, although the cause and effect relationship is uncertain.

This thematic issue covers the effects of TBI on patterns of sleep function; the approach to the evaluation and diagnosis of [sleep disorders](#); how sleep disorders affect various aspects of physiological, emotional, and cognitive functioning; and the pharmacologic and non-pharmacologic [treatment](#) of sleep disturbances following TBI.

Introducing the issue, Guest Editor David Ripley, MD, MS, of the Brain Injury Medicine and Rehabilitation Unit, Shirley Ryan Ability Lab, Northwestern University, and Department of Physical Medicine and Rehabilitation, Feinberg School of Medicine Northwestern University, Chicago, IL, explains: "Our system of care typically does not do the best job of recognizing sleep as a problem after serious illness and injury. Hospitals,

especially intensive care settings, are frequently poor at allowing patients adequate, restful sleep due to the presence of equipment, the need for frequent monitoring, the facility design, and the disruption of nursing interventions."

Sangeeta Driver, MD, MPH, of the Brain Injury Medicine and Rehabilitation Unit, Shirley Ryan Abilitylab, and Northwestern University, Feinberg School of Medicine, Chicago, IL, and Ryan Stork, MD, of the Department of Physical Medicine and Rehabilitation, University of Michigan Medical School, Ann Arbor, MI, review evidence-based pharmacologic treatment principles and agents to consider for use in the treatment of TBI-related sleep-wake disturbances and provide readers with an easy-to-follow clinical framework to guide management.

The goal of this study was to highlight the importance of early treatment of sleep-wake disturbances following TBI and provide an evidence-based treatment algorithm for health care practitioners. The authors explain that management of TBI-related sleep-wake disturbances requires a multifactorial approach, and key treatment principles include utilizing first-line non-pharmacological interventions such as establishing a regular bedtime routine, creating a restful bedroom environment with minimal light and ideal ambient temperature, minimizing daytime napping, limiting evening caffeine and alcohol intake, and avoiding late-night screen-time. They advocate minimizing the use of medications that may adversely affect cognition and selecting appropriate pharmacologic agents when indicated.

The authors review several pharmacologic agents that may be utilized for the treatment of TBI-related SWD: hypnotic agents such as nonbenzodiazepine GABA-A agonists; melatonin receptor agonists; and antidepressants. They conclude that pharmacological intervention for regulation of sleep-wake disturbances is reasonable in the TBI

population as improved sleep may help lessen daytime sleepiness, fatigue, neurobehavioral impairments, and improve aspects of cognition. However, they point out that caution must be used with the use of pharmacologic agents and in particular, use of benzodiazepine GABA-A agonists, due to potential for contributing to impaired cognition and transient memory loss and potential for impairing neurological recovery.

"Sleep is now increasingly viewed as a priority by the general public and is of even greater importance for TBI patients," comment Dr. Driver and Dr. Stork. "Sleep restoration can have a profound impact on cognitive recovery and this review provides practitioners with the most up-to-date evidence-based treatments for TBI-related sleep-wake disturbances."

"We hope this review will have a positive impact on patients who have suffered TBIs and aid in optimizing their cognitive recovery. However, more studies are needed to document efficacy of pharmacotherapy for sleep-wake cycle regulation in the TBI population and tolerance of side effects," they conclude.

Alphonsa Thomas, DO, and Brian D. Greenwald, MD, of the JFK Johnson Rehabilitation Center for Brain Injuries, Hackensack Meridian Health, Edison, NJ, review alternative and non-pharmacologic options for treating sleep disturbance after TBI. "People should be aware of all of their options for treatment," they explain. "Non-pharmacologic options may limit risk of side effects or drug-drug interactions."

The authors point out that the approach to sleep should start with conservative measures to rule out possible causes of disturbed sleep such as pain, bowel/bladder issues, and mood changes, and modifying these, with progression to more aggressive options if needed. They describe measures to improve sleep such as sleep hygiene and behavioral therapy, light therapy, chiropractic and osteopathic manipulative treatment, acupuncture, diet, melatonin, and herbs (such as valerian), and other nutritional remedies. They also review studies on the use of warm footbaths and cannabinoid products.

"Insomnia after TBI is a common and vexing problem, says Dr. Greenwald, who is Medical Director of the JFK Johnson Rehabilitation Center for Brain Injuries. "The management of sleep disorders after TBI is of utmost importance as it lends itself to neurorecovery. Clinicians should be aware of how to evaluate patients with this problem as well as both pharmacologic and non-pharmacologic options for treatment."

"Poor sleep can impact almost every aspect of healing and cognitive function; therefore, addressing this should be a cornerstone of treatment," concludes Dr. Ripley.

More information: Alphonsa Thomas et al, Nonpharmacological management of sleep disturbances after traumatic brain injury, *NeuroRehabilitation* (2018). DOI: [10.3233/NRE-182535](https://doi.org/10.3233/NRE-182535)

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