

# Obstructive Sleep Apnea and Traumatic Brain Injury

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<https://msktc.org/tbi/factsheets>

TBI Factsheet

This factsheet explains OSA for persons with TBI, including signs for and diagnosis and treatment of OSA.

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The Traumatic Brain Injury Model System Program is sponsored by the National Institute on Disability, Independent Living, and Rehabilitation Research, Administration for Community Living, U.S. Department of Health and Human Services. (See <https://msktc.org/tbi/model-system-centers> for more information).

## What Is Obstructive Sleep Apnea?

Obstructive sleep apnea (OSA) is a common breathing disorder during sleep. With OSA, tissues in the back of the throat block the flow of air from the nose and mouth to the lungs. The blockage reduces the amount of oxygen getting into blood cells and to the brain. As a result, sleep is disturbed, and people don't get the health benefits (physical, emotional, and cognitive) of good sleep.



## What Are the Signs of OSA?

The most common signs of OSA are

- Excessive daytime sleepiness
- Loud or frequent snoring
- Silent pauses in breathing
- Choking or gasping sounds during sleep
- Feeling unrefreshed after 7–8 hours of sleep
- Headaches in the morning
- Insomnia
- Difficulty concentrating, focusing, or sustaining attention
- Memory problems
- Decreased sexual interest
- Waking up at night to urinate
- Irritability, anxiousness, and depressed mood

OSA has been found to be common after traumatic brain injury (TBI), whether the TBI is mild or severe. This is likely due to some incoordination of the throat muscles associated with the brain injury. Since some of the signs of OSA like memory problems are to be expected after TBI, health care providers might not always consider OSA. And people with TBI may **not** complain about their sleep problems. The first clue may be family members telling them that they are snoring.

Living with untreated OSA for a long time can worsen several conditions, for example,

- High blood pressure (hypertension)
- Blood sugar (diabetes)
- Heart disease
- Risk of stroke
- Depression
- Cognitive problems



Poor sleep over a long time can make depression and memory worse. This can change behavior, like leading people to become more irritable. These symptoms can result in poor function at work and school, increase the risk for accidents, and increase family stress. Because problems with thinking are common with OSA, children with OSA may perform poorly at school and be mislabeled with Attention Deficit Hyperactivity Disorder. Children with OSA may also wet their beds at night more often than children without OSA.

## How Is OSA Diagnosed?

Concerns about sleep problems should be discussed with your primary or rehabilitation doctor who can refer you for specialty screening with a sleep clinic. Doctors use tools to screen for OSA. The tools may include questions designed to identify persons at risk for OSA. For example, the STOPBANG questionnaire (See Table below) and Multi-Apnea Prediction Index help doctors to identify persons at risk for OSA after TBI.



There are common things that increase your risk of OSA: middle aged and older men with larger neck sizes, certain ranges of height and weight, high blood pressure or relatives with OSA.

Doctors may order a sleep study based on their assessment of symptoms and level of risk for OSA. A sleep study can be done at home or in a sleep laboratory. The study records heart rate, breathing and oxygen levels, and brain waves while the person sleeps.

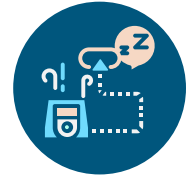
STOP-BANG Sleep Apnea Questionnaire		
STOP		
Do you <b>SNORE</b> loudly (louder than talking or loud enough to be heard through closed doors)?	Yes	No
Do you often feel <b>TIRED</b> , fatigued, or sleepy during the daytime?	Yes	No
Has anyone <b>OBSERVED</b> you stop breathing during your sleep?	Yes	No
Do you have or are you being treated for high blood <b>PRESSURE</b> ?	Yes	No
BANG		
Body Mass Index (BMI) more than 35 kg/m <sup>2</sup> ?	Yes	No
Age over 50 years old?	Yes	No
<b>NECK</b> circumference > 16 inches?	Yes	No
<b>GENDER</b> : Male?	Yes	No
High risk of OSA: Yes 5–8 Intermediate Risk of OSA: Yes 3–4 Low Risk of OSA: Yes 0–2 If you suspect you may be at risk for OSA, seek a medical profession.		

Chung, F., Yegneswaran, B., Liao, P., Chung, S. A., Vairavanathan, S., Islam, S., Khajehdehi, A., & Shapiro, C. M. (2008). STOP questionnaire: A tool to screen patients for obstructive sleep apnea. *Anesthesiology*, 108(5), 812–21. Reprinted with permission.



## How Is OSA Treated?

The severity of OSA determines the treatment options. Doctors will tailor a treatment program to best meet the needs of each person with OSA.



Treatment may include

- **Positive Airway Pressure machines** (Continuous Positive Airway Pressure-**CPAP**; Automatic Positive Airway Pressure - **APAP**). These machines keep a person's airway inflated with moist air to prevent a blocked airway while he or she sleeps at night. The CPAP delivers air through a mask that is placed over a person's nose and mouth or just over the nose while he or she sleeps.
- Persons with mild to moderate OSA may be treated with a **mandibular advancement device** (which looks a little like a top and bottom dental retainer). This device keeps the lower jaw (also called the man-di-bu-la) from falling backwards when you sleep and so helps to keep the airway open. Mandibular advancement devices (or MAD) are different from retainers or dental guards.
- **Lifestyle changes** may also lessen the symptoms of OSA. Lifestyle changes include weight loss, quitting smoking, not drinking alcohol, and good control of allergies.
- Some people experience OSA only when sleeping on their backs. **Special belts** can be used to help persons avoid that position while sleeping.
- **Surgical therapies** may be an option for some. This usually involves trimming some of the extra tissue at the back of the throat which can block air flow during sleep or implanting a neurostimulator device that keeps the throat tissues from blocking the airway.



To learn more about OSA, visit:

- American Academy of Sleep Medicine: <http://sleepeducation.org/>
- National Sleep Foundation: <https://www.sleepfoundation.org/>
- American Academy of Dental Sleep Medicine: <https://aadsm.org/>
- VA TBI Model Systems/IMAP Newsletter, Spring 2019: <https://www.polytrauma.va.gov/PolytraumaCenterDatabase/publications/NewsletterIssue07.pdf>
- IMAP/TBI Model Systems Newsletter, Spring/Summer 2016: <https://www.polytrauma.va.gov/PolytraumaCenterDatabase/publications/NewsletterIssue04.pdf>



## Authorship

*Obstructive Sleep Apnea After Traumatic Brain Injury* was developed by Kathleen Bell, M.D., Brian D. Greenwald, M.D., and Risa Nakase-Richardson, Ph.D., FACRM, in collaboration with the Model Systems Knowledge Translation Center

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**Disclaimer:** This information is not meant to replace the advice of a medical professional. You should consult your health care provider regarding specific medical concerns or treatment. The contents of this factsheet were developed under grants from the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR grant numbers 90DP0082 and 90DPKT0009), and Patient-Centered Outcomes Research (PCORI grant number CER-1511-33005). NIDILRR is a Center within the Administration for Community Living (ACL), Department of Health and Human Services (HHS). The contents of this factsheet do not necessarily represent the policy of NIDILRR, PCORI, ACL, or HHS, and you should not assume endorsement by the federal government.

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