

# All About Sleep Apnea: A Guide to Diagnosis and Treatment



## What is Obstructive Sleep Apnea?

*Obstructive Sleep Apnea (OSA)* is a common but under-diagnosed breathing disorder that occurs during sleep. It is caused when the upper airway- the portion between the back of the nose and the voicebox - collapses, blocking air from reaching the lungs. Because the muscles that hold our upper airway open are less active when we are asleep, almost everyone experiences some decrease in airflow during sleep. For example, loud snoring is often associated with limited airflow. However, some people experience blockage in the airway during sleep, and temporarily stop breathing or breathe inadequately for repeated periods of time. When this occurs the individual has Obstructive Sleep Apnea.

## What are the symptoms of OSA?

The most common symptom of OSA is loud snoring. Snorers may not realize that they have difficulty breathing at night unless there is someone listening to them who can tell them that they snore, or sound like they're holding their breath. Having someone to watch and listen to you sleep can be very helpful. If a bed partner witnesses that you stop breathing, it is a warning that you may have Obstructive Sleep Apnea. Loud snoring can affect the bed partner's ability to get a good night sleep as well!

The next most common symptom is sleepiness during the day. Each time the OSA patient fails to breathe they must awaken sufficiently to get a breath and their sleep is interrupted. Patients may develop sleepiness so slowly over the years that they "forget" what normal alertness is like. Many patients with severe sleep apnea are unable to reach a sleep state that allows them to dream. *Other* people can be affected by severe sleepiness, as well: Patients with severe OSA are 2-7 times more likely to have a motor vehicle accident creating additional OSA victims!

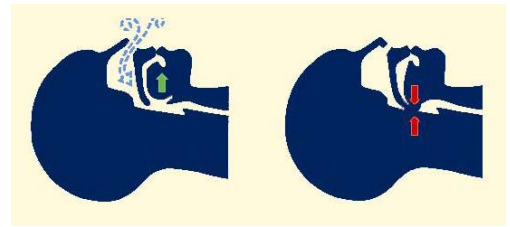
Other symptoms of OSA include dry mouth, sore throat, or headaches in the morning. Some patients suffer from impotence or having to use the restroom several times during the night. Others have restless sleep or night sweats. Depression, irritability, morning confusion, and inability to think clearly have all been linked to OSA.

## What effect does Obstructive Sleep Apnea have on your health?

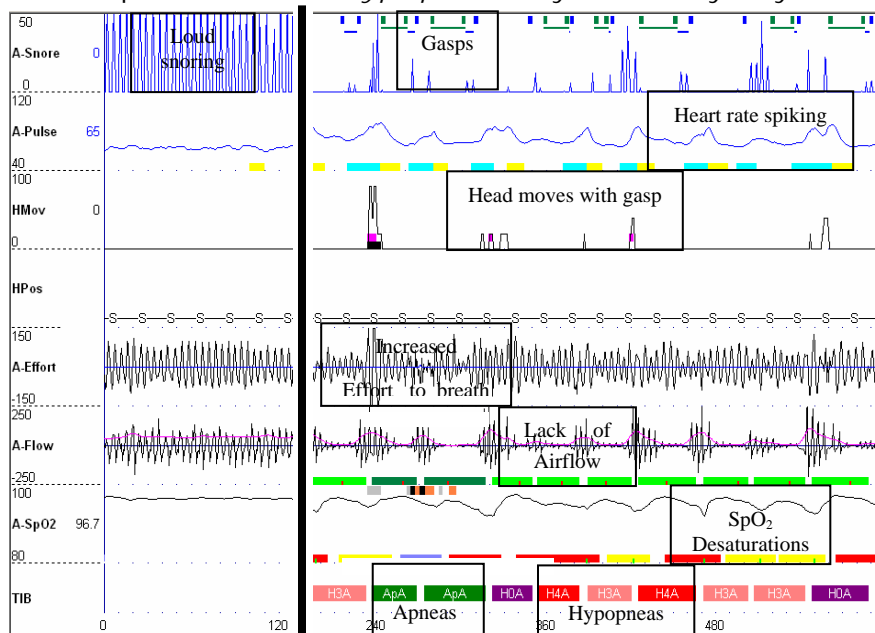
Abnormal breathing during sleep can lead to permanent problems with your heart or blood vessels. With untreated OSA, you're 2.5 times more likely to have high blood pressure (hypertension) and 3.9 times more likely to have congestive heart failure, even if you are not obese. Having OSA doubles the chance that you'll have a heart attack and stroke. OSA contributes to sexual impotence, increases risk of depression by 40% and is associated with an increased likelihood of having diabetes. People with severe OSA have twice the chance of dying during sleeping hours than those without OSA. A patient with OSA who remains untreated may die up to 10 years sooner than a patient who is treated for OSA.

## What causes Obstructive Sleep Apnea?

OSA occurs in individuals whose upper airway is narrower or more collapsible than normal. The most common cause of this airway abnormality is obesity. Having a large neck (men: greater than 16.5 inches around, women: greater than 15 inches around) increases your risk for OSA, because it narrows the airway. In small children, large tonsils are the most common cause of OSA. For some people with smaller jaws, OSA can also be more common. The drawing below shows the airway of a healthy individual (left) and an OSA patient (right). During sleep the healthy patient is breathing normally without blockage, but the OSA patient's upper airway is obstructed, with the arrows showing the blockage.



When your brain is given the choice between sleeping and breathing, it always picks breathing. So with obstructed breathing, your brain's response is to wake up. These awakenings are very brief and often are not remembered unless you wake up choking. Your throat muscles respond to your brain's message to wake up, you begin breathing again, your blood oxygen levels return to normal, and then you fall back asleep. If your airway partially closes and then you wake up, it is called a *hypopnea*. If your airway fully closes, it is called an *apnea*.



A sample of a sleep study is presented above. The signals to the left side of the recording show really loud snoring (A-snore) but are not associated with obstructed breathing. The signals to the right are typical for someone with OSA. There is no snoring (A-snore) when the patient stops breathing but the recording shows gasps each time breathing starts again. The heart rate spikes when the brain wakes the patient up to breath (A-Pulse). There is head movement when the patient gasps for air (HMov). There is an increased effort to breathe (A-effort) while the airflow decreases (A-Flow) as a result of the obstruction. The lack of breathing results in a decrease in oxygen saturation (A-SpO2). These patterns identify obstructive breathing events. When added together and divided by the measured or estimated sleep time, an Apnea/Hypopnea Index (AHI) is determined. If you have mild OSA, the AHI or number of obstructive breathing per hour ranges from 5 to 20 events per hour. For moderate OSA, between 20 and 40 events per hour and for severe OSA, more than 40 times per hour. Persons with OSA commonly experience more apnea events when they are sleeping on their back (sleeping *supine*) than when they're sleeping on their side (sleeping *laterally*).

## Legal considerations for CDL holders with possible OSA?

The DOT guidelines require that CDL holders be screened for OSA and if diagnosed, treated because OSA can cause extreme daytime drowsiness. While truck collisions occur for a variety of reasons and many do not involve the carelessness of the driver, if a collision is caused by a driver who is both drowsy and aware of the drowsiness, then it is likely the driver will be held responsible for the injuries and damages caused by the accident. Because a drowsy truck driver is dangerous and creates a risk for the driver and others, an accident caused by drowsiness can result in criminal charges with accompanying consequences. In a recent case, a driver was convicted of involuntary manslaughter because he became drowsy, knowingly continued to drive, and killed a construction worker. Three months after the accident he was diagnosed with OSA. In another case, a driver is being tried for involuntary manslaughter because he allegedly caused an accident killing two people after he had ignored a physician's recommendation to be tested for OSA, and failed to disclose his physician's recommendation at the time of his recertification physical.

## How to find out if you have OSA?

If you've completed the ARES Screener and you were identified as possibly having OSA you should undergo a sleep study. You may be recommended for an ARES sleep study in your home or a laboratory sleep study. The Unicorder (left) is designed for you to wear during sleep for two-nights, in your own home. During your study, the ARES Unicorder will record the signals needed to diagnose Obstructive Sleep Apnea (see sample above).



When your study is completed a physician will review the signals and if you have OSA, make a recommendation for treatment based on the severity. As part of an ARES study, you will be provided a Patient Report which lists information about your study and OSA severity. You should also provide a Physician Report to your Primary Care Physician.

## What can influence OSA severity?

If you gain or lose significant weight or your neck size changes, your OSA severity can change. If you drink alcohol prior to sleep, your snoring will be louder and OSA will be worse. If you have positional sleep apnea and you avoid sleeping on your back, your OSA severity will decrease. If you're a woman, your OSA severity will increase after menopause. If you are prescribed a sedative, sleeping pill or narcotic (opiate), your OSA severity may increase.

## If I have OSA, what are my treatment options?

**CPAP Treatment for OSA:** Nasal *Continuous Positive Airway Pressure*, or CPAP, is the most common and effective treatment for OSA. If you have a Commercial Driver's License and have an apnea/hypopnea index greater than 30, you must be treated with CPAP. In this treatment, the patient wears a mask over the nose during sleep. When the mask is worn, air continuously flows into the nose and throat to keep the airway open. The air pressure is adjusted so that it is just enough to prevent the throat from collapsing during sleep. The CPAP eliminates a person's snoring, gasping, and choking during the night. The CPAP prevents airway closure while it is worn, but apnea episodes will return when CPAP is stopped or if it is used improperly. In other words, CPAP doesn't "cure" or prevent you from having OSA when you're *not* wearing the mask. With successful CPAP treatment, patients may experience

improvements in alertness and memory, mood and energy, job performance, quality of life, and/or weight loss.

Different types of CPAP devices and features are used to treat OSA:

- **Fixed CPAP:** Delivers a constant pressure of air through your nose throughout the night. The amount of treatment pressure is determined after the patient spends the night in a sleep lab or after wearing an Automated CPAP for several nights.
- **Automated CPAP:** Automatically adjusts pressure on a breath-by-breath basis and eliminates the need to a sleep lab to determine the pressure setting. Because the CPAP pressure is adjusted automatically, the pressure is usually lower and may be more comfortable for some patients.
- **Heated Humidifier:** Adds moisture to the air that as it flows to the mask. This prevents the sinus and upper airway from becoming too dry, and allows greater comfort for the patient using CPAP. A physician prescription is usually required to obtain "heated humidification."
- **Masks:** All CPAP devices use a mask to transmit air through your nose. There are two common types of masks, a "nasal mask" (upper) and "nasal pillow" (lower). Your facial structure will determine which mask works best for you, so you may need to try different types to ensure the best fit. Your medical insurance will usually reimburse you for a replacement mask and hose every six months. If you find that the CPAP is not comfortable or is not working for you, inform your primary care physician immediately so other treatment options can be considered.



**Mandibular Advancing Devices (MAD) - Oral Appliance:** are becoming more popular for treating Obstructive Sleep Apnea. A MAD works best for patients with mild to moderate OSA



and for patients who experience OSA mostly when sleeping on their backs. These devices are worn in the mouth, much like retainers or sport protectors. They are designed to keep the mandible (jaw) and/or tongue in a forward position that allows your airway to remain open. A MAD is custom-made to fit your mouth, and is adjusted until your OSA is resolved.

Once your MAD is fitted properly, a follow-up ARES Sleep Study should be performed to confirm that the device is working and is adjusted properly.

**Surgical Procedure:** The most common surgical procedure is called Uvulopalatopharyngoplasty or UPPP. The procedure increases the width of the airway at the throat opening, removes tonsils and other excess tissue, and "squares off" the palate. UPPP is often an invasive procedure that typically requires general anesthesia and an overnight hospital stay. However UPPP done with a laser can be an out-patient procedure. It generally requires three to five separate treatments, as only a small amount of tissue may be removed at a time. UPPP does not address obstructions occurring at the base of tongue. The success of UPPP is limited, and when considering this surgery a person should have expert evaluation.

New surgical procedures are currently being developed. Recommendations about these should be made by a sleep medicine specialist in conjunction with an Ear, Nose and Throat (ENT) specialist. A follow-up ARES sleep study should be performed is needed to evaluate the success of any surgical treatment for snoring or OSA.