



Patient education: Sleep apnea in adults (Beyond the Basics)

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INTRODUCTION

Normally during sleep, air moves in and out through the nose, throat, and lungs at a regular rhythm with the upper airway open enough to not interrupt sleep. In a person with sleep apnea, air movement is periodically reduced or stopped. There are two types of sleep apnea, obstructive sleep apnea and central (nonobstructive) sleep apnea; some forms of apnea involve both types (a "mixed" apnea). For both types of sleep apnea, there is a reduction in breathing that starts the apnea. In obstructive sleep apnea, breathing becomes abnormal because of narrowing or closure of the throat. In central sleep apnea, breathing is abnormal because of a change in the breathing control and rhythm, but the airway remains open.

Sleep apnea is a serious condition that can affect sleep satisfaction and quality, alertness and efficiency while awake, and the ability to safely drive a motor vehicle; it can also impact long term health. Approximately 25 percent of adults are at risk for sleep apnea of some degree [1]. Males are more commonly affected than females, but after menopause it is more equal. Other risk factors include middle and older age, being overweight or obese, and having a small mouth and throat.

This topic review focuses on the most common type of sleep apnea in adults, obstructive sleep apnea (OSA).

HOW SLEEP APNEA OCCURS

The throat is surrounded by muscles that control the airway for speaking, swallowing, and breathing. These muscles hang from the skull and jaw and surround a flexible tube (the main airway that brings air to the lungs). During sleep, muscles are less active, which can cause the throat to narrow ([figure 1](#)). In most people, this narrowing does not affect breathing. In others, it can cause snoring, sometimes with reduced or completely blocked airflow ([figure 2](#)). A completely blocked airway without airflow is called an obstructive apnea. Partial obstruction with diminished airflow is called a hypopnea. A person may have both sleep apnea and hypopnea.

Insufficient breathing due to apnea or hypopnea results in falling oxygen levels and rising carbon dioxide levels. Because the airway is blocked, breathing faster or harder does not help to improve oxygen levels until the airway is reopened. Typically, the obstruction requires the person to briefly awaken to activate upper airway muscles. Once the airway is opened, the person then takes several deep breaths to catch up on breathing. As the person awakens, they may move briefly, snort, or loudly snore. Less frequently, a person may awaken completely with a sensation of gasping, smothering, or choking.

If the person falls back to sleep quickly, they will not remember the event. Many people with sleep apnea are unaware of their abnormal breathing in sleep, and all patients underestimate how often their sleep is interrupted. Awakening from sleep even for short periods makes sleep unrefreshing and produces a sense of fatigue and wake time sleepiness.

Some patients have OSA because of a small upper airway. As the bones of the face and skull develop, some people develop a small lower face, a small mouth, and a tongue that seems too large for the mouth. These features are largely genetically determined, which explains why OSA tends to cluster in some families. Obesity also increases the risk of airway closure. Tonsil enlargement can be an important cause, especially in children. While these factors increase the risk of apnea during sleep, they are not likely to cause noticeable symptoms or problems while the person is awake.

SLEEP APNEA SYMPTOMS

Symptoms — The major symptoms of OSA are loud snoring, fatigue, and feeling sleepy during the day (or whenever the person is normally awake). However, some people have no symptoms. For example, if the person does not have a bed partner, they may not be aware of the snoring. Fatigue and sleepiness have many causes and are often attributed to overwork and increasing age. A person may dismiss such symptoms as aging or excessive work stress. A bed partner or spouse often prompts the person to seek medical attention (eg, for pauses, snorts, and snoring during sleep).

Other symptoms may include one or more of the following:

- Restless sleep
- Awakening with choking, gasping, or smothering
- Morning headaches, dry mouth, or sore throat
- Waking frequently to urinate
- Awakening unrested, groggy
- Low energy, difficulty concentrating, memory impairment

Risk factors — Certain factors increase the chance of having sleep apnea.

- Increasing age – OSA occurs at all ages, but it is more common in middle and older age adults.
- Male sex and hormones – OSA is twice as common in males as females, especially in middle aged males and in those on replacement hormones.
- Obesity – The more obese a person is, the more likely they are to have OSA.
- Sedation from medication or alcohol – These reduce breathing and prevent awakening during sleep, and can lengthen periods of apnea (no breathing), with potentially dangerous consequences.
- Abnormality of the airway that narrows it (eg, large tonsils). (See '[How sleep apnea occurs](#)' above.)

SLEEP APNEA HEALTH CONSEQUENCES

Complications of sleep apnea can include reduced alertness, difficulty concentrating, and sleepiness. These consequences increase chances of crashes, accidents, and errors. Studies have shown that people with severe OSA are more than twice as likely to be involved in a motor vehicle accident as people without sleep apnea. People with OSA are encouraged to recognize this risk and discuss options for driving, working, and performing other high-risk tasks with a healthcare provider.

In addition, people with untreated OSA may have an increased risk of or difficult control of cardiovascular problems, such as high blood pressure, heart attack, abnormal heart rhythms, or stroke [2]. This risk may be due to changes in the heart rate and blood pressure that occur during sleep.

SLEEP APNEA DIAGNOSIS

The diagnosis of OSA and a plan to manage it is best made by a knowledgeable sleep medicine specialist who has an understanding of the individual's health issues. The diagnosis is usually based upon the person's medical history, physical examination during wakefulness, and then testing, including:

- A complaint of snoring and ineffective sleep
- Neck size (greater than 17 inches in males or 16 inches in females) is associated with an increased risk of sleep apnea
- A small upper airway: difficulty seeing the throat because of a tongue that is large for the mouth
- High blood pressure, especially if it is resistant to treatment
- If a bed partner has observed the patient during episodes of stopped breathing (apnea), choking, or gasping during sleep, there is a strong possibility of sleep apnea

An overnight sleep study is called a polysomnogram. The polysomnogram measures the breathing effort and airflow, blood oxygen level, heart rate and rhythm, duration of the various stages of sleep, body position, and movement of the arms/legs.

At-home devices can monitor breathing, oxygen saturation, position, and heart rate, but not sleep itself. Home monitoring is a reasonable alternative to conventional testing in a sleep laboratory if the clinician strongly suspects moderate or severe sleep apnea and the patient does not have another sleep disorder or disability that may interfere with interpretation of the results.

SLEEP APNEA TREATMENT

The goal of treatment is to maintain an open airway during sleep. Effective treatment will eliminate sleep arousals and reduced oxygen levels; long-term health consequences are also reduced. Medical treatments require nightly use. The challenge for the clinician and the patient is to select an effective therapy that is appropriate for the patient's problem and acceptable for long term use.

Continuous positive airway pressure — The most effective predictable, and commonly used treatment for sleep apnea uses air pressure from a mechanical device to keep the upper airway open during sleep. A continuous positive airway pressure (CPAP) device ([figure 3](#)) uses an air-tight attachment for the nose, typically a mask, connected to a tube and a blower that generates the pressure [3]. Devices should fit comfortably into or over the nasal opening, or over the nose or nose and mouth. CPAP should be used any time the person sleeps (day or night).

The CPAP device can be started in the sleep lab, where a technician can adjust the pressure and select the best equipment to keep the airway open. Alternatively, an "auto" device with a self-adjusting pressure feature, provided with proper education and training, can get treatment started without another sleep test and can occur at home. CPAP devices are now relatively quiet, and having a comfortable mask fit is key, but most people will accept the treatment if it improves their symptoms. However, difficulty with mask comfort and/or nasal congestion result in a reduction of regular use to only 50 percent of people after two years.

Continued follow-up with an experienced provider helps adjust treatment and encourage use. Information from the CPAP device is often used by you, physicians, therapists, and insurers to track the success of treatment. CPAP can be delivered with different features to improve comfort and solve problems that may come up during treatment. Changes in treatment may be needed if symptoms do not improve or if the person's condition changes, such as a gain or loss of weight.

Behavior and lifestyle changes — Most people with OSA can benefit from certain behavior changes.

Changing sleep position — Adjusting sleep position (to stay off the back) may help improve sleep quality in people who have OSA when sleeping on the back. However, this is difficult to maintain throughout the night and is rarely an adequate solution.

Weight loss — Weight loss is very helpful for people who are obese or overweight. Weight loss by any means (dietary changes, exercise, medication, surgical treatment) is equally effective. However, it can be difficult to maintain weight loss; the five-year success of nonsurgical weight loss is only 5 percent, meaning that 95 percent of people regain lost weight. (See "[Patient education: Losing weight \(Beyond the Basics\)](#)".)

Avoiding alcohol and other sedatives — Alcohol can worsen sleepiness, increasing the risk of accidents or injury. People with OSA are often counseled to drink little to no alcohol, even during the daytime. Similarly, people who take anti-anxiety medications or sedatives to sleep should speak with their healthcare provider about the impact of these medications on sleep apnea.

If you have OSA, you will need to notify other healthcare providers, including surgeons, about your condition and the potential risks of being sedated. People with OSA who are given perioperative anesthesia and/or pain medications require special management and close monitoring to reduce the risk of a blocked airway.

Other treatments — While behavioral changes and CPAP are typically recommended as initial therapy for people with OSA, other treatments may be used in some situations.

Oral and other devices — An oral appliance (or "mandibular advancement device") can reposition the jaw, bringing the tongue and soft palate forward to relieve obstruction in some people [4].

Oral appliances work very well to reduce snoring, although the effect on OSA is sometimes more limited [4]. As a result, they are best used for mild cases of OSA when relief of snoring is the main goal. While oral appliances are not as effective as CPAP for OSA, they may be an alternative for people who cannot tolerate (or choose not to have) CPAP. Side effects of oral appliances are generally minor but may include changes to the bite with prolonged use.

Other devices that aim to reduce snoring and improve sleep are also available over the counter or by prescription. These include strips that are placed over the nose or nostrils with the goal of helping keep the airway open. While some people find these devices helpful, there is limited evidence for their efficacy in treating sleep apnea. If you are interested in trying one of these devices, be sure to read all labels and instructions carefully, and discuss it your health care provider first.

Upper airway surgery — Surgery is an alternative for those who cannot tolerate or do not improve with nonsurgical treatments. Surgery can also be used in combination with other nonsurgical treatments.

The most common nonanatomic surgical approach uses nerve stimulation to prevent the upper airway from closing during sleep. This is known as "hypoglossal nerve stimulation." It is being increasingly used in people with mild to moderate sleep apnea, indicated for those in whom CPAP has been unsuccessful or is not tolerated.

Surgical procedures reshape structures in the upper airways or surgically reposition bone or soft tissue. Uvulopalatopharyngoplasty (UPPP) removes the uvula and excessive tissue in the throat, including the tonsils, if present. Other extensive procedures, such as maxillomandibular advancement (MMA), address both the upper and lower pharyngeal airway.

UPPP alone has limited success rates (less than 50 percent) and people can relapse (when OSA symptoms return after surgery) [5]. As a result, this surgery is only recommended in a minority of people and should be considered with caution. MMA may have a higher success rate, particularly in people with abnormal jaw (maxilla and mandible) anatomy, but it is a complicated procedure.

Tracheostomy creates a permanent opening in the neck. It is reserved for people with severe disease in whom less drastic measures have failed or are inappropriate. Although successful in eliminating obstructive sleep apnea, tracheostomy requires significant lifestyle changes and carries some serious risks (eg, infection, bleeding, blockage).

All surgical treatments require discussions about the goals of treatment, the expected outcomes, and potential complications.

WHERE TO GET MORE INFORMATION

Your healthcare provider is the best source of information for questions and concerns related to your medical problem.

This article will be updated as needed on our web site (www.uptodate.com/patients). Related topics for patients, as well as selected articles written for healthcare professionals, are also available. Some of the most relevant are listed below.

Patient level information — UpToDate offers two types of patient education materials.

The Basics — The Basics patient education pieces answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials.

[Patient education: Sleep apnea in adults \(The Basics\)](#)

[Patient education: Sleep apnea in children \(The Basics\)](#)

[Patient education: Daytime sleepiness \(The Basics\)](#)

[Patient education: What is a sleep study? \(The Basics\)](#)

[Patient education: Good sleep hygiene \(The Basics\)](#)

[Patient education: How to use a PAP device \(The Basics\)](#)

Beyond the Basics — Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are best for patients who want in-depth information and are comfortable with some medical jargon.

[Patient education: Losing weight \(Beyond the Basics\)](#)

Professional level information — Professional level articles are designed to keep doctors and other health professionals up-to-date on the latest medical findings. These articles are thorough, long, and complex, and they contain multiple references to the research on which they are based. Professional level articles are best for people who are comfortable with a lot of medical terminology and who want to read the same materials their doctors are reading.

[Assessing and managing nonadherence with continuous positive airway pressure \(CPAP\) for adults with obstructive sleep apnea](#)

[Obstructive sleep apnea and cardiovascular disease in adults](#)

[Central sleep apnea: Risk factors, clinical presentation, and diagnosis](#)

[Central sleep apnea: Treatment](#)

[Clinical presentation and diagnosis of obstructive sleep apnea in adults](#)

Evaluation of suspected obstructive sleep apnea in children

Titration of positive airway pressure therapy for adults with obstructive sleep apnea

Obstructive sleep apnea: Overview of management in adults

Management of obstructive sleep apnea in children

Pathophysiology of upper airway obstruction in obstructive sleep apnea in adults

Mechanisms and predisposing factors for sleep-related breathing disorders in children

Oral appliances in the treatment of obstructive sleep apnea in adults

Evaluation and management of residual excessive sleepiness in adults with obstructive sleep apnea

Overview of polysomnography in adults

Home sleep apnea testing for obstructive sleep apnea in adults

Polysomnography in the evaluation of sleep-disordered breathing in adults

Upper airway imaging in obstructive sleep apnea in adults

The following organizations also provide reliable health information.

- National Library of Medicine

(www.nlm.nih.gov/medlineplus/healthtopics.html)

- National Heart, Lung, and Blood Institute

(www.nhlbi.nih.gov)

- American Academy of Sleep Medicine

(www.aasmnet.org)

- National Sleep Foundation

(www.thensf.org)

- American Sleep Apnea Association

(www.sleephealth.org)

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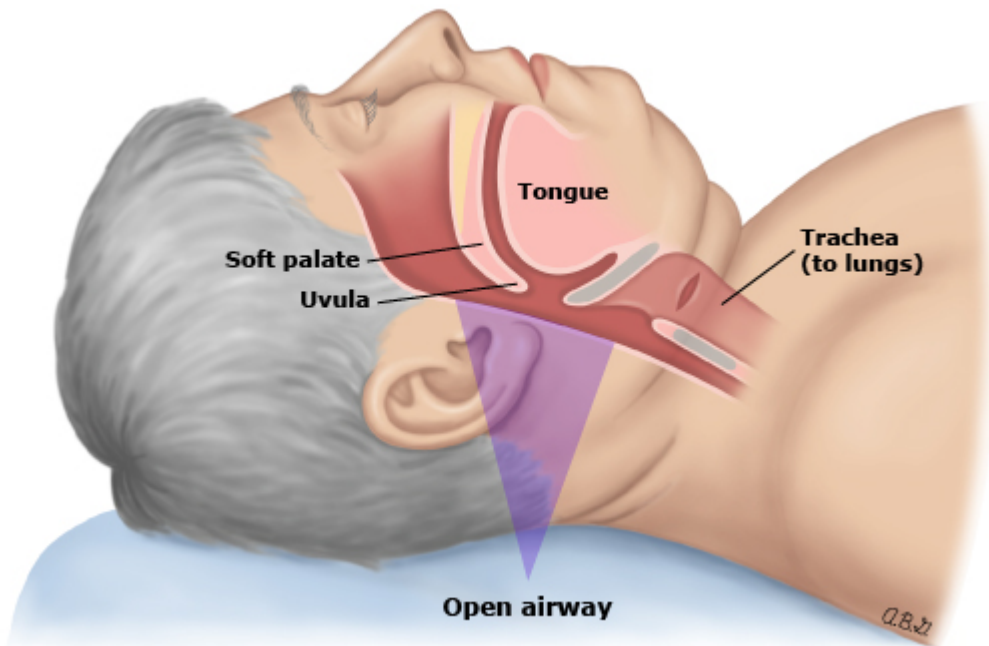
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Topic 7719 Version 36.0

GRAPHICS

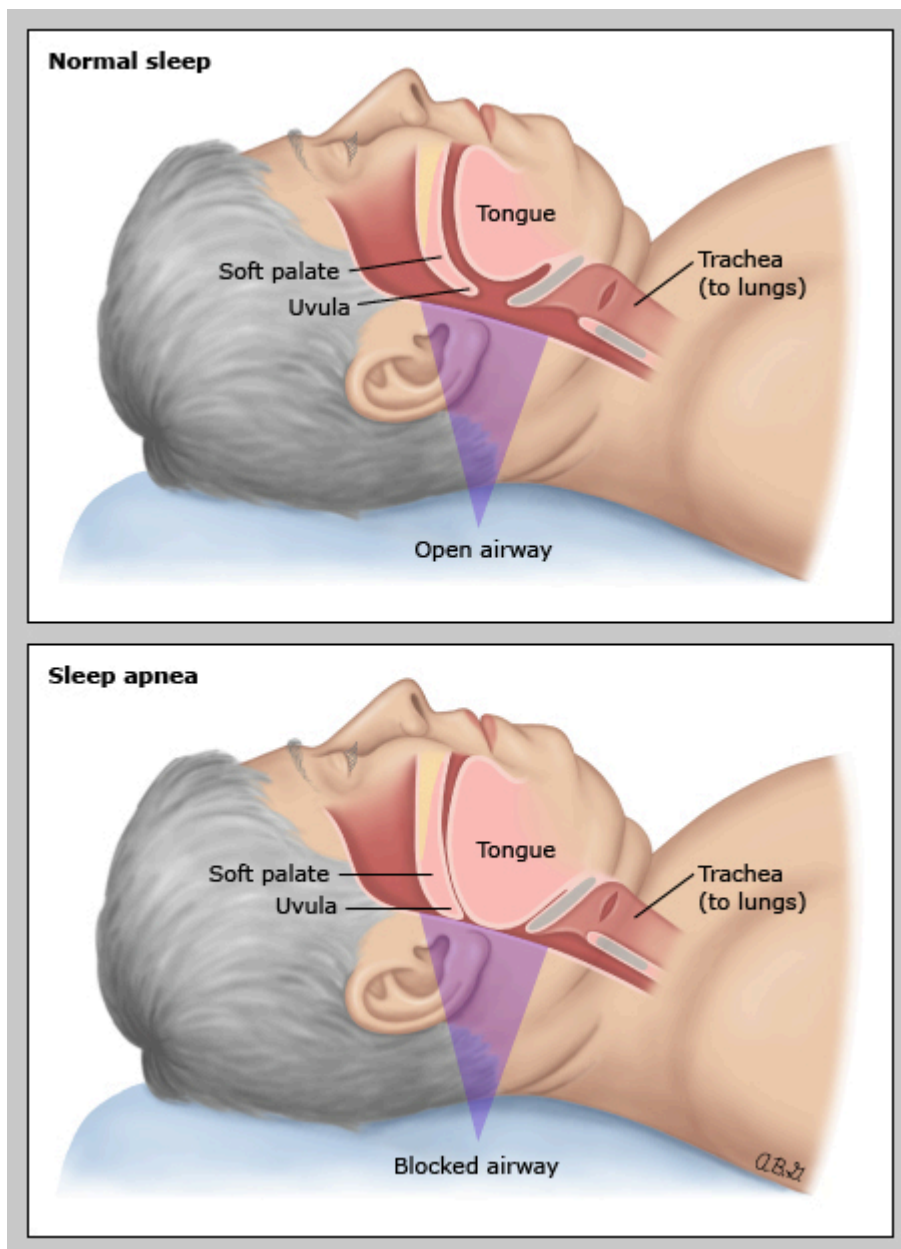
Normal airway during sleep



This figure shows how the tongue, uvula, and soft palate (which make up the upper airway) should normally look in a person who is sleeping.

Graphic 51217 Version 5.0

Airway in a person with sleep apnea



Normally, when a person sleeps, the airway remains open, and air can pass from the nose and mouth to the lungs. In a person with sleep apnea, parts of the throat and mouth drop into the airway and block off the flow of air. This can cause loud snoring and interrupt breathing for short periods.

Graphic 75747 Version 6.0

Continuous positive airway pressure (CPAP) for sleep apnea



The CPAP mask gently blows air into your nose while you sleep. It puts just enough pressure on your airway to keep it from closing. The mask in this picture fits over just the nose. Other CPAP devices have masks that fit over the nose and mouth.

Graphic 65324 Version 5.0

