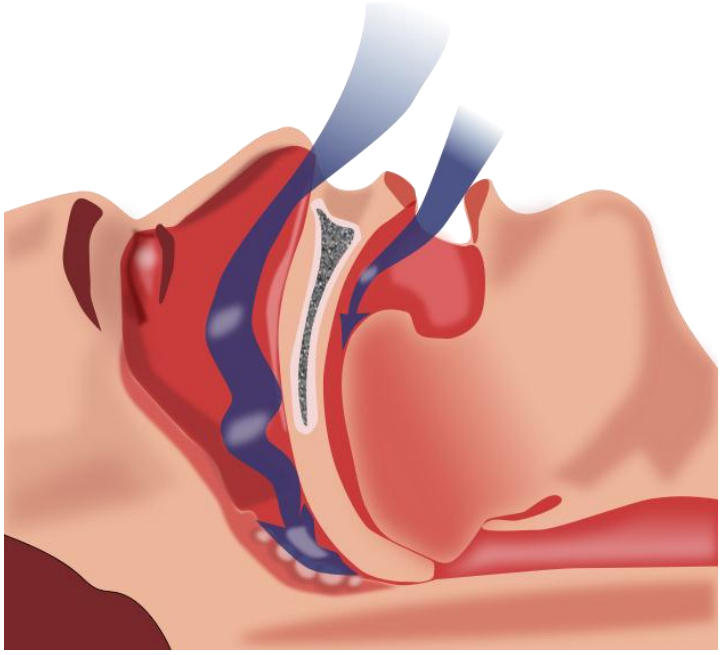
THE AVIISHA GUIDE TO OBSTRUCTIVE SLEEP APNEA



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Inspiring Health Champions

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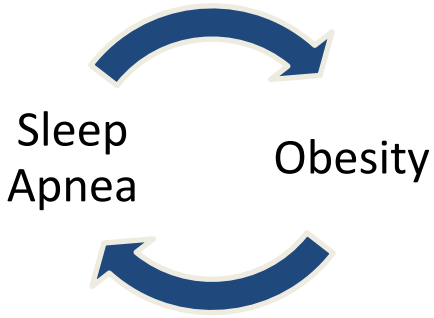
INTRODUCTION

The Obesity-Sleep Apnea Epidemic

It is estimated that at least 20 million Americans suffer from moderate-to-severe obstructive sleep apnea (OSA)and at least 1 in 5 Americans (60 million) has mild sleep apnea (Young et al. 2007). OSA is the second most common sleep disorder. In the US, referrals for sleep studies have increased 12-fold in the past 10 years (Lettieri 2009). It is estimated that 9% of middle-age women and 24% of middle-age men are affected by sleep apnea but are undiagnosed and untreated (Young et al. 1993). In individuals over 65, moderate-to-severe OSA has been found in 70% of men and 56% of women (Anocli-Israel et al. 1991).

Why is the prevalence of sleep apnea so high?

The answer has to do with obesity. OSA usually travels as a cluster alongside two other notoriously prevalent diseases: obesity and diabetes. These diseases reinforce one another and have immediate and long-term health consequences. According to the Centers for Disease Control and Prevention, approximately 65% of Americans are now overweight or obese and that number continues to climb. Obesity is currently the strongest risk factor for obstructive sleep apnea. The prevalence of OSA in obese men and women is estimated to be about 40% (Young et al. 2002). It is estimated that 70% of OSA sufferers are obese (Malhotra et al. 2002).



Despite its alarmingly high prevalence, OSA remains undiagnosed in approximately 92% of affected women and 80% of affected men (Young et al. 1997). These sufferers need both education *and* treatment.

The Aviisha Medical Institute

The Aviisha Medical Institute, LLC is tackling the health crisis facing America through education and treatment. We provide patients and physicians with up-to-date health information and the latest research on the current obesity and sleep apnea epidemic. We publish weekly articles, videos, newsletters, and webinars.

We also operate 2 full service sleep clinics in the Los Angeles area.

Finally, we created and operate the MD Home Sleep Program which empowers non-sleep physicians to treat sleep apnea in a way that is simple and inexpensive. The MD Home Sleep Program allows patients to get tested at home with the most advanced diagnostic tools available today. We also provide treatment and management services using state-of-the-art Auto-CPAP devices.

For more information or to get tested for sleep apnea, visit www.aviisha.com or call us at 877-634-7748.

WHAT IS SLEEP APNEA?

In This Chapter

What is sleep apnea? How is it defined? What are its symptoms?

Defining Sleep Apnea

Sleep apnea is a disorder characterized by complete or partial cessations of breathing during sleep. The interruptions in breathing, called apneas, can cause or exacerbate a host of other dangerous medical conditions.

The 3 Types of Sleep Apneas

There are three types of sleep apnea: central, obstructive, and mixed.

- In **central sleep apnea** (CSA), the brain fails to instruct the body to breath. The person *can* breathe, but doesn't.
- **Obstructive sleep apnea** (OSA) is far more common than central sleep apnea. In obstructive sleep apnea the upper airway repeatedly collapses during sleep, either completely or partially preventing air from reaching the lungs. During an obstructive sleep apnea event, the person cannot breathe even though they try to.
- **Mixed sleep apnea** is a condition where a person experiences both central and obstructive apnea.

Key Terms

Sleep apnea is a disorder characterized by complete or partial cessations of breathing during sleep despite effort to breathe.

Pauses in Breathing

The gaps in breathing occur between 5 to over 100 times per hour depending on the severity of the condition and typically last between 20 and 40 seconds. In some cases, breathing can even stop for up to two minutes at a time. During each lapse in breathing, oxygen levels in the blood drop.

When the brain registers the lack of oxygen in the body, it jolts the body to wake up. This reopens the airway but also interrupts sleep. A gasp or choking sound can often be heard as breathing resumes. The person will typically fall back asleep with no memory of being woken up which makes sleep apnea hard to recognize. The condition is typically identified by spouses or family members who notice heavy snoring and pauses in breathing.

Poor Sleep and Heart Problems

As a result of repeatedly being woken up throughout the night, the person fails to sustain deep sleep and may feel tired throughout the day. Over time, the heart also weakens because it endures stress every time the body is jolted awake. The combination of poor sleep and cardiovascular stress predisposes OSA patients to a litany of diseases including obesity, hypertension, stroke, memory problems, difficulty concentrating, mood disturbance, anxiety, and depression. Obstructive sleep apnea can be fully treated.

What Causes Sleep Apnea?

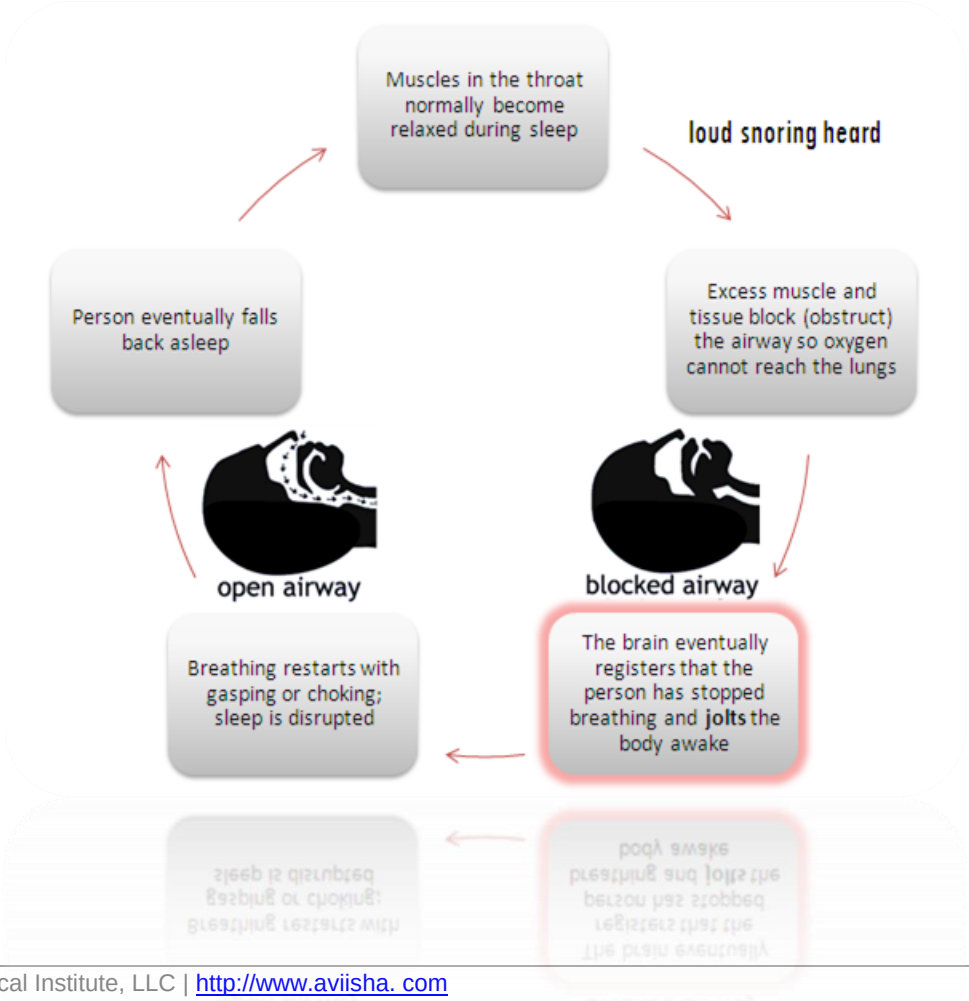
1. **Muscles in the body become relaxed during sleep.** This is a normal part of sleeping.

2. **When throat muscles relax, they can block the airway and prevent oxygen from entering the lungs.** People with OSA experience complete (or near-complete) blockages repeatedly throughout the night. When the obstruction is partial, snoring becomes louder as air struggles to pass in and out of the lungs. When the obstruction is complete, the person completely stops breathing and is silent. Several factors make obstruction more likely like genetics, obesity, and gender. Those factors are covered in the "Risk Factors" section.

3. **When the brain registers that the person has stopped breathing, it reacts by jolting the body.** This places stress on the cardiovascular system.

4. **The sleeper wakes up and throat muscles stiffen, removing the obstruction.** A gasp or choking sound can often be heard as the person begins to breathe again. Waking up disturbs sleep by preventing the sleeper from achieving deep sleep though the person rarely remembers waking up.

The Sleep Apnea Cycle



Symptoms of Sleep Apnea

The major symptoms of sleep apnea are:

- **Loud, persistent snoring.** Loud snoring is often followed by periods of silence when the airway is completely obstructed.
- **Unexplained or excessive daytime sleepiness.** People with sleep apnea are prone to dozing off while at work or driving or even during conversations.
- **Poor sleep.** Since the brain repeatedly jolts the body to wake up and resume breathing, sleep quality is disturbed throughout the night.
- **Witness apneas.** Bed partners of sleep apnea sufferers may see or hear pauses in breathing followed by choking sounds.

Key Term

Excessive daytime sleepiness is a condition that can be measured with the Epworth Sleepiness Scale. See page 16.

Other, often overlooked, symptoms include:

- Anxiety
- Depression
- Difficulty concentrating and completing tasks
- Diminished sex drive
- Forgetfulness
- Frequent urination at night (nocturia)
- High blood pressure (hypertension)
- Increased heart rate
- Insomnia
- Mood disturbance and severe irritability
- Morning headaches and at times uncontrolled migraine headaches
- Night sweats
- Sore throat or dry mouth in the morning caused by loud snoring
- Unexplained weight gain

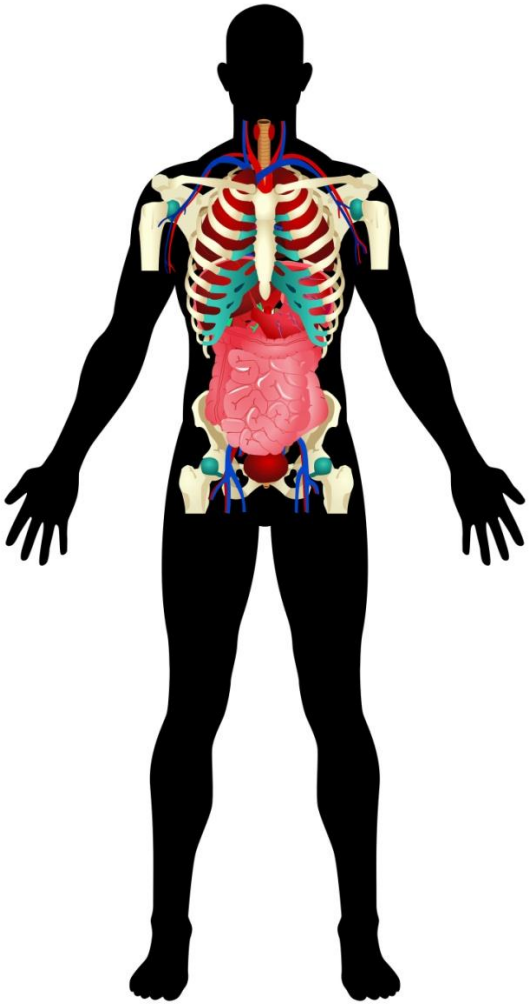
Individual with unexplained symptoms such as those described above should be evaluated for OSA.

Children with Sleep Apnea

Children with sleep apnea may exhibit hyperactivity, poor academic performance and hostile behavior. Bedwetting and unusual sleep positions are also seen in children with sleep apnea. It is not unusual for undiagnosed sleep apneic children to be misdiagnosed with Attention Deficit Disorder or Autistic Spectrum Disorder.

THE DANGERS AND COMPLICATIONS OF SLEEP APNEA

In This Chapter



Although sufferers and their partners often minimize their condition, sleep apnea carries a wide range of serious physical and psychological consequences when left untreated.

Immediate Consequences

The immediate consequences of untreated sleep apnea include:

- Chronic sleepiness, poor concentration, mood disturbance
- Hypertension (high blood pressure, heart failure, and stroke)
- Loud snoring and marital distress
- Apnea can even be fatal in and of themselves

Long-Term Complications

Some of the main complications of OSA include:

- Fatigue and Depression
- Memory and Concentration Impairment
- Obesity
- Heart Failure
- High Blood Pressure
- Arrhythmias
- Death
- Coronary Artery Disease
- Atrial Fibrillation and Stroke
- Asthma, Seizures, and Headaches
- Erectile Dysfunction (ED)
- Loud Snoring and Marital Complications

Fatigue and Depression

Reduced sleep quality leads to chronic sleepiness throughout the day. Sleepiness can affect quality of life, motivation, and raise one's risk of injury while at work or driving. People with sleep apnea are 2-3 times more likely to get into a car accident and 5-7 times more likely to get into multiple accidents. Untreated sleep apnea sufferers also have more irritability, moodiness, and depression. People with even mild sleep apnea are twice as likely to have depression as those without while those with moderate to severe sleep apnea are 2 to 6 times as likely to have depression.

Memory and Concentration

The absence of restful sleep can cause difficulty concentrating and memory disturbance, also known as cognitive impairment. These factors can affect job performance and productivity. Research has suggested that people with OSA show a loss of tissue in brain regions associated with memory which may cause irreversible memory loss.

Obesity

Sleep apnea and obesity feed on each other and create a deadly downward spiral of disease. Repeated arousals during sleep may result in insulin resistance and poor regulation of blood sugars. In addition, hormonal changes may increase the storage of fat and the increase appetite for high calorie foods, leading to further weight gain. Ninety percent of morbidly obese males and fifty percent of morbidly obese females have sleep apnea. CPAP (continuous positive airway pressure) treatment, the gold standard for treating OSA, has been shown to reduce insulin resistance and improve blood sugar control.

Heart Failure

Patients with moderate-to-severe sleep apnea have a greater risk of death from heart disease and heart failure. One third of patients with sleep apnea also show symptoms of congestive heart failure. Heart failure can be exacerbated by sleep apnea and leads to a greater chance of death. Between 11-37% of patients with heart failure have sleep apnea. It is strongly recommended that any new patient with congestive heart failure should be screened for sleep apnea.

High Blood Pressure

Sleep apnea is considered an identifiable cause of high blood pressure (hypertension) and is observed in 50-70% of patients. Sleep apnea has been identified as the most common cause of secondary hypertension in the US. As with congestive heart failure, it is recommended that all patients with newly diagnosed or difficult-to-control hypertension should be screened for sleep apnea.

Arrhythmias

Individuals with untreated sleep apnea are 2-4 times as likely to experience nocturnal complex arrhythmia (irregular heart rhythms that may be harmful). Bradyarrythmia (slower, irregular heart rhythm) is observed in 10% of patients and is commonly seen during apneic events. At times, patients may have pauses in their heartbeat lasting several seconds as a result of the apneas, requiring a pacemaker.

Death

People with untreated moderate to severe sleep apnea have an increased rate of all-cause mortality (death) which means they are more likely to die from any cause as compared to people without sleep apnea. In a study using patients with untreated moderate-to-severe sleep apnea, researchers found that the five-year risk of death was 14% in those who refused CPAP treatment compared to 4% in those receiving treatment. The 14-year risk of death was 33% compared with only 7% in those without sleep apnea. Furthermore, patients with severe sleep apnea are almost three times as likely to die from heart-related complications.

Coronary Artery Disease

There is a very strong, independent association between sleep apnea and coronary artery disease (CAD). Men with untreated severe sleep apnea have an increased number of fatal and non-fatal cardiovascular events (such as heart attack, stroke, and angina) which nearly normalize with treatment.

Atrial Fibrillation and Stroke

Atrial fibrillation and complex ventricular ectopy (abnormal heart beats) occur more frequently with OSA. Untreated obstructive sleep apnea doubles the risk of recurrence of atrial fibrillation**.** Patients with obstructive sleep apnea are more likely to have a stroke and die than those without sleep apnea. The risk of developing a stroke increases as the severity of the sleep apnea increases. A great majority of stroke patients have OSA and should be evaluated for the disease. Roughly 90% of stroke patients are found to have OSA.

Asthma, Seizures, and Headaches

Medical studies have shown that sleep apnea may exacerbate asthma symptoms and reduce the effectiveness of medication, underlining the need to evaluate in brittle asthmatics. Additionally, there may be an association between seizures and obstructive sleep apnea, especially in older adults. Some studies have shown treatment of obstructive sleep apnea, when present, may help in the control of seizures. Sleep disorders, including apnea, may be the underlying causes of some chronic headaches. In some patients with both chronic headaches and apnea, treating the sleep disorder has cured the headache, even the very severe and disabling ones known as a cluster headache. Recent literature has also linked OSA to morning headaches which can improve with treatment.

Erectile Dysfunction (ED)

Men with any degree of ED are more than twice as likely to have OSA as their counterparts. As ED worsens, the prevalence of OSA increases: OSA occurred in 59% in men with normal erectile function; 83% with moderate ED; and 88% with severe ED. The link may be due to sleep deprivation or hypoxemia (decreased oxygen in the blood) caused by sleep apnea. It is recommended that men with even mild ED be referred for a sleep evaluation.

Loud Snoring and Marital Distress

Sleep apnea is often accompanied by very loud snoring which can affect the quality of sleep of *their bed partners*. As a result, spouses or partners may also suffer from sleeplessness and fatigue. In some cases, the snoring can disrupt relationships, forcing couples to sleep apart and affecting intimacy. Diagnosis and treatment of sleep apnea can help alleviate these problems.

Comorbidities

The table below illustrates the prevalence of OSA found in people suffering with various other diseases. As you can see, OSA is associated with many other disease states.

Disease	Prevalence	Disease	Prevalence
Asthma	17%	Ischemic heart disease	38%
Atrial fibrillation	49%	Morbid obesity, female	50%
Congestive heart failure	76%	Morbid obesity, male	90%
Daytime sleepiness	87%	Nocturia	48%
Drug-resistant hypertension	83%	Pulmonary hypertension	77%
Dysrhythmias	58%	Stroke	90%
Gastroesophageal reflux disease	60%	Type 2 diabetes mellitus	15%
Hypertension	30%		

The image on the following page presents this data (and more) graphically.

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The Consequences of Obstructive Sleep Apnea

Obstructive sleep apnea afflicts 1 in every 5 Americans.
What other problems arise for OSA patients?

STROKE

90%

- Men with moderate to severe OSA were nearly 3x more likely to have a stroke.
- OSA is often found in patients following a stroke.
- Risk of stroke rises with severity of the disease.

POOR SLEEP*

58% 87%

MOOD DISTURBANCE

- **Depression**
- **Anxiety**
- Loss of motivation
- Shortened attention span
- Moodiness and bad temper
- Poorer judgment

DAYTIME SLEEPINESS

- **6-fold increased risk of car accidents**
- Impaired concentration and memory loss
- Reduced work-efficiency
- Reduced alertness
- Slower reaction time

STRESS ON THE HEART

HYPERTENSION

77%

- Sleep apnea is an identifiable cause of high blood pressure.
- OSA is the leading cause of secondary hypertension.

LOUD SNORING

80%

- **Relationship discord**
- Morning headaches caused by oxygen deprivation

CORONARY ARTERY DISEASE

25%

CARDIAC ARRHYTHMIAS

58%

- 4x as likely to have atrial fibrillation

DIABETES TYPE II

15%

- Lack of insulin control and poorly controlled blood sugars
- 58% have OSA

CONGESTIVE HEART FAILURE

76%

- Moderate OSA have increased mortality rates.
- New patients are screened for OSA.

OBESITY

61%

- As sleep shortens or diminishes in quality, appetite for high-calorie food increases.
- Obesity is the best documented risk factor for OSA. It is estimated that 90% of obese males and 50% of obese females have OSA.
- The prevalence of OSA increases with body mass index (BMI).
- Approximately 80% of OSA patients weigh 130% or more of their ideal body weight.

HEART DISEASE

38%

SUDDEN DEATH

30%

- OSA sufferers have a 30% higher risk of heart attack or premature death.

More than 50% of sudden deaths from OSA occur between 10 pm and 6 am.

GASTROESOPHAGEAL REFLUX DISEASE (GERD)

60%

MEDICAL COSTS

- Untreated sleep apnea costs Americans an extra 4.3 billion per year.
- Treated sleep apnea can halve a patient's healthcare costs.

Change in annual health care costs per patient after treating OSA:

$200,000

SEXUAL DYSFUNCTION

80% of middle-aged men

- Loss of libido
- Impotence

NOCTURIA

48%

- Frequent urination at night

Sources: Medscape, Pubmed.gov, BioMed Central

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* Many patients may not be aware of their poor sleep quality.

AM I AT RISK?

In This Chapter

What are the symptoms of OSA? What are some of the factors that predispose patients to OSA? What should you do if you realize you or your partner is at risk?

Risk Factors for Obstructive Sleep Apnea

- **Male gender.** Males, who typically have higher BMI than females, are three times as likely to have OSA.
- **Older age.** As muscles weaken with age, the chances of obstruction increase. Adults between 40 and 60 years old are at significantly greater risk for sleep apnea.
- **Obesity.** More than half of sleep apnea sufferers are overweight. It's believed that fat deposits narrow the airway, making it more susceptible to obstruction. Ninety percent of morbidly obese individuals suffer from sleep apnea. Large amounts of central body fat are also a risk factor.
- **A wide neck.** Wide necks are indicators of obesity. Men with neck circumferences 17" or great and women with neck circumferences of 16" or greater are at greater risk for sleep apnea.
- **High blood pressure.** Untreated hypertension increases one's chance of having sleep apnea.
- **Family history of sleep apnea.** Those with family members who have sleep apnea are 2-4 times as likely to have it themselves.
- **Enlarged tonsils or an enlarged tongue.** Both enlarged tonsils and tongues can block the airway more easily.
- **Small airways in the nose, throat, or mouth.** Small airways are easier to obstruct, and thus carry a greater risk of sleep apnea.
- **Nasal congestion.** Nasal congestion makes it more difficult for air to pass through to the lungs and can independently disturb sleep by creating physical discomfort.
- **Abnormal jaw.** Morphological features like recessed or small jaw suggest a narrow airway, leading to a higher probability of sleep apnea.
- **During pregnancy or after menopause.** Women during pregnancy and after menopause have a higher BMI and are more susceptible to obstructive sleep apnea. Women are three times more likely to have sleep apnea after menopause than before.
- **Race.** There is a greater incidence of sleep apnea in African American, Hispanic, Chinese, and Pacific Islander populations.
- **Sleep position.** Obstructive events are more likely when sleeping on one's back.
- **Use of alcohol or sedatives.** Alcohol and sedatives relax the muscles in the throat which makes them more likely to obstruct the airway.
- **Smoking.** Smoking can irritate the back of the throat and promote fluid retention, narrowing the airway. Individuals who smoke more than 2 packs a day at 40 times more likely to have sleep apnea.
- **Lower extremity edema.** Those with unexplained lower extremity edema are at a higher risk for obstructive sleep apnea.
- **Polycystic Ovary Syndrome (PCOS).** OSA, daytime sleepiness, and diabetes are all associated with PCOS.

Symptoms: The 3 S's

The easiest way to identify people at risk for sleep apnea is by the "3 S's":

- **S**noring that is persistent and loud
- **S**leepiness during the day that is unexplained
- **S**ignificant other's report of apneas.

Other symptoms include:

- Anxiety
- Depression
- Difficulty concentrating and completing a task
- Diminished sex drive
- Forgetfulness
- Frequent urination at night (nocturia)
- High blood pressure
- Increased heart rate
- Insomnia
- Mood disturbance and severe irritability
- Morning headaches and at times uncontrolled migraine headaches
- Night sweats
- Sore throat or dry mouth in the morning due to the irritated throat from the increased turbulence and snoring
- Unexplained weight gain

When should I see a doctor?

You should see your doctor when you notice any of the following symptoms:

- Persistent sleepiness throughout the day (mostly seen when you are watching a movie, driving a car, seating in the movie theater, reading a book, or even waiting for a doctor's visit)
- Impaired sleep quality (waking up tired after a full night of sleep; sleep that is not restorative)
- Observed apneas during sleep by your bed partner
- Waking up with choking or gasping as if you were being smothered
- High blood pressure and heart problems that are unexplained or uncontrolled by medication
- In children, behavioral problems or difficulty with concentration and school work

What will happen at the appointment?

If you believe you may be suffering from sleep apnea, you should schedule an appointment with your doctor as soon as possible. Ask your doctor if there is anything you should bring to your appointment. Some doctors may ask you to chart your sleeping patterns (how long, how many interruptions) and monitor your energy levels prior to the appointment. It is suggested that you bring your bed partner with you or even a recording of yourself snoring.
Your doctor will inspect you for physical features that increase the likelihood of having sleep apnea such as your body mass index (BMI), a large neck circumference, excessive abdominal fat, and an enlarged tongue or tonsils.

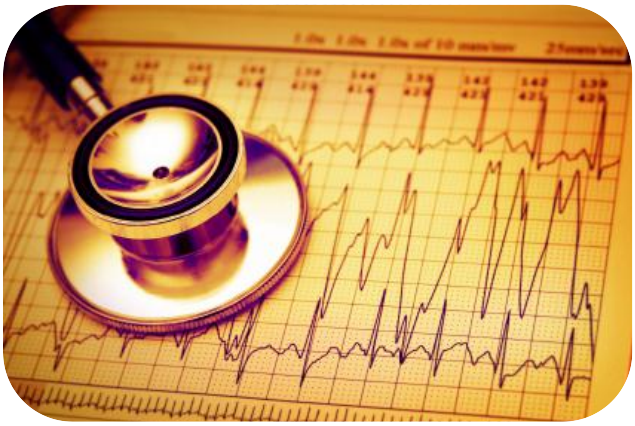
Your doctor will also ask you about your medical history and co-existent diseases. Your doctor may ask you to fill out a questionnaire like the STOP-BANG questionnaire, the Epworth Sleepiness Scale, or the Berlin questionnaire. You can access the questionnaires here. If your doctor determines that you are at risk for having sleep apnea, he or she will prescribe a sleep test to confirm the diagnosis.

Questions Your Doctor May Ask You

Below are some of the questions your doctor may ask you at your appointment. You can print this page, complete it, and bring it to your appointment to assist your doctor.

1. *Do you feel refreshed after sleep?*
2. *Do you sleep on your back or on your side?*
3. *Has your partner witnessed gaps in breathing, loud snoring, gasping, or choking?*
4. *Do you fall asleep as soon as you go to bed?*
5. *How frequently do you wake up to use the restroom?*
6. *Is there a history of sleep apnea in your family?*
7. *Are you taking any medication?*
8. *Do you ingest stimulants such as coffee or tobacco?*
9. *How frequently do you consume alcohol?*
10. *How many times a day do you experience bouts of tiredness?*
11. *Do you suffer with anxiety, depression, or irritability?*
12. *Do you have difficulty concentrating or remembering things?*
13. *Do you experience heartburn?*
14. *How often do you have morning headaches?*
15. *Is your sex drive diminished?*

Spotlight: Screening for OSA



Several screening tools have been developed by researchers to help physicians screen for sleep apnea. The most prominent tools are discussed below. *These tools should not be used as substitutes for diagnoses by a sleep test but are screening tools that may warrant further testing.*

The questionnaires below can be accessed online by going to http://www.aviisha.com/new/patients/epworth-sleepiness-scale.

- **The STOP-BANG Questionnaire.** The STOP-BANG Questionnaire is a validated questionnaire that is used to screen patients for sleep apnea.
- **The Berlin Questionnaire.** Like the STOP-BANG, the Berlin questionnaire was especially designed to screen for obstructive sleep apnea although scoring the Berlin questionnaire is a little more complicated than the STOP-BANG.
- **The Epworth Sleepiness Scale**. The Epworth Sleepiness Scale measures a patient's sleepiness throughout the day. The test examines the likelihood of dozing off or falling asleep in various situations.

DIAGNOSING OBSTRUCTIVE SLEEP APNEA

In This Chapter

How is OSA diagnosed? What options does a patient have? How does a sleep study work and what does it measure?

How is sleep apnea diagnosed?

Obstructive sleep apnea is diagnosed based on the number of apneas (cessation of breathing) or hypopneas (partial or incomplete cessations of breathing) observed per hour. These totals are combined into an index score called the apnea-hypopnea index (AHI). The AHI is an average of the total number of apneas and hypopneas lasting 10 seconds or more, per hour.

Another measure used is the respiratory disturbance index (RDI). The RDI is more inclusive than the AHI because it counts disruptions in breathing that do not qualify as apneas or hypopneas but still result in physiological arousal. These disturbances are called respiratory effort related arousal or RERAs.

Both indices are used to create a final diagnosis. (See the table to the right.)

In order to accurately determine the frequency and severity of sleep disturbances, a physician will prescribe a sleep study. The sleep study can be conducted in a laboratory (called a polysomnogram or PSG) or at home.

AHI or RDI	Diagnosis	Requires Treatment?
5 or greater	Mild sleep apnea	Sometimes*
15 or greater	Moderate sleep apnea	Always
30 or greater	Severe sleep apnea	Always

* May require treatment depending on nature of apneas and symptoms. Medicare will cover costs for treatment of patients with mild OSA who exhibit symptoms.

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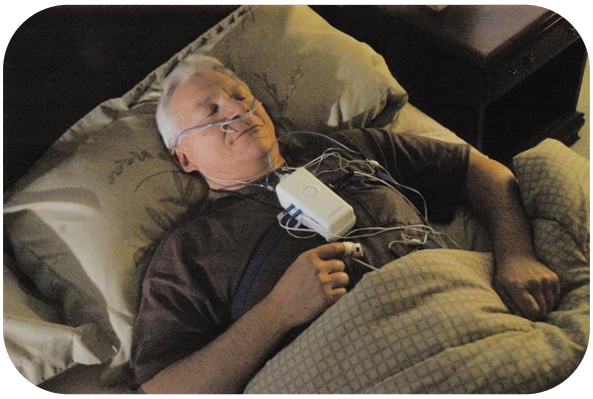
What is the sleep study?

In order to confirm a diagnosis of sleep apnea, a doctor must prescribe a sleep study (or “sleep test”). The sleep study takes a full night to complete. During the study, the patient is connected to several sensors that measure various physiological data such as brain activity, heart rate, blood oxygen, respiratory effort, sleep position, and eye movements.



A PATIENT TAKING A HOME SLEEP TEST

The data is recorded and later scored by a sleep technologist. The technologist searches the data and counts all the apneas, hypopneas, and RERAs (see the next section for more) that occurred during the study. The results are shared with a physician or specialist who then renders an interpretation and makes treatment recommendations to the patient.

Two Ways to Test for Sleep Apnea

The sleep study can be conducted in a sleep clinic or at home, with equally reproducible results.

Sleep laboratory or sleep clinic (Polysomnogram or PSG)

In a sleep lab or clinic, patients stay overnight and are hooked up to medical equipment that monitors all respiratory activity, oxygen levels, one electrocardiogram lead, muscle activity in the legs, as well as brain activity.

Home sleep test (Portable Sleep Monitoring)

The patient is connected to a device that monitors snoring and all respiratory activity including blood oxygen saturation, heart rate, sleep position, and breathing effort. Click here to see what a home sleep test looks like.

Home testing has several advantages: it allows patients to sleep comfortably at home, is more convenient and affordable, and is more representative of natural sleep habits. The Centers for Medicare and Medicaid Services and the

Key Term

Apnea-Hypopnea Index is a measure of the total number of apneas and hypopneas per hour.

American Academy of Sleep Medicine have endorsed the use of home sleep tests for those patients with a high-likelihood of having sleep apnea.

What are the differences between apneas, hypopneas, and RERAs?

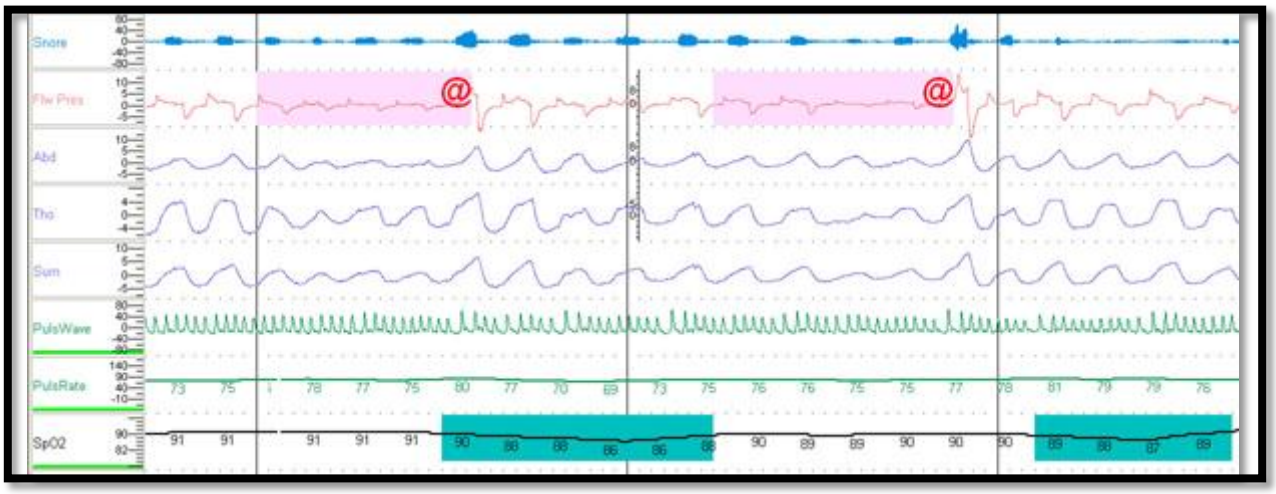
Apneas, hypopneas, and RERAs (respiratory effort related arousals) are different types of sleep disturbances. The difference between them relates to the amount of reduction in airflow and blood oxygen saturation.

	Reduction in airflow	Reduction in blood oxygen saturation	Length of disruption	Has physiological arousal?	Example
Apnea	90%	3%*	10 seconds or more	Yes	
Hypopnea	30% or 50%	4% or 3%	10 seconds or more	Yes	
RERA	30%	Any or none	10 seconds or more	Yes	

* Many sleep technicians will score apneas based on the 90% reduction in airflow alone.

Sample Data from a Home Sleep Test

The data below is a sample from an actual patient using a home sleep test. The results show two apneic episodes, over a 30 second period, although results vary depending on the person and severity of the apnea.



Legend

Snore represents snoring intensity
FlwPres represents air flow pressure
SpO2 represents blood oxygen saturation
Abd, **Tho**, **Sum** indicate changes in the abdominal and thoracic sensors
PulsWave and **PulsRate** measure heart rate

 signifies an apnea  signifies an oxygen desaturation

Following the cessation of breathing (first apnea), blood oxygen saturation dropped from 91 to 86 during the first episode and 90 to 87 in the second (highlighted in turquoise).

Note that the abdominal and thoracic sensors (rows three and four in purple) still show activity, indicating that the patient is trying to breath but cannot. This pattern is typical of obstructive sleep events. In contrast, during *central* sleep apneic events the abdominals and thoracic lines become flat as the patient stops making effort to breathe because the brain is not sending messages to breathe. These episodes are scored and are then collected into a final report that summarizes the sleep study findings.

TREATMENT

In This Chapter

What treatments are available for sleep apnea and how do they compare to each other?

Treatment Options

Treatment for obstructive sleep apnea falls into 3 main categories: medical, dental, and surgical.

Medical Treatment: PAP therapy, the Gold Standard

The "gold standard" and most common treatment for obstructive sleep apnea is CPAP or continuous positive airway pressure (also called PAP therapy). In CPAP treatment, the patient sleeps with a mask that delivers a steady and constant stream of room-temperate filtered air. The stream of air pressure holds the airway open and prevents obstruction by the tongue or soft palate. *Ninety-five percent of patients who use CPAP see a 90-95% reduction in the number of apneas and hypopneas they experience* which makes CPAP the optimal treatment for sleep apnea patients.

CPAP Titration

CPAPs are used at home, although they must be calibrated by a sleep technician in a sleep lab prior to being used so the correct pressure can be obtained. This process is called a CPAP titration. During titration, the patient is fit with the CPAP machine and a mask that goes under or over the nose or one that goes over the nose and mouth. The sleep technician will adjust the air pressure level in order to resolve all obstructive and snoring events. When titration is completed, the patient can begin using the CPAP at home. It is recommended that CPAP titrations should be done once a year due to changes in airway resistance, weight, and medical conditions.

APAP: No Titration Needed

In contrast to the CPAP, the APAP (automatic positive airway pressure, also called "automatic PAP" or "auto-titrating PAP") are self-titrating and automatically adjusts the air pressure each night to maximize sleep quality and resolve obstructive apneas. . When a person is breathing normally, the pressure delivered is low. The APAP is equipped with sensors that track respiration. When the APAP senses an apnea or hypopnea, it automatically increases its air pressure to keep the airway open and unobstructed.

> **Key Term**
> **Titration** refers to the process of determining the lowest effective PAP pressure that will prevent the occurrence of apneic events.

The end result is that sleep quality is preserved while delivering up to 40% less pressure than the traditional CPAP (which has one constant pressure) leading to a better night sleep. Because the APAP automatically titrates, the correct pressure will always be delivered and that sleep will be uninterrupted. There is no need for titration in a sleep lab and the machines can be used immediately.

Dental Devices

Dental appliances may be useful in shifting the tongue and jaw forward to prevent the airway from closing. They are helpful in treating OSA but are not as immediate as PAP therapy. Dental devices may need to be adjusted. Once adjusted a repeat study is recommended.

Surgery

A third option for patients is surgery. There are several types of surgeries that can be done, all focusing on different parts of the airway. Some of the surgeries available include; resection or hardening of the palate, removing the tonsils, advancing the tongue, and advancing the jaw line. On average, 50% percent of patients may see a 50% reduction in their apnea-hypopnea index with simple surgeries. Those surgeries, however, are more effective at eliminating *snoring* than eliminating *apneas*. Patients with moderate to severe sleep apnea would benefit from jaw advancement if they are unable to tolerate PAP therapy. Jaw advancement surgery is more complicated but usually successful and requires a hospital stay.

Lifestyle Changes

Some patients may be able to alleviate their symptoms considerably by making lifestyle changes that may increase the airway diameter. Those suffering with sleep apnea should consider making these changes in addition to, but not instead of, medical treatment.

- Losing weight
- Quitting smoking
- Opening or clearing the nasal passages using a nasal dilator, saline wash, or breathing strip,
- Avoiding alcohol, sleeping pills, and sedatives before bedtime
- Avoid sleep deprivation
- Avoid sleeping on the back
- Elevate the head four to six inches above the rest of the body

Spotlight: Tips for Adjusting to CPAP and APAP

Research shows that the first month is crucial to the success of APAP and CPAP treatment. Many patients stop using PAP therapy during the first three months, a critical time for adjusting to the device. Patients must understand that PAP therapy is not an option but a *prescription* like any other medication prescribed; if not used, patient puts himself at higher risk for health complications. Below are some tips to assist patients in acclimating to treatment.

- Be prepared to endure some discomfort in the beginning. It takes time to adjust to your new device. Some patients experience slight headaches for the first few mornings after beginning treatment.
- Ensure that the mask is properly fit. Adjust the straps so that they are comfortable and snug. Make sure the mask creates a seal around the nose (and mouth if using a full-face mask). If red lines appear on the face, the mask is too tight. Overtightening the mask can cause air leaks.
- To reduce dry mouth, use a humidifier with your CPAP. All APAPs already have humidifiers built in.
- Patients with allergies should use a special fine filter. The filter should be replaced when necessary. Filters should be changed more often if the patient sleeps with the window open. If nasal congestion persists, talk to your doctor as prescription nasal sprays often help.
- Clean the mask and tubing frequently.
- Muffle the sound of the machine by putting it under the bed (hard floors only).

STATISTICS

Prevalence

- Sleep apnea is extremely common. According to current estimates, as least 1 in 5 Americans have mild sleep apnea and 1 in 15 has moderate or severe sleep apnea.
- It is believed that 80% of those affected with obstructive sleep apnea are undiagnosed and in need of treatment.
- It is estimated that 9% of middle-age women and 24% of middle-age men are affected by sleep apnea and the majority are undiagnosed and untreated.
- In individuals over 65, obstructive sleep apnea with an AHI>10 has been found in 70% of the men and 56% of the women, which are three times the estimates for middle age. We are seeing an increasing prevalence in the adolescent population due to the rise of childhood obesity.

Risk Factors

- In one clinical study, 17% of African Americans tested positive for obstructive sleep apnea compared to 8% of Caucasians.
- Men are at a 2- to 3-fold greater risk for having obstructive sleep apnea compared to women.
- In a study comparing snoring habits in pregnant and non-pregnant women, research found that 14% of pregnant women reported snoring often or always versus only 4% of non-pregnant women.

Dangers and Complications

- Over the past 10 years, referrals for sleep studies have increased 12-fold.
- Between 50-70% of obstructive sleep apnea patients have systemic hypertension independent of obesity, age, smoking, and alcohol intake.
- It is estimated that the risk of depression in patients with mild obstructive sleep apnea is doubled. In patients with moderate or severe obstructive sleep apnea, the risk is 2. 6 times as great.
- Sleep apnea sufferers have a 30% higher risk of heart attack or death compared to their normal counterparts.
- The all-cause mortality rate over a 14-year period for patients with moderate to severe OSA was 33%, compared to 7% for people without OSA.

Treatment

- According to one study, the 5-year risk of death for moderate-to-severe sleep apnea patients was 14% for those who refused CPAP treatment compared to 4% for those receiving CPAP.
- In the US, diagnosing and treating sleep apnea can halve patients' healthcare costs.
- Untreated sleep apnea costs $1,336 more in health care costs per person, compared to individuals without sleep apnea. This accounts for an estimated $3. 4 billion a year in additional medical costs.
- Approximately 95% of patients with OSA will have a 90%-95% reduction in their apnea-hypopnea index with CPAP treatment.

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Sleep apnea is a serious disease. It carries with grave consequences if not treated, both medically and socially. It is strongly recommended that patients who have associated disease states or sleepiness should be treated with PAP therapy even if their AHI score is over 5. **The Aviisha Medical Institute provides testing, treatment, compliance management, and equipment for sleep apnea patients.**

To get tested or treated for sleep apnea, call Aviisha at 877-634-7748 or visit http://www.aviisha.com.

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