

# Snoring and Obstructive Sleep Apnea

A Guide for Patients and Providers

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The information in this guide is based on current medical literature and is generally accepted by the medical community at this time. However, this information is not meant as a substitute for professional medical advice. Only your health care provider can diagnose and treat a medical problem. If you are worried about your symptoms, talk to a health care provider.

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## Understanding Sleep Disordered Breathing

Sleep disordered breathing (SDB) describes a range of breathing problems that occur during sleep.

**Snoring:** The most common sign of sleep-related breathing problems. It is a **warning sign** for a more serious, chronic health problem called obstructive sleep apnea.

**Obstructive Sleep Apnea (OSA):** A chronic condition in which your breathing stops (or is restricted) multiple times an hour while you sleep.

Often people wait to talk about snoring or sleep apnea with their doctor. Some wait as many as ten years after they first notice symptoms to take action. Without treatment, SDB can:

- Disrupt your sleep, cause daytime sleepiness and affect your quality of life
- Increase your risk for other chronic diseases
- Make co-existing medical problems worse or harder to treat

The good news is that you have options. SDB can be treated and controlled with help from your healthcare providers. If you have already been diagnosed with OSA, careful management of your condition can improve your sleep and help reduce your risk of major health problems.



## It Starts with Snoring

### The Progression

#### Normal Breathing

- Blood oxygen level is normal

#### Snoring

- Sounds made when air passes through the airway and causes the throat tissue to vibrate
- Despite the noise, oxygen levels are normal
- Primary warning sign of sleep apnea

#### High Upper Airway Resistance

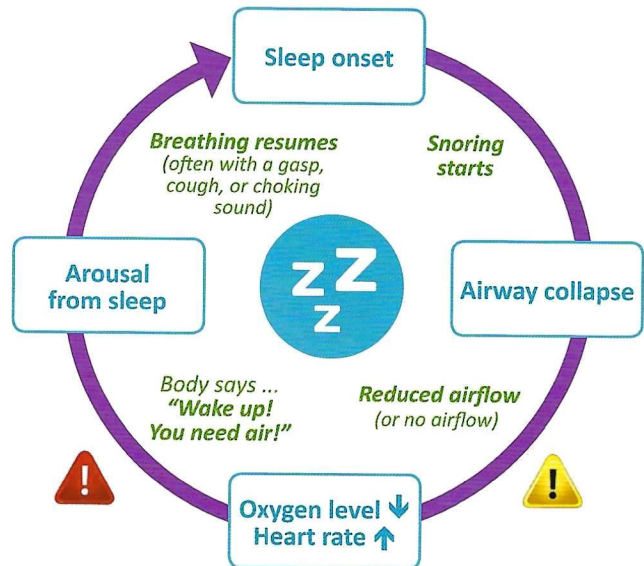
- Reduced airflow through the airway
- Narrow or partially collapsed airway passages make it harder to draw air into the lungs, so the body has to work harder to get oxygen
- Oxygen levels are normal (or nearly normal)
- Leads to non-refreshing sleep, daytime sleepiness, fatigue and lack of energy

#### Obstructive Sleep Apnea

- Breathing stops in a repeating pattern multiple times an hour
- A complete or partial blockage limits the amount of air that passes through the airway
- Blood oxygen level falls below normal
- Leads to non-refreshing sleep, daytime sleepiness, fatigue and lack of energy
- Increases risk of heart disease, diabetes, obesity and other chronic conditions

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### The Repeating Pattern



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## Problems in the Airway

### Airway Collapse Leads to SDB

Your airway is a flexible tube surrounded by over 30 muscles. During the day, these muscles support and protect your airway. Some of the muscles also help you swallow.

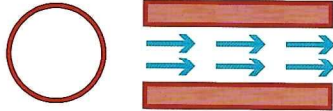
When you fall asleep, your muscles naturally relax, including your tongue and the muscles in your face, neck and throat. Under certain conditions, changes in muscle tone during sleep lead to the partial or complete collapse of the airway. This can affect the shape of your airway and restrict or completely block air from reaching your lungs.

### Reasons for Collapse

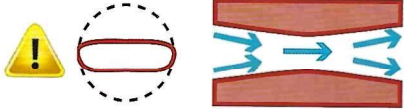
- Throat muscles relax and fail to support the airway
- Side walls of the airway collapse under pressure when you inhale
- Jaw falls back or open, which pinches the airway
- Tongue relaxes and falls backwards, causing a blockage in the airway

### Airflow Changes in SDB

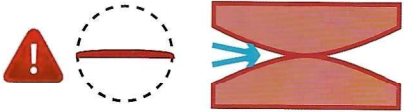
No blockage  
Normal airflow



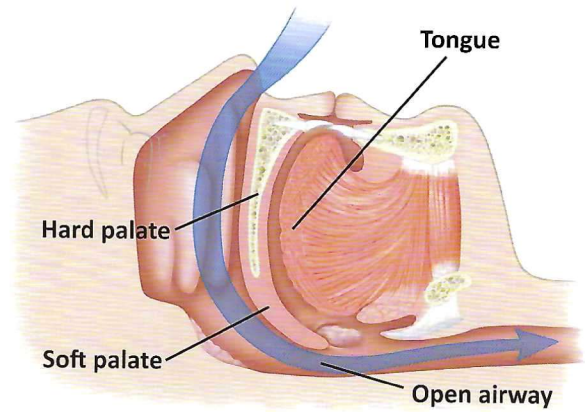
Partial blockage  
Restricted airflow



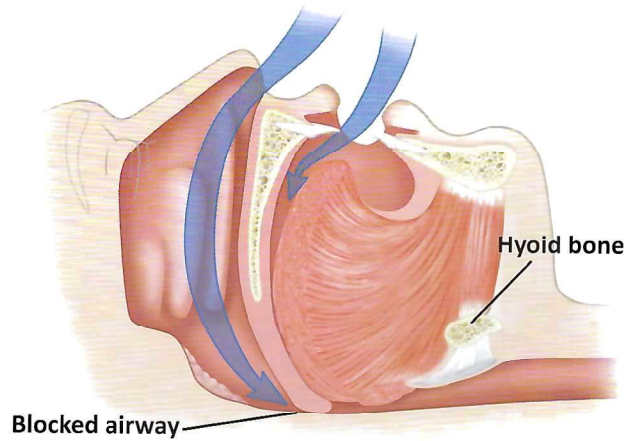
Complete blockage  
No airflow



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Normal breathing during sleep



Obstructive sleep apnea

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## Signs and Symptoms of OSA

In general, the likelihood that you suffer from OSA increases as the number and severity of your symptoms increase.

### Red Flags during Sleep

- Habitual snoring or heavy breathing
- Witnessed pauses in breathing
- Choking or gasping sounds, often after a pause in breathing
- Restless, non-refreshing sleep
- Frequent trips to the bathroom

### Other Symptoms during Sleep

- Acid reflux
- Heavy sweating
- Teeth grinding



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### Red Flags when You Are Awake

- Daytime sleepiness, fatigue or lack of energy
- Falling asleep at inappropriate times
- Personality or mood changes, irritability
- Poor concentration
- Early morning headaches

### Other Symptoms when You Are Awake

- Slow reaction times
- Inability to think clearly
- Impotence, low sex drive



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### Physical Exam

During an exam, your doctor or dentist may notice one or more of the following physical features and ask you about your sleep and your breathing during sleep.

#### Head and Neck Anatomy

- Flabby, soft tissue in the neck region
- Fat deposits in and around the airway
- Small lower jaw (retrognathia)

#### Oral Airway

- Soft tissue that visually blocks the airway, such as tonsils or adenoids
- Long soft palate or uvula
- Large or scalloped tongue
- Narrow or "V-shaped" upper arch

#### Nasal Airway

- Narrow nostril openings or nasal passages
- Nasal valves that collapse when you inhale
- Nasal blockage due to a deviated septum or polyps
- Swollen air passages due to allergies or sinus problems

#### Medical History

If you snore *and* have any of the following conditions, there is a good chance that you also have apnea or will develop apnea at some point during your lifetime.

- High blood pressure
- Heart disease, heart failure, atrial fibrillation
- Heart attack or stroke
- Diabetes
- Acid reflux

### Family History

Sleep apnea runs in families. If you have a parent or sibling that has been diagnosed with OSA, you are more likely to develop the condition at some point in your life.

### Weight

There is a very strong link between weight, snoring and sleep apnea. However, weight does not always play a role in sleep disordered breathing, especially after the age of 60.

You may be at risk for sleep apnea if you:

- Are overweight or obese
- Have a large neck size (Men: more than 17 in or 43 cm; Women: more than 15 in or 38 cm)
- Have recently gained more than 10 lbs (4.5 kgs)





## Dangers of Untreated Apnea

When you suffer from OSA, you stop breathing (or nearly stop breathing) many times during the night. OSA makes it hard to get the deep, restful sleep you need to be your best.

Sleep apnea is stressful on your body and the noise can create problems if it disturbs others.

**If you ignore the warning signs:** sleep apnea increases your risk for other medical conditions such as diabetes, heart disease and obesity.

**If you already have a chronic disease and *don't* get treated for apnea:** your original problem may get worse or become harder to control.

Here are just a few of the problems that are linked to snoring and obstructive sleep apnea.

### Cardiovascular Problems

- High blood pressure
- Abnormal heart beat (cardiac arrhythmias)
- Atrial fibrillation
- Heart attack and stroke
- Hardening of arteries (atherosclerosis)

### Metabolic Problems

- Increased appetite
- Weight gain (or difficulty losing weight)
- Insulin resistance
- Type II diabetes

### Mental Health Problems

- Depression or anxiety
- Lack of motivation
- Poor memory
- Clouded thinking

### Functional Problems

- Excessive daytime sleepiness
- Delayed reaction times
- Accidents (e.g. while driving, at work)
- Loss of productivity and performance

### Relational Problems

- Irritability
- Loss of intimacy
- Conflict with others
- Sleep-deprived bed partner

### Other Health Problems

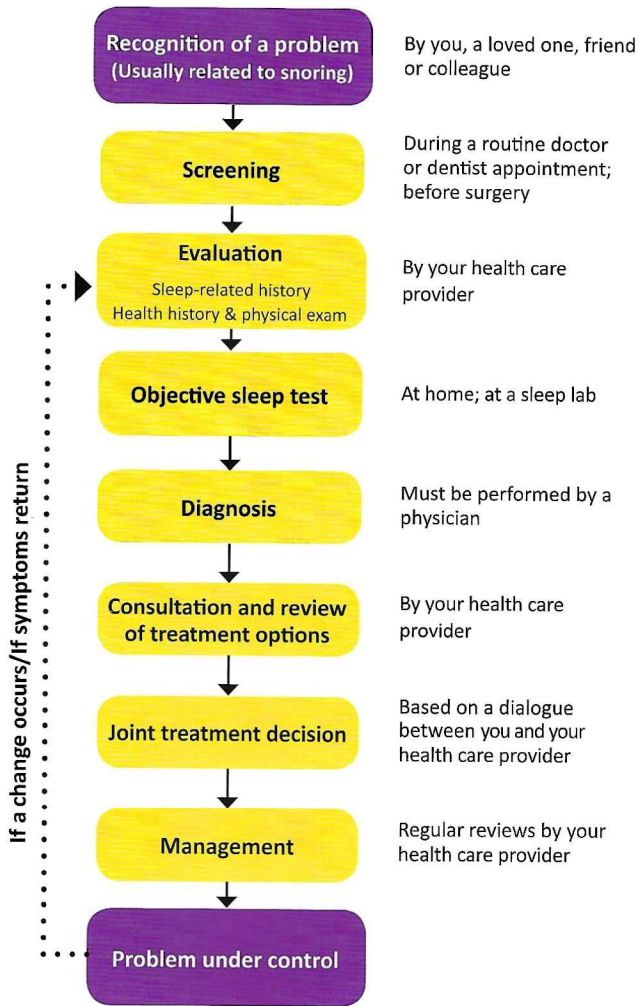
- Morning headaches
- Impotence, low sex drive
- Acid reflux
- Teeth grinding

### OSA is particularly hard on your heart.

If you **don't** get treated, you are:

- **1.5x – 3x** more likely to develop high blood pressure
- **1.5x – 2x** more likely to have a stroke
- **2x** more likely to die from a heart-related health event (such as heart attack or stroke)
- **2x – 5x** more likely to develop heart failure
- **4x** more likely to develop atrial fibrillation

## I Think I Have a Problem ... Now What?



## My Sleep and Breathing Problem List

**My main problem:**

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**Signs and symptoms when I sleep (page 8):**

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**Signs and symptoms when I'm awake (page 9):**

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**Clinical clues (pages 10-11):**

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**Problems related to untreated apnea (pages 12-13):**

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**My other concerns:**

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## Sleepiness: A Cause for Concern

When you are sleepy, tired or worn out, you are much more likely to nod off or fall asleep at times when you should be awake and alert. Fatigue can have serious consequences. In 2011, over \$11 billion was spent in the US on accidents related to driver fatigue and drowsy driving. Because sleepiness is a feeling that varies from person to person, it's hard to measure.

### The Epworth Sleepiness Scale (ESS)

The ESS is a screening tool that can help you and your health care providers discuss how fatigue affects your life. This questionnaire can also be used to measure changes in how sleepy you feel over time and assess any improvements due to treatment.

### Directions

**Step 1:** Choose the most appropriate number for each situation. Then, enter that number in the "Score" column.

**Step 2:** Add the numbers in the "Score" column to calculate the Total Score.

**Step 3:** Discuss these results with your health care provider.

**In contrast to just feeling tired, how likely are you to doze off or fall asleep in the following situations?** This refers to your usual way of life in recent times. Even if you haven't done some of these things recently, try to work out how they would have affected you.

0 = No chance of falling asleep

1 = Slight chance of falling asleep

2 = Moderate chance of falling asleep

3 = High chance of falling asleep

Situation	Score
Sitting and reading	
Watching television	
Sitting inactive in a public place (i.e. theater)	
As a car passenger for an hour without a break	
Lying down to rest in the afternoon	
Sitting and talking to someone	
Sitting quietly after lunch without alcohol	
In a car, while stopped for a few minutes in traffic	
<b>Total Score</b>	

Johns MW. A new method for measuring daytime sleepiness: the Epworth sleepiness scale. *Sleep* 1991;14:540-5.



## Second-Hand Snoring

Sometimes, the only person concerned about snoring or sleep apnea is the person that actually hears it. (Often people don't know that they snore or stop breathing when they sleep!) If you are the bed partner of a snorer, the noise can disrupt your sleep and can affect your relationship, quality of life and even your health.

### The Bed Partner Questionnaire

The following questions relate to how snoring affects a bed partner physically and emotionally. This information can be used to talk to a loved one who snores about his or her condition. It can also be used to monitor changes after the snorer seeks treatment. This questionnaire should be completed by the bed partner, not the person that snores.



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### Directions

**Step 1:** Choose the most appropriate number for each situation. Then, enter that number in the "Score" column on the far right.

**Step 2:** Add the numbers in the "Score" column to calculate the Total Score.

**Step 3:** Discuss these results with your bed partner who snores and his or her health care provider.

**How often do the following situations occur in your household?**

0 = Never

1 = Infrequently (1-2 times per week)

2 = Frequently (3-5 times per week)

3 = Always (6-7 times per week)

My bed partner's snoring...	Score
Awakens me during the night	
Disturbs my sleep	
Affects our relationship	
Causes me to be tired during the day	
Causes me to be irritable during the day	
Requires us to sleep in separate rooms	
<b>Total Score</b>	

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### Overnight Sleep Tests

Once you are aware of a sleep-related breathing problem, you will need a sleep test to determine how severe the problem is and how it affects your body.

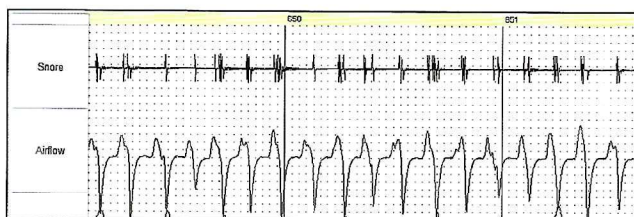
### Home Sleep Tests vs. Lab Sleep Tests

In many cases, your doctor can order a home sleep test to see if you have OSA. This type of test is recommended when symptoms of sleep apnea are present (such as snoring or witnessed apneas) and there are no other co-existing chronic conditions of concern.

Doctors often recommend that you go to a sleep lab for a test if you have symptoms of sleep apnea and one or more serious chronic conditions, such as heart failure, history of stroke or morbid obesity. They also order sleep tests when they suspect that you may have a sleep disorder other than apnea.

### What Does the Test Measure?

In general, the sleep test measures your oxygen levels, heart rate, airflow and amount of effort that you make to breathe. (See sample results below.) It records your breathing patterns and counts how many times you stop breathing (or experience restricted breathing). The test also shows when your oxygen levels drop and how your heart and brain respond. (See page 5.)



### What Does the Diagnosis Mean?

A diagnosis of OSA means that you stop breathing (or nearly stop breathing) multiple times an hour when you sleep. As a result, you do not get enough oxygen and your heart has to work harder to compensate.

### Types of Obstruction

**Apnea:** A period when *breathing stops* for 10 seconds or more due to a *complete collapse* of the airway which *blocks airflow* to the lungs.

**Hypopnea:** A period of *restricted breathing* that lasts for 10 seconds or more due to a *partial collapse* of the airway which *limits airflow* to the lungs.

### The Apnea-Hypopnea Index (AHI)

The American Academy of Sleep Medicine classifies OSA severity by the number of times breathing stops per hour.

$$\text{AHI} = \frac{\text{\# of apneas} + \text{\# of hypopneas}}{\text{Total hours of sleep}}$$

Typically, people with an AHI of 5 or more receive a diagnosis of obstructive sleep apnea.

### OSA Severity

Severity	Events per Hour
Normal Breathing	0 to 4
Mild OSA	5 to 14
Moderate OSA	15 to 29
Severe OSA	30 or more



### Your Treatment Journey

There are a number of treatment options for snoring and obstructive sleep apnea. Some treatments involve lifestyle changes. Others require you to use a device every time you sleep to prevent your airway from collapsing. In some cases, surgery may be an option.

It may be easy to find a treatment that works for you, or it may take some time and effort. Your health care team will help you understand your choices. You can also turn to patient groups for support.

### What is the Goal of Treatment?

The goal of treatment is to maintain an open airway while you sleep and:

- **For snoring:** to reduce your snoring to a level that is acceptable to you and those people that are affected by your snoring (e.g. a bed partner)
- **For OSA:** to resolve the clinical signs and symptoms of OSA and normalize the apnea-hypopnea index (AHI) and blood oxygen levels

Treatment is often said to be “successful” when

- Your AHI is less than 5 events per hours
- Your symptoms have improved or are under control
- Your bed partner is satisfied
- You are compliant with therapy
- You have few, if any, side effects from therapy

### Changes in Lifestyle and Habits

- Weight loss<sup>1</sup>
- Positional therapy (sleeping on your side)<sup>1</sup>
- Limiting the use of alcohol and sedatives<sup>1</sup>

### Oral Appliance Therapy

- Mandibular (jaw) advancement devices<sup>2</sup>
- Tongue retaining devices

### Positive Airway Pressure Therapy

- Continuous positive airway pressure (CPAP)<sup>2,3</sup>
- Auto-titrating positive airway pressure (APAP)<sup>2,3</sup>
- Bi-level positive airway pressure (Bi-PAP)<sup>4</sup>

### Surgical Procedures

- Surgery to remove tissue in the throat<sup>4</sup>
- Nasal surgery<sup>4</sup>
- Jaw advancement surgery<sup>4</sup>

### Other Therapies

- Expiratory positive airway pressure (EPAP)
- Implants to stiffen soft palate
- Implant to stimulate the tongue during sleep

1 Recommended for everyone

2 Recommended for patients with mild to moderate apnea

3 Recommended for patients with severe apnea

4 Recommended in select cases

## You and Your Doctor Are a Team

### Weigh Your Options, Together

As you develop a treatment plan with your doctor, keep in mind that a number of factors can affect treatment success. Even if the recommended therapy gets the best results for the most number of people, it won't make much difference for you if you don't use it when you sleep. The "right" treatment for you will depend on:

- **Treatment efficacy:** How well the treatment works under the best possible conditions
- **Treatment adherence (compliance):** How much and how often you use the treatment
- **Treatment effectiveness:** How well the treatment works in real life, under normal conditions

The most effective therapies get the best results in terms of your health status and how you feel.

### Treatment Success

$$\text{Efficacy} \times \text{Adherence} = \text{Effectiveness}$$



### Questions to Ask Yourself

It's important to talk about the pros and cons of each treatment with your health care provider. Keep in mind that your treatment needs may change over time. Revisit these questions if you need to make changes in your therapy.

#### Efficacy

- How well does the treatment control my apnea at any point in time?

#### Convenience

- How hard is it to incorporate the treatment into my lifestyle?
- Is it something that I have to use every night and for the rest of my life?
- How portable is the device? How hard will it be to travel with it?
- How hard is it for me to clean and care for the device?

#### Tolerability

- How comfortable is the device to wear?
- How does the therapy affect my bed partner?

#### Compliance / Adherence

- How often do I use the device per week?
- How long do I wear the device when I sleep?

#### Effectiveness

- How well does the treatment control my apnea over time?
- To what degree does the treatment resolve my symptoms?
- How much does it improve how I feel?

#### Cost

- How much does the therapy cost?
- How much does it cost to maintain the device per year (e.g. replacement parts)?

#### Other

- What are the trade-offs of one treatment versus another?
- What are the potential side effects of the treatment?
- How are those side effects managed or minimized?



## Comparing Two Choices

### **PAP: Positive Airway Pressure Therapy**

A PAP device is a machine that is connected to a mask via a flexible tube. Patients that use this therapy wear the mask when they sleep. The machine gently blows air into the airway and prevents it from collapsing.

Many clinical trials confirm that PAP devices get the best treatment results for moderate to severe apnea. There are many mask options and other add-ons to the machine that increase comfort. However, compliance with this therapy is sometimes a problem for patients and can limit the benefits of treatment.

PAP therapy is recommended for all patients with severe sleep apnea and as a choice for patients that have mild to moderate apnea.



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### **OAT: Oral Appliance Therapy**

An oral appliance for the treatment of OSA is a medical device that looks like an orthodontic retainer or mouth guard. It consists of two trays that snap over the upper and lower teeth. The device keeps the airway open by stabilizing the lower jaw in a neutral or slightly forward position.

Many studies show that custom oral appliances provide excellent results, particularly for people who suffer from mild to moderate OSA. Although there are over 100 models on the market, only a handful of devices have been studied in large clinical trials. Ask your health care provider which ones get the best results.

Oral appliance therapy is recommended for patients with mild to moderate OSA. It is sometimes recommended for severe sleep apnea, typically when a patient is unable to tolerate CPAP therapy.



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## A Happy, Healthy Life

### Benefits of Therapy

Once you get your sleep and breathing under control, your health and your quality of life can change for the better. Successful treatment often means:

- Deeper, more restful sleep
- Increased alertness and concentration
- Increased energy and motivation
- Lower blood pressure
- Decreased risk for heart attack and stroke
- Decreased feelings of depression or anxiety
- Ability to lose weight
- Minimal disturbance to others (e.g. a bed partner)
- Improved sex drive



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### Importance of Regular Follow-Up

Sleep disordered breathing is a chronic condition that typically gets worse with age. What starts as occasional snoring often progresses over time and turns into sleep apnea later in life. When it comes to treatment, what works for you now may not be the right solution for you 10 years from now.

It is *very important* to see your health care provider for regular check-ups. If you start having symptoms again or if your current treatment stops working as well as it did when you first started, schedule an appointment. You may need to make changes to your therapy. If you see multiple doctors for different health problems, make sure that you update each one about your sleep health and the status of your apnea treatment.



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## Patient Resources

- **The American Sleep Apnea Association**

[www.sleepapnea.org](http://www.sleepapnea.org)

The ASAA is a patient-led, nonprofit organization founded in 1990. Their mission is two-fold: to reduce injury and disability from sleep apnea and to enhance the well-being of those affected by this common disorder. The ASAA provides education and creates public awareness about sleep disordered breathing. They also:

- connect people with health care providers that diagnose and treat apnea
- coordinate a large network of patient support groups
- help patients enroll in clinical trials

If you want to learn more about sleep apnea or need to get answers from knowledgeable patients who know what you're going through, contact the ASAA. They will connect you with resources and tools to help you at any stage of your journey with sleep disordered breathing.

- **The National Heart, Lung, and Blood Institute**

[www.nhlbi.nih.gov](http://www.nhlbi.nih.gov)

The NHLBI provides global leadership for research, training, and education to promote the prevention and treatment of heart, lung, and blood diseases, and sleep disorders. The institute also houses the National Center for Sleep Disorders Research. Their goal is to enhance the health of all individuals so that they can live longer and more fulfilling lives. The Institute collaborates with patients, families, health care professionals, scientists, professional societies, patient advocacy groups, community organizations, and the media to promote the application of research results and leverage resources to address public health needs.

## References

The information presented in this booklet is derived from a number of national guidelines and practice parameters published by independent research groups and professional societies.

For a complete list of references and additional reading material on sleep disordered breathing, please visit [www.popsleep.com/references](http://www.popsleep.com/references).

