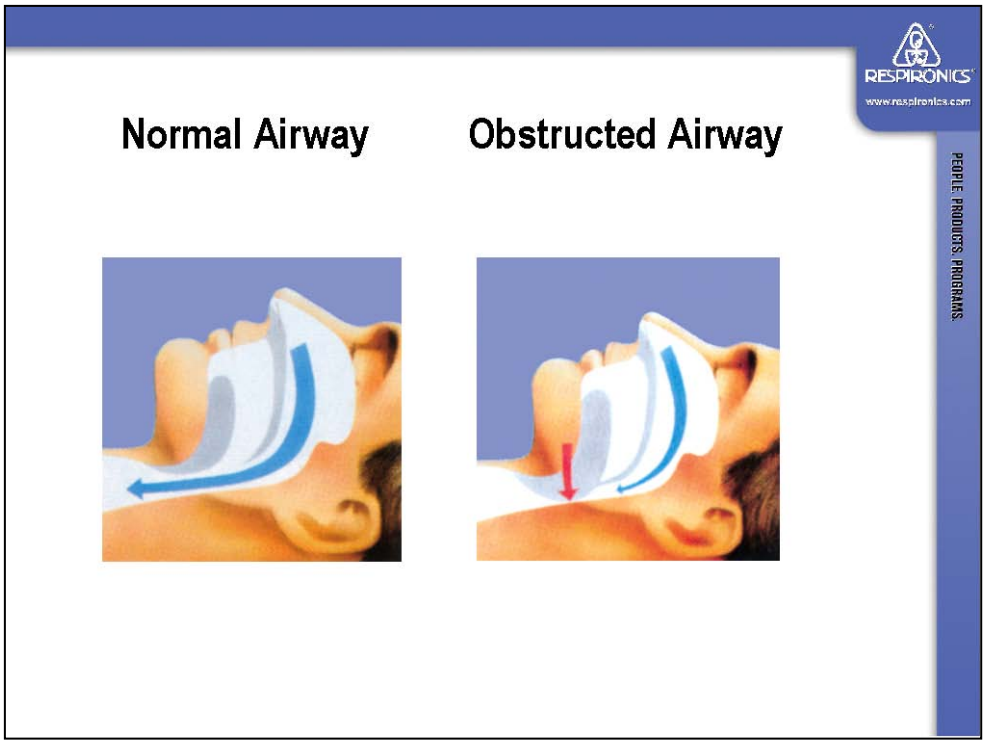


It is estimated that 25% of the adult population (52m) sufferer from some form of sleep disordered breathing (SDB). Obstructive Sleep Apnea (OSA) is the most common form of SDB.

OSA occurs when the upper airway repeatedly collapses during sleep, causing cessation of breathing (apnea) or inadequate breathing (hypopnea) and sleep fragmentation. The cessation or inadequate breathing and sleep disruption occurs throughout the night,

This cycle of inadequate breathing and poor sleep quality leads to:

excessive daytime sleepiness – Think about how you have felt when your sleep has been interrupted for a single night. If you have children remember when they were first born or what about when your significant other has had a cold and is up coughing all night. Think about those interruptions in your sleep happening every minute, night after night….

impaired concentration and memory loss – How effective are you when you have not had a good nights sleep and do not feel rested? Think about how individuals with OSA may feel after a few months to years of poor quality sleep.

mood and behavioral changes – We have all been irritable after a poor nights sleep. It is easy to see how mood and behavioral changes can be exacerbated by the cycle of OSA. Depression is common in OSA sufferers.

Research studies have shown OSA impacts the quality of the OSA sufferer's life. It impacts:

- activities of daily living
- performance and productivity at work
- social & family relationships
- intimacy & sexual performance

Research studies have also linked OSA to cardiovascular disease and increased morbidity & mortality.

Undiagnosed and untreated OSA also has an economic toll and is a public safety concern. Research studies have shown that those with untreated OSA have:

- a higher rate of work related accidents and injuries
- a three times greater incidence of motor vehicle accidents
- increased healthcare utilization

It is estimated that 18 million adults suffer from symptomatic and severe asymptomatic OSA. Adding to this public health issue is the reality that OSA is frequently unrecognized and undiagnosed by the medical community. It is estimated that 90% of the sufferers are still undiagnosed & untreated.

When looking at the impact of high blood pressure we also need to look at the indirect costs and consequences associated with poorly controlled blood pressure.

Hypertension is the most important risk factor predisposing to stroke. There are 600,000 strokes in the US per year. While stroke is the 3rd leading cause of death (170,000 deaths / yr) it is also the 3rd leading cause of morbidity (430,000 survivors / yr). There are 4.5 million stroke survivors in the US.

Uncontrolled blood pressure doubles the risk for developing heart failure. Currently heart failure affects only 2% of the population while it is responsible for a disproportionate amount of cost. It is estimated that 20 – 40 billion dollars a year is spent on caring for CHF patients.

Clinicians have known that OSA patients frequently had high blood pressure and that hypertensive patients are often found to have underlying OSA. The incidence of high blood pressure in sleep clinic patients has been documented at approximately 40% and small studies have shown that as many as 50% of hypertensive individuals have underlying OSA.

However, the overlap was attributed to both hypertension and OSA sharing some of the same risk factors. Risk factors are conditions that have already been demonstrated to have an association with a given disease. OSA and hypertension share the following risk factors

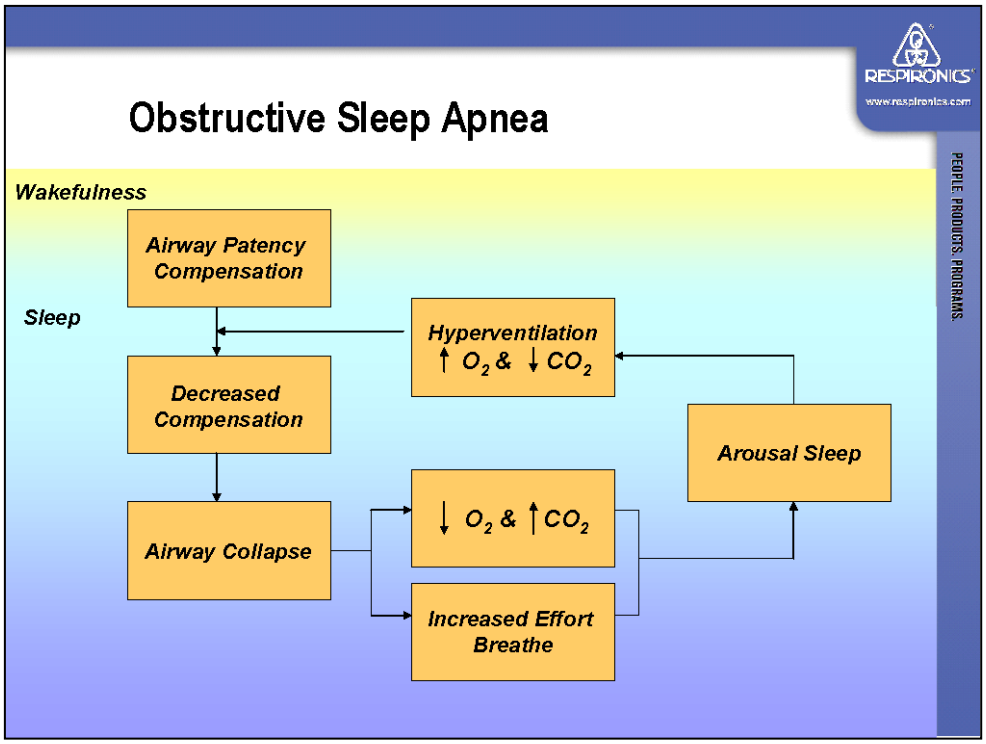
- Male gender
- Race
- Obesity
- Smoking
- Alcohol consumption

Significant new research now demonstrates an actual association or link between hypertension and OSA. This research has:

- Been done on individuals from the general population
- Been done on large populations
- Taken shared risk factors into consideration

Detection and treatment of high blood pressure is a major public health initiative. Even with the

- national education and awareness campaigns
- ease by which high blood pressure can be detected from physician's office to self monitoring machines in malls
- adverse consequences of HTN that should motivate people to have their blood pressure checked approximately 30% of hypertensive patients remain undiagnosed and untreated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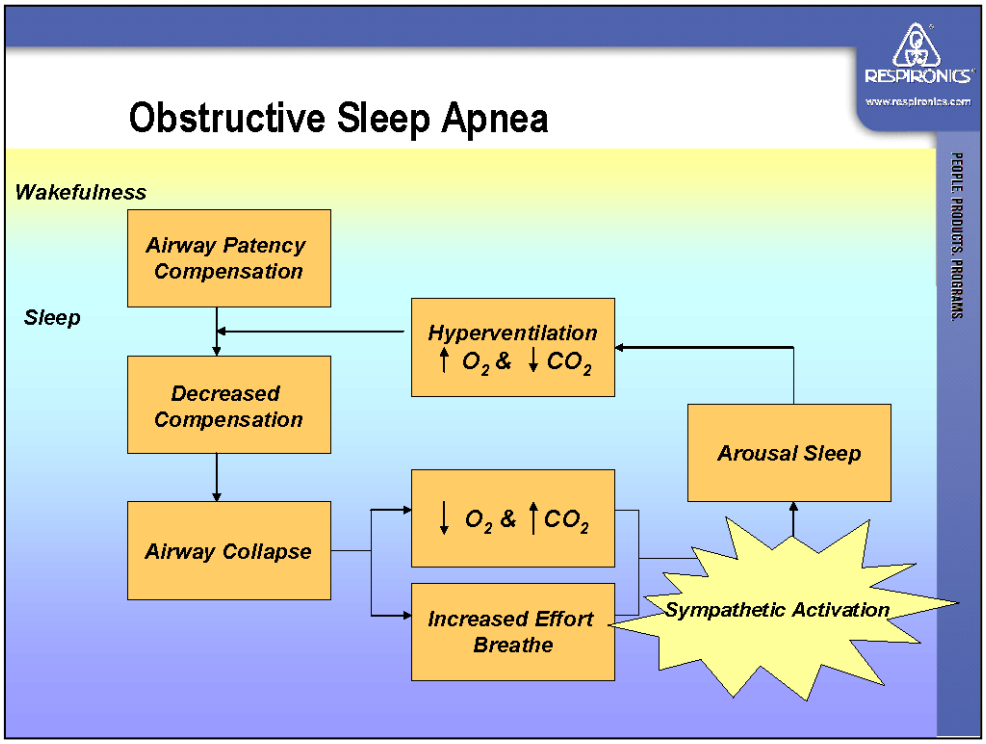
Increased Effort Breathe
Arousal Sleep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Sympathetic Activation

It is important to understand how the hypoxia, hypercapnia and increased ventilatory effort provoke the body to respond to the apneic event. The body responds by activating the sympathetic nervous system. Sympathetic nerves go to all parts of the body. Activation of the sympathetic system:

- Increases heart rate
- Constricts peripheral blood vessels
- Increases mental activity

In response to the hypoxia and hypercapnia, the heart rate increases to pump more blood to the vital organs. Over time, the repeated surges in rate place a strain on the heart. The peripheral blood vessels constrict to increase blood pressure and cardiac output. Again, the body is trying to compensate for the low oxygen and high carbon dioxide levels by increasing the blood flow to the vital organs. The increase in blood pressure is transient. Blood pressure returns to a normal level after the airway is opened and hyperventilation returns the oxygen and carbon dioxide levels to a normal range. Over time the transient increases in blood pressure during the night can have a carry over effect on daytime BP. The increase in mental activity causes the arousal to a lighter stage of sleep.

The constant stress and strain on the CV system takes its toll.

Normally when healthy individuals sleep their systolic blood pressure drops. However, every individual does not exhibit the normal dipping of blood pressure at night. "Non-dipping" refers to a lack of the normal drop in blood pressure during sleep. Non-dipping is a well known risk factor for hypertension and cardiovascular disease.

Davies notes that if the lack of a nocturnal dip seen in OSA patients carries the same significance as a lack of a nocturnal dip does in essential hypertension, in theory, it would increase the risk for stroke by 40% and the risk for coronary heart disease by 15%.
Davies C., et al., Thorax 2000; 55(9): 736-40

Research has shown that OSA patients use 25-50% more medical resources in the 5 years prior to diagnosis. The OSA patients had more physician office visits and spent more nights in the hospital. Physician costs were also higher than in matched controls.

The highest diagnostic expenditures in the OSA patients were for the treatment of hypertension and cardiovascular disease. The cost for treating hypertension in the OSA patients was higher than the cost for treating hypertension in the general population. OSA patients with hypertension received more anti-hypertensive prescriptions and higher cost drug therapies.

Let's talk about ways to screen patients.

You can look for documentation of the hallmark signs and symptoms of OSA. Excessive daytime sleepiness with one or more of the following signs is highly indicative of OSA. The signs are

- loud disruptive snoring, or
- nocturnal choking, gasping or snorting, or
- pauses in breathing.
- Family history of OSA
- Obesity or BMI > 30
- Large neck circumference, men with a neck size greater than 17 inches women with a neck size greater than 16 inches have an increased incidence of OSA
- Individuals with a crowded airway, i.e. small caliber airway with large tonsils, or certain facial characteristics like a small jaw or a recessed chin

Please keep in mind that patients, especially female patients, may not talk about sleepiness. They often complain instead of tiredness or fatigue. It is important in these case to ascertain on follow up if they regularly do not feel refreshed after sleeping and if they are feel sleepy especially during passive activities.

Snoring marked by frequent changes in loudness and frequency is highly suggestive of OSA. However even simple, regular snoring is associated with hypertension.

If your patient does not have a bed partner who witnesses the pauses in breathing you can ask the patient if they awaken gasping or choking for air or if they are a "messy sleeper." When OSA sufferers arouse from the apneic episode, the airway opens, they gasp for breath and there are often gross body movements. OSA sufferers frequently move around in bed and bedding is often disrupted.

The sufferer may also complain of any of the following symptoms

- Recurrent nocturnal awakenings
- Un-refreshing sleep
- Daytime fatigue
- Impaired concentration / memory loss
- Mood / behavioral changes
- Morning headaches
- Loss of sexual interest