SLEEP APNEA

"Sleep-disordered breathing (also known as sleep apnea) is associated with an increased risk of death, according to new results from the Wisconsin Sleep Cohort, an 18-year observational study supported by the National Heart, Lung, and Blood Institute (NHLBI) of the National Institutes of Health." (Science Daily Aug. 4, 2008)

Sleep Apnea is a common physical disorder that affects millions of adults and children. Sleep apnea is a disorder characterized by a reduction or a pause of breathing during sleep. "An apnea is a period of time during which breathing stops or is markedly reduced. In simplified terms, an apnea occurs when a person stops breathing for 10 seconds or more. So, if normal breath airflow is 70% to 100%, an apnea is if you stop breathing completely, or take less than 25% of a normal breath (for a period that lasts 10 seconds or more)." (WebMD Medical Reference Cleveland Clinic SOURCES: The National Sleep Foundation. National Institutes of Health. Reviewed by Michael W. Smith, MD on September 14, 2008)

While we are at it we might take a look at what happens as we breathe. In mechanical terms, our lungs can be described as the site of gas exchange: Oxygen is a the fuel all the cells and organs of our body need to function and it is removed there from the air we inhale and oxygen defuses into the bloodstream. It is then able to be distributed to other organs and tissues within our body. When we exhale we dispose of the carbon dioxide that is the by-product of our bodily metabolic processes. "In our lungs, in the course of a single day, an astonishing 8,000 to 9,000 liters of breathed-in air meet 8,000 to 10,000 liters of blood pumped in by the heart through the pulmonary artery (American Lung Association). The lungs, through a process of gas exchange, relieve blood of this metabolic waste and return a refreshed, oxygen-rich stream of blood to the body.

In order to be able to understand the deficit of sleep apnea it would be good to review some of the basic physiology of pulmonary gas exchange. An important distinction for you to understand is there is a large difference in the definition of breathing, respiration and cellular respiration. Many people used these terms interchangeably but there are large differences.

Breathing or respiration can be defined as a bodily process of inhalation and exhalation of gases through the contraction and relaxation of the diaphragm and other muscles of the chest. During this process a component of air, oxygen (O), is inhaled from the air in our environment and simultaneously there is a releasing carbon dioxide (CO_2) from the lungs back into this environment. The exchange of gases occurs across a cellular border in the lungs where capillaries come into close contact with specialized cells known as alveoli. The next step in the process would be when we exhale and remove gaseous waste products of which carbon dioxide is a main component. We will consider this then a process known as ***physiologic*** respiration.

When we consider ***cellular*** respiration we are considering a processis which is the metabolic process by which your body obtains energy by reacting oxygen with glucose to give water,

carbon dioxide and energy. Although physiologic respiration is necessary to sustain cellular respiration, the processes are distinct whereby cellular respiration takes place in individual cells of your body, while physiologic respiration concerns the continuous exchange of gases between your body and the external environment.

So why have I burdened you with all of this the detail? It is necessary for you to understand the need for adequate oxygenation of the blood and its consequences as we continue to seek an understanding of sleep apnea. Since we have mentioned the need for adequate oxygenation you should know that the aacceptable normal ranges are from 95 to 100 percent saturation. Please be aware it is not abnormal to see some measured values down to 90% in a normal patient.

As we continue to understand the normal process of gas exchange let's take a moment and review what the normal breathing rate is for the average adult.

Average respiratory rates have been reported in a healthy adult at 12 breaths per minute but estimates may vary between sources, as between 12-20 breaths per minute.
A listing or normal rates might be found as:

- Newborns: Average 44 breaths per minute
- Infants: 20–40 breaths per minute
- Preschool children: 20–30 breaths per minute
- Older children: 16–25 breaths per minute
- Adults: 12–20 breaths per minute
- Adults during strenuous exercise 35–45 breaths per minute
- Athletes' peak 60–70 breaths per min

Now let's consider the process of sleep apnea. A patient who is affected by this process may find that their breathing pauses can last from a few seconds to minutes. They often occur 5 to 30 times or more an hour. Typically, normal breathing then starts again, sometimes with a loud snort or choking sound. Sleep apnea often goes unrecognized by the patient undiagnosed by their physician. Doctors usually can't detect the condition during routine office visits. Also, there are no routine diagnostic tests for the condition. Most people who have sleep apnea don't know they have it because it only occurs during sleep. A family member and/or bed partner may first notice the signs of sleep apnea.

Apnea usually occurs during the sleep process. When an apnea occurs, sleep is disrupted. Sometimes this means the person wakes up completely, but sometimes this can mean the person comes out of a deep level of sleep and into a more shallow level of sleep. Some of the symptoms that we might exhibit during periods of sleep apnea include:

- Waking up with a very sore and/or dry throat
- Occasionally waking up with a choking or gasping sensation
- Sleepiness during the day
- Morning headaches
- Forgetfulness, mood changes and a decreased interest in sex
- Recurrent awakenings or insomnia (Sleep Medicine Center at Cleveland Clinic).

There are three types of sleep apnea (Health Cares Net):

A) Obstructive sleep apnea (OSA) affects primarily men between the ages of 30 and 50. It occurs when air passage in the upper respiratory tract becomes obstructed during sleep (obstruction is caused by soft tissue of the pharynx relaxing and blocking the flow of air). It prevents breathing until low levels of oxygen in the blood cause a person to respond by waking up and taking a deep, snorting breath. Being overweight or having a small tongue or mouth can contribute to the obstruction. In children enlarged tonsils or adenoids are the most common cause of obstruction

B) Central sleep apnea is a rare type of sleep apnea where the region of the brain and nerves that regulate breathing do not function normally and cause breathing to be impaired. It can be caused by head injury or stroke. In central sleep apnea, although the airway is open, changes in the part of the brain that controls breathing bring a temporary halt to the body's effort to breathe. Rarely, people have a combination of obstructive and central sleep apnea.

C) Mixed sleep apnea begins with a loss of breathing effort but ends with symptoms of obstruction. Individuals experience a combination of obstructive sleep apnea and central sleep apnea.

Now that we have discussed what is sleep apnea let's spend a little time and review the known factors for those who might have an increased risk for this anomaly. (Risk Factors by Mayo Clinic Staff)

Age. Sleep apnea can affect people of all ages. It's estimated that more than 12 million American adults have obstructive sleep apnea. Although it is most common in older adults, it has been reported in between 1.6% to 3.4% of children. Some experts believe that sleep disorder breathing may occur in as many as 11% of children. Interestingly, one study suggested that although prevalence of sleep apnea increases with age, its health consequences decline. Sleep apnea is more common in men. One out of 25 middle-aged men and 1 out of 50 middle-aged women has sleep apnea. In the study, apnea posed more of a threat to a person's health before age 45 than afterward.

Ethnicity. African Americans face a higher risk for sleep apnea than any other ethnic group in the United States. Hispanics and Pacific Islanders are more likely to develop sleep apnea than Caucasians.

Obesity. Obesity, particularly having fat around the abdomen is a particular risk factor for sleep apnea, even in adolescents and children. It should be noted, however, that many people with sleep-disordered breathing, particularly women and small children, are not obese.)

Smoking. Smokers are at higher risk for apnea, with heavy smokers (more than 2 packs a day) having a risk 40 times greater than nonsmokers.

Neck circumference. The size of your neck may indicate whether or not you have an increased risk of sleep apnea. That's because a thick neck may narrow the airway and may be an indication of excess weight. A neck circumference greater than 17.5 inches (44 centimeters) is associated with an increased risk of obstructive sleep apnea.

High blood pressure (hypertension). Sleep apnea is not uncommon in people with hypertension.

A narrowed airway. You may inherit a naturally narrow throat. Or, your tonsils or adenoids may become enlarged, which can block your airway.

What's Next

So you think that you or someone in your family might have this problem? So what do you do now?

You need to have a conversation with your primary care physician. Based on your history your doctor, while considering your signs and symptoms, they may refer you to a sleep disorder center. There are a multitude of centers available throughout the country. In consultation with a sleep disorder specialist he/she help you decide on your need for further evaluation. These evaluations often involve overnight monitoring of your breathing and other body functions during sleep. Tests to detect sleep apnea may include: (Mayo Clinic Staff)

Nocturnal polysomnography. During this test, you're hooked up to equipment that monitors your heart, lung and brain activity, breathing patterns, arm and leg movements, and blood oxygen levels while you sleep.

Oximetry. This screening method involves using a small machine that monitors and records the oxygen level in your blood while you're asleep. A simple sleeve fits painlessly over one of your fingers to collect the information overnight at home. If you have sleep apnea, the results of this test will show drops in your oxygen level during apneas and subsequent rises with awakenings. If the results are abnormal, your doctor may have you undergo polysomnography to confirm the diagnosis. Oximetry doesn't detect all cases of sleep apnea, so your doctor may still recommend a polysomnogram even if the oximetry results are normal.

Portable cardio respiratory testing. Under certain circumstances, your doctor may provide you with simplified tests to be used at home to diagnose sleep apnea. These tests usually involve oximetry, measurement of airflow and measurement of breathing patterns.

If you have obstructive sleep apnea, your doctor may decide to refer you to an ear, nose and throat doctor (otolaryngologist) to rule out any anatomical blockage in your nose or throat. An evaluation by a heart doctor (cardiologist) or a doctor who specializes in the nervous system (neurologist) may be necessary to look for causes of central sleep apnea.

These factors are extremely important and warrant your attention. Untreated sleep-disordered breathing has been linked to a higher risk of cardiovascular disease and increased risk factors which might include high blood pressure, stroke, and diabetes. Other tell tale indicators might include excessive daytime sleepiness, which can impair quality of life and performance on the job or in school, ***and increase the risk of injury or death from work-related accidents and vehicular crashes.***

What can we extrapolate from this information concerning our workplace?

- Sleep Apnea causes increased healthcare spending and resultant increased contract costs
- There is a documented decrease in productivity by the workforce.
- Employees suffering with undiagnosed sleep apnea are absent almost three times as long as other employees (1).
- Workers with sleep apnea perform 20% less work product than their colleagues (2).
- Patients with untreated Sleep Apnea are three to five times as likely to have an accident at work, at home and on the road.
- Patient who remain undiagnosed suffer from continual drowsiness and progressive memory loss.
- Studies shows 30 – 50% of commercial drivers suffer from untreated Sleep Apnea (3).
- Drivers diagnosed and treated show a 75% decrease in accidents (4).
- The average cost of a vehicular crash without injuries is over $75,000 (5).
- Accidents causing at least one injury cost over $217,000 average (5).
- Accidents involving a fatality cost an average of $3,540,000 (5).
- For every 100 employees, 50 would need to be studied for Sleep Apnea and 12.5 are likely to have severe Sleep Apnea. (6).

SOME EXAMPLES OF DEPARTMENT OF ENERGY RELATED EVENTS

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FOR MORE INFORMATION

http://www.ninds.nih.gov/disorders/sleep_apnea/sleep_apnea.htm

http://www.sleepapnea.org/info/index.html?gclid=COnGwNHd6ZoCFQuU7QodyCWNg

http://www.sleepapnea.org

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