Overview of COPD

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a common lung disease that affects millions of people, and it is the fourth leading cause of death in the United States. It is a progressive disease that causes serious disabilities, and COPD contributes to the development of heart disease, as well. Almost all cases of COPD are caused by cigarette smoking. Medications and lifestyle adjustments can help reduce the severity of COPD, but at this time there is no cure.

Learning Break: COPD will be defined here as a chronic, progressive lung disease.

OBJECTIVES

After finishing this module, the learner will be able to:

1. Identify the correct definition of COPD.
2. Identify the primary function of the pulmonary system.
3. Identify the major structures of the pulmonary system.
4. Identify the two disease processes involved in COPD.
5. Identify the primary cause of COPD.
6. Identify common signs and symptoms of COPD.
7. Identify medications that are commonly used to treat COPD.
8. Identify the proper use of oxygen for the patient with COPD.
9. Identify two complications of COPD.
10. Identify situations with COPD patients in which the CNA would notify a nurse.

THE PULMONARY SYSTEM

Physiology

The pulmonary system (also called the respiratory system) is vital to life because the pulmonary system 1) delivers oxygen to the body, and 2) eliminates carbon dioxide.

Our bodies depend on oxygen to survive. Oxygen is needed to produce the fuel and energy that we need to function. In addition, our bodies must eliminate carbon dioxide. Carbon dioxide is a gas that is produced when oxygen is used for energy; if carbon dioxide is not eliminated, the body cannot survive.

Oxygen is delivered to, and carbon dioxide is eliminated from the body by the pulmonary system. This delivery of oxygen and elimination of carbon dioxide is called gas exchange, and gas exchange is the primary function of the pulmonary system. When we inhale, oxygen is delivered to the blood that is circulating through the lungs, and the oxygen is carried by the blood to the heart, brain, kidneys, and other organs. When we exhale, the carbon dioxide that is produced during metabolism and is also carried by the blood is eliminated through the lungs. Normal gas exchange is an essential process: without it, we cannot survive.
**Anatomy**

The pulmonary system is comprised of: 1) the upper airway structures; 2) the two lungs; 3) the bronchial passages; 4) the alveoli, and; 5) the pulmonary circulation.

- **Upper airway structures:** The upper airway structures are, in order: the nose, the oral cavity, the larynx, and the trachea (commonly called the windpipe). These structures do not participate in gas exchange; they act as passages for air moving in and out of the lungs.

- **Lungs:** The lungs are made of elastic tissue that can expand and contract. The lungs contain a series of tubes called the bronchi and also the alveoli.

- **Bronchial passages:** The bronchial passages (also called the bronchi) start with the left and right main stem bronchi (for the left lung and the right lung), and as the bronchial passages extend into the lungs they branch out and get smaller. Only the tiniest bronchi - the respiratory bronchioles - are involved in gas exchange; the other bronchi function as passages for air to move through.

- **Alveoli:** The alveoli are where gas exchange occurs. The alveoli are located at the end of the bronchial passages. There are millions of alveoli, and they are very small, delicate structures that can be easily damaged.

- **Pulmonary circulation:** The lungs have a very extensive circulation. Most of the pulmonary circulation consists of capillaries, tiny blood vessels with very thin walls that are located immediately next to the alveoli. The pulmonary circulation has two basic functions: 1) it carries carbon dioxide from the body to the alveoli, and 2) it carries blood with oxygen from the lungs to the body.

**CHRONIC OBSTRUCTIVE PULMONARY DISEASE: THE DISEASE PROCESS**

When many people think of COPD they think of emphysema, and these terms - COPD and emphysema - are sometimes used interchangeably. However, COPD is actually a combination of several different disease processes: asthma, chronic bronchitis, and emphysema. In most people, chronic bronchitis and emphysema are the cause of COPD.

**Chronic Bronchitis**

Chronic bronchitis is defined as a chronic inflammation of the bronchi. People who have chronic bronchitis have bronchial passages that are chronically inflamed and swollen. In addition, large amounts of mucous are produced, and because of the inflammation, the swelling, and the excess production of mucous, the bronchi are partially obstructed.

**Emphysema**
Emphysema is defined as destruction of the small respiratory passages and alveoli. People who have emphysema have respiratory bronchioles and alveoli that are permanently damaged and non-functional and because of this damage oxygen in adequate amounts cannot reach the blood and carbon dioxide cannot be eliminated.

*Chronic bronchitis and emphysema are progressive diseases.* The changes in the bronchial passages and the permanent damage of the alveoli and the respiratory bronchioles occur slowly and gradually over a period of many years. No one completely clearly understands how they happen, but there is no doubt about what causes these changes - cigarette smoking.

**Causes of COPD**

Almost all cases of COPD are caused by cigarette smoking. There are a very small percentage of cases of COPD that are cause by environmental exposures and by second-hand smoke, and there are some rare genetic causes of COPD, but it is cigarette smoking that causes the great majority of the cases of COPD. The more years you smoke and the more cigarettes you smoke, the more severe COPD will be. It is not completely clear how cigarette smoking damages the respiratory passages and the alveoli, but the smoke seems to cause a permanent state of inflammation in the bronchial passages and permanent scarring in the respiratory bronchioles and alveoli.

**SIGNS AND SYMPTOMS OF COPD**

The signs and symptoms that a patient who has COPD will experience depend on: 1) how long the patient has had the disease; 2) how severe the disease is, and; 3) other pre-existing medical problems the patient may have. As mentioned in the introduction, COPD is a progressive disease and the damage to the respiratory structures develops slowly over many years. Because of that, patients who have COPD most often do not have signs and symptoms during the early stages of the disease or the signs and symptoms may be very subtle. But as the disease progresses and the patient ages, the following signs and symptoms will be seen and they get worse each year.

- **Dyspnea**: Dyspnea is a medical term that means difficulty breathing. Because the respiratory passages are swollen and narrowed, it is very difficult for the patient with COPD to draw air into his/her lungs. Also, because the alveoli are permanently damaged, even if air can be taken into the lungs, oxygen cannot reach the vital organs and that contributes to the dyspnea.

**Learning Break:** Some people who have COPD may have dyspnea all the time; this condition is called dyspnea at rest. Other people who have COPD may only have dyspnea that occurs when they try to ambulate or exercise; this condition is called dyspnea on exertion.
• Cough: People with COPD often have a cough, and the cough usually is accompanied by large amounts of mucous. This is called a **productive cough**.

• Wheezing: Many people who have COPD suffer from **wheezing**. Because the respiratory structures in people who have COPD are partially obstructed, air passing in and out of the lungs must be “forced” in and out of the lungs and this produces the wheezing sound that is characteristic of COPD.

• Tachypnea: Tachypnea is a medical term that means rapid breathing.

• Fatigue: Because oxygen delivery is compromised, patients with COPD get tired very easily.

People with COPD often suffer from respiratory infections, they are more susceptible to colds and the flu than are people who do not have COPD, and they have a higher risk for developing heart disease than do people with COPD. In the initial stages of the disease, the dyspnea, cough, and wheezing are very subtle and are hard to notice. Many people simply adjust their life to accommodate these problems and for a while this approach works. But as COPD gets worse - and it always does - the signs and symptoms seriously limit what people can do. Even a very slight level of exertion can be exhausting, having a simple conversation is difficult, and the person with severe COPD is, in a sense, a captive to the disease. If the person with severe COPD develops a cold or flu, this can quickly develop into pneumonia and that person may need to be admitted to intensive care and placed on a ventilator. Because the health status and the respiratory status of a person with COPD is so fragile and because they are so susceptible to sudden, unpredictable changes in their breathing, many people who have COPD become socially withdraw, anxious, and depressed.

**Learning Break:** People who have COPD suffer periods during which breathing is especially difficult. These periods are called **exacerbations of COPD**. The term simply means that the person’s breathing is worse than it usually is but that there is no obvious reason for this difficulty. Exacerbations of COPD are common, and they become more frequent and more intense as the disease gets worse and as the person gets older.

**TREATMENTS FOR COPD**

There is no cure for COPD, and the disease gets worse over time. However, COPD can be managed and the goals of treatment are to: 1) help the patient live as normally as possible, and; 2) reduce the number of complications and exacerbations. Life style changes, patient education, and medications offer the most effective ways to manage COPD.

**Life Style Changes and Patient Education**

Life style changes can help a person who has COPD cope with the disease, and these changes should include stopping smoking, diet, and exercise.
Stopping smoking is the first and most important treatment for COPD, and stopping smoking can help slow the progression of COPD. However, it is notoriously difficult for people to stop smoking: nicotine is very addictive. There are many types of smoking cessation programs, and people with COPD who smoke can use nicotine gum, lozenges, or patches. The medications Chantix and Zyban can be helpful, as well.

People who have COPD do not have to follow a specific diet. However, they should be encouraged to stay well hydrated. Dehydration can make the mucous in the respiratory passages very thick. This can interfere with the flow of air and it can increase the risk of respiratory infections.

Exercising can be very difficult for people who have COPD, but it can help strengthen the respiratory muscles and make it easier to breath. People with COPD can also be taught breathing and coughing exercises by a physical therapist or respiratory therapist, and these can help someone cope with COPD. Activity is helpful physically and mentally and people should be encouraged to do what they can tolerate.

Health care professionals can help a person with COPD to manage the disease, but it is very important for the patient to take an active role in the process. The lifestyle changes mentioned above can be very helpful, but the patient must be the one who sustains these changes. Important points that should be covered in patient education include:

- Handling exacerbations: Every person who has COPD will have exacerbations. Regardless of what the person does, there will be times when they simply “cannot catch their breath.” Patients must be educated about what to do and when to seek medical attention if they are having an exacerbation.

- Hygiene: People with COPD must be aware of their susceptibility to infection. They should be instructed to get a yearly flu vaccine, practice good hand washing, and avoid contact with people who have an infectious illness.

- Complying with lifestyle changes: Patients need to know that although COPD cannot be cured, it can be managed if they comply with lifestyle changes.

**Medications**

There is a variety of medications that can be used to treat COPD, but these medications can be divided into two groups: bronchodilators and anti-inflammatory drugs.

The bronchodilators work by physically opening up the bronchial passages and allowing for greater air flow. Bronchodilators can be short-acting or long-acting: albuterol, Atrovent, and Spiriva are commonly used bronchodilators. The anti-inflammatory drugs work by decreasing inflammation in the respiratory passages; commonly used anti-inflammatory drugs include Flovent and prednisone. Antibiotics are not used unless the patient has an infection. However, people who have COPD are very susceptible to upper respiratory infections and they should be given a flu vaccine each year.

Many - but not all - patients who have COPD need oxygen. Oxygen should be considered to be a drug; it has benefits and risks and it must be used correctly. The
patient’s physician will determine how much oxygen the patient needs, and the rate of oxygen flow should **never** be changed - by the patient or by anyone else - unless a change has been ordered by the physician.

**WORKING WITH A PATIENT WHO HAS COPD**

Working with a patient who has COPD is not difficult, but you will need to understand several key points.

The first point is **time**. Because the patient who has COPD gets out of breath and fatigued very easily, simple tasks such as dressing, eating - and in severe cases, talking – will take them much longer to do, and this should be considered when you are planning your care.

You must also be very aware of **hygiene** when you are caring for a patient who has COPD. People with COPD are very susceptible to respiratory infections. If you are going to be caring for this patient population you may be required to have a flu shot. You should **not** be caring for a patient who has COPD if you have the flu or any other infectious illness, and you should be very careful to use standard precautions for infection control and to **always** use proper hand washing techniques.

The final point you must consider when caring for these patients is **safety**. The breathing status of someone with COPD is very compromised, and even small stressors can cause infections or an exacerbation that can be serious. Assessing the respiratory status of someone who has COPD is not the responsibility of the CNA, but you should be able to recognize when the patient is in distress. You should immediately notify a nurse or your supervisor if any of the following occur.

- The patient has a fever.
- The patient’s respiratory rate is abnormally fast or slow.
- The patient has an abnormally high pulse.
- The patient requests that his/her oxygen flow be increased.
- The patient reports that the bronchodilator medication did not provide relief.