

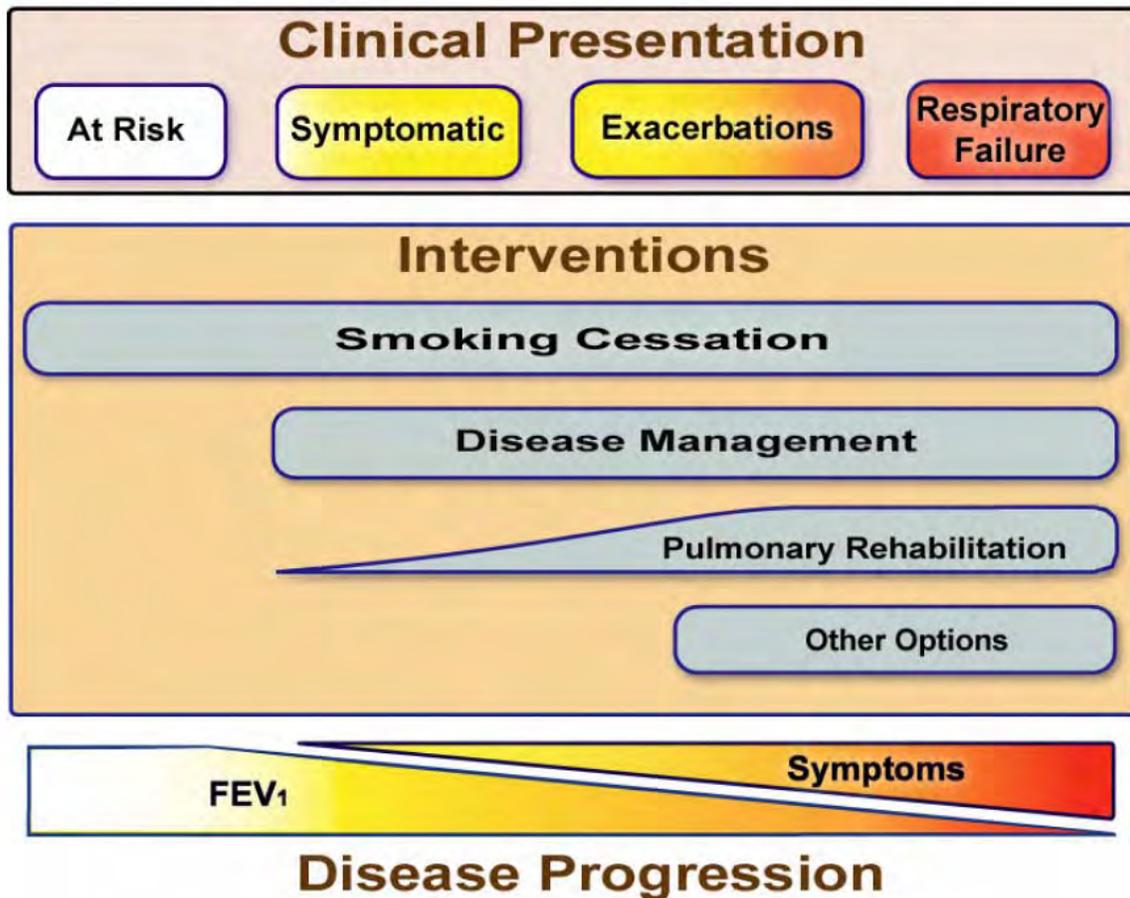
# American Thoracic Society

and

EUROPEAN RESPIRATORY SOCIETY



## Standards for the Diagnosis and Management of Patients with COPD



This section is for patients with COPD and their family and friends

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## Participants

The committee members are clinicians, nurses, respiratory therapists and educators interested in the field of COPD. The document is unique in that it also had input from patients suffering from COPD. The committee members were proposed and approved by the ATS and ERS. The members were selected because of their expertise and willingness to participate in the generation of the document. A unique feature of this project was the development of a patient document that could serve as a formal source of information for the patients, thereby making them partners in the effort to decrease the burden of the disease.

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# 1. Patients: general

## 1.1. Anatomy and function of the normal lung

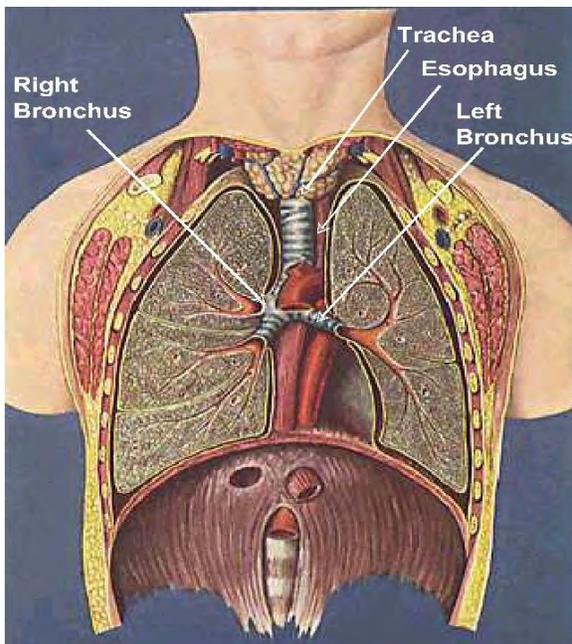
To understand your lung condition, you should be familiar with how the lungs normally work.

### 1.1.1. How do the lungs normally work?

The chest contains two lungs, one lung on the right side of the chest, the other on the left side of the chest. Each lung is made up of sections called lobes. The lung is soft and protected by the ribcage. The purposes of the lungs are to bring *oxygen* (abbreviated O<sub>2</sub>), into the body and to remove *carbon dioxide* (abbreviated CO<sub>2</sub>). Oxygen is a gas that provides us energy while carbon dioxide is a waste product or “exhaust” of the body.

### 1.1.2. How does air get into the body?

To deliver oxygen to the body, air is breathed in through the nose, mouth or both. The nose is the preferred route since it is a better filter than the mouth. The nose decreases the amount of irritants delivered to the lung, whilst also heating and adding moisture (humidity) into the air we breathe. When large amounts of air are needed, the nose is not the most efficient way of getting air into the lungs and therefore mouth breathing may be used. Mouth breathing is commonly needed when exercising.



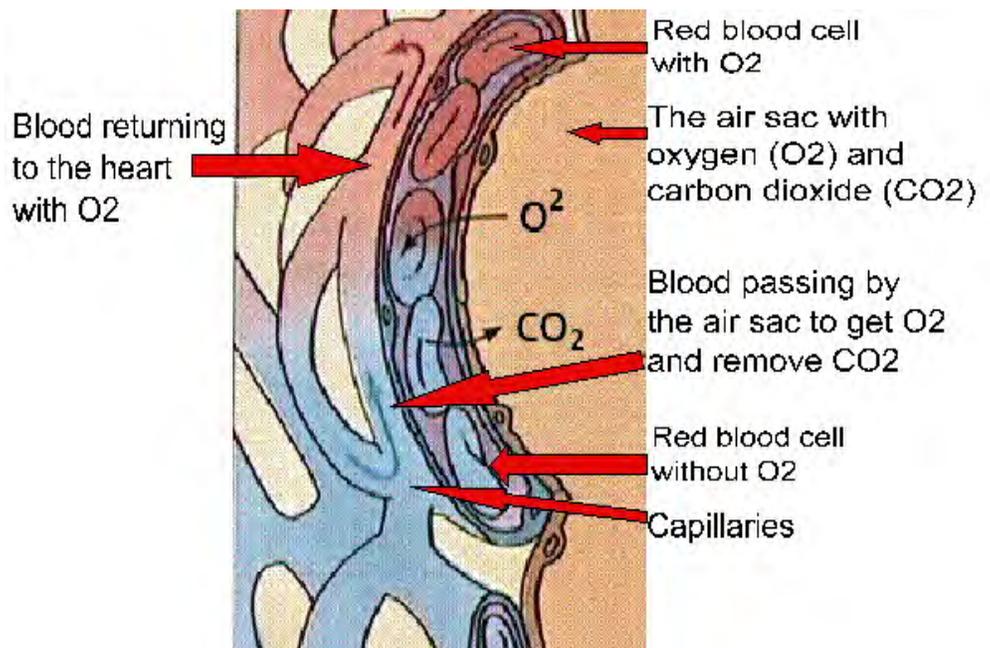
After entering the nose or mouth, air travels down the *trachea* or “*windpipe*”. The trachea is the tube lying closest to the neck. Behind the trachea is the *esophagus* or “*food tube*”. When we inhale air moves down the trachea and when we eat food moves down the esophagus. The path air and food take is controlled by the epiglottis, a gate that prevents food from entering the trachea. Occasionally, food or liquid may enter the trachea resulting in choking and coughing spasms.

The trachea divides into one left and one right breathing tube, and these are termed *bronchi*. The left bronchus leads to the left lung and the right bronchus leads to the right lung. These breathing tubes continue to divide into smaller and smaller tubes called *bronchioles*. The bronchioles end in tiny air sacs called *alveoli*. Alveoli, which means “bunch of grapes” in Italian, look like clusters of grapes attached to tiny breathing tubes. There are over 300 million alveoli in normal lungs. If the alveoli were opened and laid out flat, they would cover the area of a doubles tennis court. Not all alveoli are in use at one time, so that the lung has many to spare in the event of damage from disease, infection or surgery.

### 1.1.3. What about oxygen and carbon dioxide?

Surrounding each alveoli are tiny *blood vessels* or *capillaries*. The tiny blood vessels surround the alveoli like a net. This is where the oxygen that has traveled down the breathing tubes into the alveoli enters the blood. The carbon dioxide or “exhaust” gas from the body trades places

with the oxygen by leaving the blood and entering the alveoli. Carbon dioxide is then exhaled out of the lungs. For our body to function well, oxygen must enter the blood and carbon dioxide must leave the blood at a regular rate.



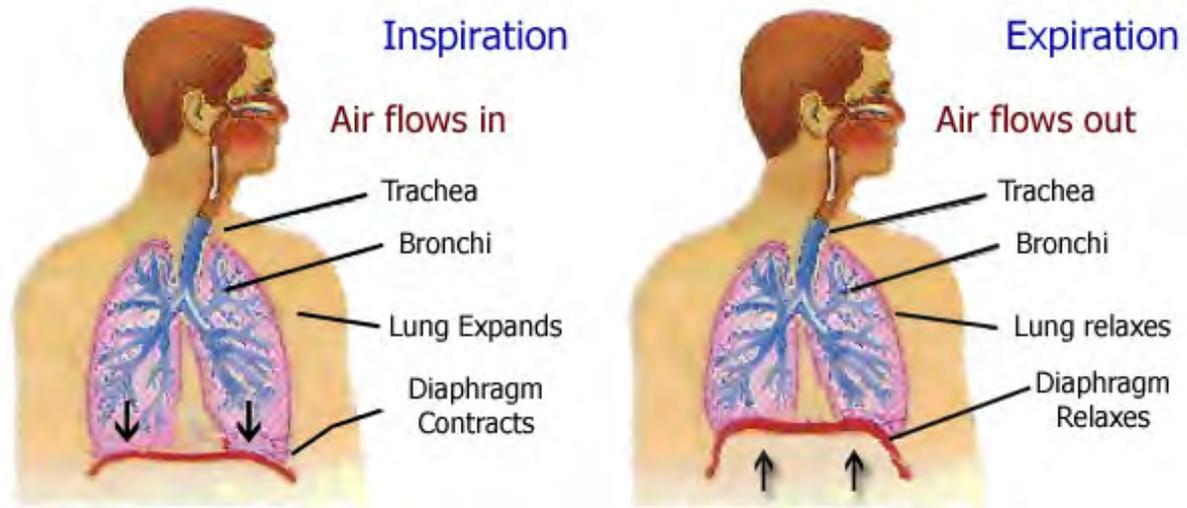
The lung also contains blood vessels and a covering of nerve fibers. Outside of the lung, there are two layers of thin material called *pleura*. One pleura is attached directly to the outside of

the lung and the other is attached to the inside of the chest, close to the ribs. The pleura contain nerve fibers. When the pleura are irritated, pain can occur, and this is called *pleurisy*. Conversely, cutting into the lungs themselves does not cause pain because there are no nerve fibers.

The lung also has two sets of blood vessels. Blood vessels can be *arteries* or *veins*. One set of blood vessels feeds into and nourishes the lung, whilst the other set is responsible for transporting oxygen from the lung to the body *via* the heart. Blood that has picked up oxygen from the lung returns to the left side of the heart and is pumped out to deliver this oxygen-rich blood (called *arterial* blood) to the body. After the blood has delivered oxygen to the cells of the body (skin, organs, *etc.*) it is called *venous* blood, which returns to the right side of the heart. Venous blood contains high amounts of carbon dioxide and small amounts of oxygen. The venous blood returns to the lungs to get rid of carbon dioxide and to pick up oxygen. When the lungs are unable to take in enough oxygen or the oxygen is blocked from getting into the blood, the lung tries to protect itself from low oxygen by shutting down some of the blood vessels. The heart then has to pump the same amount of blood as usual through fewer blood vessels. Because the total amount of blood in the body has not changed, this creates an added stress on the heart. The back-up of blood causes the heart to work harder and often results in the heart becoming enlarged, which is termed *cor pulmonale* or right heart failure.

#### **1.1.4. Which muscles help in the breathing process?**

Many different muscles are used in breathing. The largest and most efficient muscle is the *diaphragm*. The diaphragm is a large muscle that lies under the lungs and separates them from the organs below, such as the stomach, intestines, liver, *etc.* As the diaphragm moves down or flattens, the ribs flare outward, the lungs expand and air is drawn in. This process is called *inhalation* or *inspiration*. As the diaphragm relaxes, air leaves the lungs and they spring back to their original position. This is called *exhalation* or *expiration*. The lungs, like balloons, require energy to blow up but no energy is needed to get air out.



The other muscles used in breathing are located between the ribs and certain muscles extending from the neck to the upper ribs. The diaphragm, muscles between the ribs and one of the muscles in the neck called the *scalene* muscle are involved in almost every breath we take. If we need more help expanding our lungs, we “recruit” other muscles in the neck and shoulders. In some conditions, such as emphysema, the diaphragm is pushed down so that it no longer works properly. This means that the other muscles must work extra hard because they aren’t as efficient as the diaphragm. When this happens, patients may experience *breathlessness* or *shortness of breath*.

### 1.1.5. How do the lungs protect themselves?

The lungs have several ways of protecting themselves from irritants. First, the nose acts as a filter when breathing in, preventing large particles of pollutants from entering the lungs. If an irritant does enter the lung, it will get stuck in a thin layer of *mucus* (also called *sputum* or *phlegm*) that lines the inside of the breathing tubes. An average of 3 ounces of mucus are secreted onto the lining of these breathing tubes every day. This mucus is “swept up” toward the mouth by little hairs called *cilia* that line the breathing tubes. Cilia move mucus from the lungs upward toward the throat to the epiglottis. The epiglottis is the gate, which opens allowing the mucus to be swallowed. This occurs without us even thinking about it. Spitting up sputum is not “normal” and does not occur unless the individual has *chronic bronchitis* or there is an infection, such as a chest *cold*, *pneumonia* or an *exacerbation of chronic obstructive pulmonary disease (COPD)*.

Another protective mechanism for the lungs is the *cough*. A cough, while a common event, is also not a normal event and is the result of irritation to the bronchial tubes. A cough can expel mucus from the lungs faster than cilia.

The last of the common methods used by the lungs to protect themselves can also create problems. The airways in the lungs are surrounded by bands of muscle. When the lungs are irritated, these muscle bands can tighten, making the breathing tube narrower as the lungs try to keep the irritant out. The rapid tightening of these muscles is called *bronchospasm*. Some lungs are very sensitive to irritants. Bronchospams may cause serious problems for people with COPD and they are often a major problem for those with asthma, because it is more difficult to breathe through narrowed airways.

## **1.2. What is chronic obstructive pulmonary disease (COPD)?**

*Chronic obstructive lung disease (COPD)* describes a group of lung conditions (diseases) that make it difficult to empty the air out of the lungs. This difficulty can lead to shortness of breath (also called breathlessness) or the feeling of being tired. COPD is a word that can be used to describe a person with *chronic bronchitis*, *emphysema* or a combination of these. COPD is a different condition from asthma, but it can be difficult to distinguish between COPD and chronic asthma.

Two people may have COPD, but one may have more symptoms of chronic bronchitis while another may have more symptoms of emphysema. It is helpful to understand the difference between the two conditions, as COPD means a person may have some chronic bronchitis as well as emphysema.

### **1.2.1. What is chronic bronchitis?**

Chronic bronchitis is a constant swelling and irritability of the breathing tubes (bronchi or bronchioles) and results in increased mucus (phlegm) production. Chronic bronchitis is diagnosed when a person reports cough and mucus on most days for 3 months during 2 consecutive years when other lung conditions have been eliminated as a cause. This means that

other conditions (and there are many) that may cause sputum production or cough are not the cause. *Airway obstruction* occurs in chronic bronchitis because the swelling and excessive mucus production causes the inside of the breathing tubes to be narrower than normal. The narrowing of the airways prevents the normal amount of air from reaching the lungs. The amount of narrowing is measured with a breathing test called spirometry.

### **1.2.2. What is emphysema?**

Emphysema is a disease that involves the *alveoli* (air sacs) of the lung. Normally there are over 300 million alveoli in the lung. These alveoli are stretchy and springy, like little balloons. Like a balloon, it takes effort to blow-up a normal alveoli, however, it takes no energy to empty the air sac because the alveoli spring back to their original size. In emphysema, the walls of some of the alveoli have been ruined. When this happens the alveoli become stretchy and act more like paper bags. A paper bag is easy to blow-up, but you need to squeeze the bag to get the air out. So, instead of just needing effort to get air into the lungs, it also takes energy to squeeze the air out. As it is difficult to push all of the air out of the lungs, they do not empty efficiently and therefore contain more air than normal. This is called *hyperinflation* or *air trapping*. The combination of constantly having extra air in the lungs and the extra effort needed to breathe, results in the feeling of shortness of breath.

The “obstruction” in emphysema is because the breathing tubes tend to collapse on exhalation, preventing you from getting the normal amount of air out of your lungs. This is a result of the loss of stable alveolar walls, which normally hold the breathing tubes open as your exhale. Airway obstruction is measured with *spirometry* (a breathing test). Several other tests can be performed that can tell your provider if it is likely that you have a lot of emphysema causing your COPD.

### **1.2.3. What is bronchiectasis?**

Bronchiectasis is a permanent enlargement of the bronchi and bronchioles. The enlarged airways produce abnormal amounts of mucus, which can block (obstruct) the breathing passages. Bronchiectasis may occur after severe pneumonia. While bronchiectasis may at first appear to be COPD, the evaluation and treatment are different.

#### **1.2.4. What is asthma?**

Asthma is a condition of chronic swelling of the airways. These airways are sensitive to stimulation by a number of things, such as infection, cold air, exercise, pollens, *etc.* The swelling may produce an obstruction of the airways, similar to COPD. Some people with COPD also have asthma.

#### **1.2.5. What is bronchiolitis?**

Bronchiolitis is characterized by swelling of the small airways (bronchioles), usually resulting from inflammation or infection. This condition is more commonly seen in children after severe lung problems and in adults after lung transplantation. The narrowing of the breathing passages can be confused with COPD.

#### **1.2.6. What causes COPD?**

COPD can be caused by many factors, although the most common cause is cigarette smoke. Inhaling irritating particles, such as smoke or air pollutants, can cause the mucus glands that line the bronchial tubes (bronchi) to produce more mucus than normal, and can cause the walls of the bronchi to thicken and swell (inflammation). This increase in mucus causes you to cough, frequently resulting in raising mucus (or phlegm). COPD can develop if small amounts of these irritants are inhaled over a long period of time or if large amounts are inhaled over a short period of time.

Environmental factors and genetics may also cause COPD. For example, heavy exposure to certain dusts at work, chemicals and indoor or outdoor air pollution can contribute to COPD. The reason why some smokers never develop COPD and why some never-smokers get COPD is not fully understood. Family genes or heredity probably play a major role in who develops COPD.

#### **1.2.7. How do I know I have COPD?**

Cough, sputum production or shortness of breath that will not go away are all common signs of COPD. These signs and a history of smoking will usually indicate the need for a test called spirometry, which measures if you have airway obstruction or not.

### **1.2.8. How is COPD treated?**

The first most important treatment if you are a smoker is to stop smoking. As well as helping you quit smoking, your healthcare provider may prescribe medicines that widen the breathing tubes (*bronchodilators*), reduce swelling in the breathing tubes (*anti-inflammatory drugs*) or treat infection (*antibiotics*). Medications have been shown to help stabilize the breathing passages and decrease swelling. In order to provide control of your COPD, these medications must be taken every day, probably for the rest of your life.

Currently, there is no treatment available to restore damaged bronchi from bronchitis or alveoli affected by a large amount of emphysema. Unfortunately, the damage that has been done to the alveoli is permanent. In some parts of the world, surgery (*lung volume reduction*) can be performed as a way of removing some (but not all) areas of the lungs with large amounts of emphysema.

With COPD you can learn to use the lung power you have more efficiently. You should learn as much as you can about your condition. Attending groups or enrolling in a *Pulmonary Rehabilitation Program* can be helpful. *Pulmonary rehabilitation* may also be recommended so that you can learn to be in control of your breathing, instead of your breathing controlling you.

### **1.2.9. Will COPD ever go away?**

The term *chronic* in chronic obstructive respiratory disease means all of the time, therefore, you will have COPD for life. While the symptoms sometimes are less after you stop smoking, they may never go away entirely. Improvements in symptoms depend on how much damage has occurred to your lungs.

### **1.2.10. How does my healthcare provider know I have COPD?**

Your healthcare provider will decide if you have COPD based on both your reports of symptoms and test results. The single most important test to determine if you have COPD is spirometry. The most important things you can do to help your healthcare provider in determining if you have COPD is to: 1) be honest about your smoking history; 2) share your

exposures to pollutants and chemicals; and 3) remember, as best you can, when your symptoms first started.

### **1.3. What are the signs and symptoms of COPD?**

COPD can cause *breathlessness* (also called *shortness of breath* or *dyspnea*), *cough*, *production of mucus/sputum/phlegm* and *tiredness* (also called *fatigue*). Symptoms such as breathlessness and fatigue cannot be seen or easily measured because they are sensations or feelings that you experience. Only the person experiencing the symptom can describe these sensations and how badly they make them feel.

When symptoms first occur, most people ignore them as they think that they are related to smoking, *i.e.* “It’s just a smoker’s cough” or “I’m just winded/breathless from being out of shape”. These symptoms can worsen to the point that people are motivated to stop smoking in order to control the symptoms. Others let the symptoms control them. These signs and symptoms of COPD (breathlessness, tiredness, cough and sputum production) are an indication that the lungs are not normal, even though the lungs are actually responding “normally” to the irritation. Many people with COPD develop most, if not all, of these signs and symptoms.

#### **1.3.1. Is shortness of breath (breathlessness) a symptom of COPD?**

Yes, *shortness of breath*, also known by the term *breathlessness* or the medical term of *dyspnea*, is a common symptom of COPD. Breathlessness is a feeling occurring when the lung changes from working in the way it was normally designed to work, to working differently. If the lung senses that it takes more work or effort to move air in and out of the lungs, a feeling of breathlessness will be experienced. While this feeling can be very uncomfortable to the person with COPD, it does not mean that the person is further damaging their lungs by doing things that make them breathless. Unfortunately, people try to avoid this feeling by doing fewer activities or activities less often. This strategy of avoiding activities to avoid breathlessness may work initially, but eventually avoiding activities leads to getting out of shape or becoming *deconditioned*. Becoming deconditioned can result in even more shortness of breath with activity. One of the greatest challenges for people with COPD is learning to continue leading an active life in spite of the difficulties breathing. *Pulmonary rehabilitation programs* are

useful in helping people learn strategies to reduce this feeling of breathlessness with activities. An important principle for people with COPD to learn is to never avoid an activity because it causes breathlessness. To do so means COPD has taken control of you and you have lost control over your breathing problem.

#### ***1.3.1.1. What can I do to treat breathlessness?***

If you and your provider find that your breathlessness is from your COPD, you can do several things. First, be sure you are taking your medications when and how prescribed, even if you don't "feel" that they are helping. Secondly, begin a regular program of exercise to build up your strength. Thirdly, learn about paced breathing and ways of breathing more efficiently with activities. These techniques are taught in pulmonary rehabilitation programs. Fourthly, if you find the support of others with the same problem helpful, enroll in a pulmonary rehabilitation program or begin attending breathing support groups offered by your local *lung association* or clinic.

#### ***1.3.1.2. When should I call my healthcare provider about my breathlessness?***

Anytime a person has a new symptom, or the symptom worsens for no known reason, you should consider calling your healthcare provider. Describe to your provider when the breathlessness started, how long it lasts and what makes the breathlessness better or makes it worse. Providing information of this kind can help your provider determine the best steps to take in making you more comfortable.

#### **1.3.2. Is coughing a symptom of COPD?**

*Cough* can be expected with COPD. Cough is a natural reaction of the airways to try and remove mucus or it can be a reaction to protect the airways from inhaled irritants. Coughing is therefore a good thing when it results in moving sputum or phlegm out of the breathing passages. For this reason, you will sometimes find your healthcare provider unwilling or hesitant to give you anything to prevent you from coughing. Conversely, cough resulting in airway spasm is not useful over a long period of time, but can be controlled with cough "*suppressants*". While a person with COPD will often cough, coughing does not mean you have COPD.

### **1.3.2.1. What can I do to treat cough?**

Cough due to irritants can sometimes be controlled with “over-the-counter” (not needing a prescription) remedies like throat lozenges and cough syrups. Cough due to smoking will probably not go away unless the person stops smoking. If treatment with over-the-counter medications does not control the cough, your provider may prescribe medication. Coughs that are due to thick, sticky mucus can be treated by drinking plenty of fluids. Fluids can help loosen and thin the mucus. If fluids do not work, a cough *expectorant* or *mucoytic* may loosen the secretions. Coughing that produces spasm may require an inhaled *bronchodilator* and/or inhaled *steroid*. Coughing that does not produce mucus or that becomes violent and difficult to control will usually subside with cough *suppressants* (also called *antitussives*) such as codeine. Many people forget that simply drinking more fluids is often the best treatment for a cough.

### **1.3.2.2. When should I call my healthcare provider about my cough?**

Most coughing is not dangerous. People without COPD should consider seeing their provider if they have a cough that has lasted several weeks or a cough without a known reason (for example, the common cold). In addition, people with certain conditions, such as a collapsed lung or hernias, may be advised by their provider to control their coughing with medications.

Incontinence (inability to control passing urine during cough) may be another problem caused by coughing. Urinary incontinence during cough may occur more frequently in men who have had their prostate removed. Controlling the cough will reduce incontinence. Emptying the bladder more frequently than usual (*e.g.* every 2 hours) may also reduce incontinence. Pelvic muscle exercises are available and have been found to be useful in those with chronic problems with incontinence ([www.utdol.com/application/topic.asp?file=wom\\_issu/6897&type=A](http://www.utdol.com/application/topic.asp?file=wom_issu/6897&type=A)). Unexplained cough or coughing that causes you to “pass out” should be reported to your healthcare provider. Cough that does not go away with inhaler treatment should also be reported.

### **1.3.3. Is sputum production a symptom of COPD?**

*Sputum* production, also called *phlegm* or *mucus* production, can also be a symptom of COPD. Sometimes, people confuse sputum with the mucus coming from their nose, which has drained from their sinuses. Sinus drainage from the nose may drip down the back of the throat to the trachea, where it may “mix” with mucus coming from the lungs. When your provider asks about sputum production, they are usually asking about the amount coming from your lungs, not your sinuses.

It is normal for the airways to produce several ounces of sputum a day. This mucus is needed to keep the breathing passages moist. When the lungs are bothered by irritants, they try to protect themselves by producing additional mucus to trap any inhaled particles from entering the lungs. Constant attack by irritants, such as smoke, however, makes these glands enlarge and produce two to three times the normal amount of mucus. Chronic irritation also causes a problem with the natural cleaning system in the airways provided by the *cilia*.

Cilia are destroyed by smoking. Smoking also causes any surviving cilia to become paralyzed for at least 20 minutes following inhalation of cigarette smoke. The result is a poorly working sweeping system that doesn't clear the air passages very well.

Clearing mucus can be a problem for people who are very weak from illness or if they take medications that make them sleepy. Sometimes medications are needed to loosen the mucus so that the mucus can be coughed out more easily. It is possible that sputum that is allowed to accumulate in the lungs may “grow” bacteria, which can cause acute bronchitis or pneumonia.

#### ***1.3.3.1. What can I do to treat my problem with sputum?***

The first thing to remember is that sputum needs to be coughed up. Swallowing small amounts of sputum is not known to cause health problems. However, it is better to cough the sputum into a disposable tissue so that you can see the color of the sputum. Knowing the color and amount of sputum you raise on a daily basis is helpful to the person treating your COPD.

There are usually three types of treatment needed for sputum problems:

1. *expectorants*, which make the sputum easier to cough out;
2. *mucolytics*, which thin thick mucus and;
3. *antibiotics*, which treat infections in the lung.

A person with COPD may not need any of the three treatments listed above. A common problem for people with COPD is thick sputum, making sputum difficult to cough up and out. Thick sputum may come from a need to increase your fluid intake. The most natural way of thinning mucus is by drinking any type of non-dehydrating liquid, such as water, juices, *etc.* These will help make the sputum thinner and easier to cough. Since alcohol, coffee and tea are dehydrating, they should be avoided as a means of liquefying mucus. A person with sputum production should drink at least eight glasses (2 quarts/liters) of liquid a day.

If this natural way of thinning mucus does not work, then medications may be used. *Expectorants* are medications that may help make the mucus looser. Not all medical scientists, however, are convinced that they work. The most common type of expectorant is a substance called *guaifenesin*. Another approach is to use medications that break up the sputum molecules, called *mucolytics*. The most common type of mucolytic is a medication called *N-acetylcysteine*. This medication is available in inhaled form and must be delivered by a nebulizer. *N-acetylcysteine* is more commonly prescribed to patients in European countries than in the USA.

The use of *antibiotics* is reserved for sputum that is infected. Sputum that is clear in color is usually not infected. Sputum that is colored light brown, but which you can see through, may be discolored from diet, such as drinking coffee. However, infected sputum (and therefore infected lungs) is likely if the sputum is a deep yellow color that cannot be seen through. Other colors that may indicate an infection is developing are green, brown or reddish mucus.

### ***1.3.3.2. When should I call my healthcare provider about changes in sputum?***

Generally, a change in the color and the amount of sputum is a sign that there is some abnormal activity in your lungs. In some instances, these changes are so predictable (occurring

once or twice a year) that the patient with COPD and their provider can establish a system of treatment that the patient can start at home. For example, seven days of antibiotics and steroids may be prescribed for the patient to begin as soon as signs and symptoms of an infection begin. In most instances, the sputum can tell the person a great deal about what is happening in their lungs, maybe even hours to days before a severe infection develops. It is believed that people who can recognize and treat an infection early can avoid a more serious problem needing hospitalization.

### **1.3.4. Is wheezing a symptom of COPD?**

Wheezing is a sign that air is trying to flow through a narrow passage and it may indicate that the lungs are getting out of control. Airway narrowing can occur from spasms, swelling or mucus accumulating in the airways. Sometimes, when a person with COPD develops an infection in their lungs, wheezing may occur. This wheezing should be controlled with medications so that the wheezing lessens and finally is no longer present. If wheezing worsens or cannot be controlled with medication, call your healthcare provider.

#### ***1.3.4.1. What can I do to treat wheezing?***

Taking your bronchodilator medication regularly should control wheezing. Avoid things that cause wheezing, such as smoky places or, if cats or other things cause you wheezing, avoid them. Usually wheezing does not go away without treatment.

#### ***1.3.4.2. When should I call my healthcare provider about my wheezing?***

If wheezing and breathlessness do not go away with the medication you have been given, call your healthcare provider. If these symptoms become severe, seek emergency treatment.

### **1.3.5. Is tiredness or fatigue a symptom of COPD?**

While *tiredness* or *fatigue* can be very uncomfortable, it is not dangerous since it is not damaging your lungs or other organs. Tiredness may, however, be a symptom of another condition. Like breathlessness, tiredness is an uncomfortable feeling. It is a common symptom in people with COPD. Tiredness is a feeling of loss of energy or stamina. Generally, breathlessness and tiredness go hand in hand and they are, for some people, difficult to tell apart. Tiredness discourages people from keeping active, which leads to greater loss of energy,

which leads to more tiredness. When this cycle begins it is sometimes hard to break. It is estimated that for every day a person is hospitalized, it takes 3–4 days to regain their stamina. Tiredness, like breathlessness, can be prevented or reduced by keeping active and learning how to do activities with less effort.

#### ***1.3.5.1. What can I do to treat tiredness?***

If you and your healthcare provider find that your tiredness is from your COPD, you should take the same measures as with breathlessness; make sure you are taking your medications as prescribed, begin a regular program of exercise to build your strength, learn about paced breathing and ways of breathing more efficiently with activities and consider learning from others with the same problem by attending breathing support groups offered by your Lung Association or enrolling in a pulmonary rehabilitation program.

#### ***1.3.5.2. When should I call my healthcare provider about my tiredness?***

Call your healthcare provider when unexpected tiredness occurs and does not go away. Ask yourself similar questions that you would with breathlessness. Have you ever had this type of tiredness before, what happened? Anytime a person has a new symptom, or the symptom worsens for no known reason, they should consider calling their healthcare provider. Describe to your provider when the tiredness started, how long it lasts, what makes the tiredness better or makes it worse. If you have ever had this type of tiredness before, what happened? Did any medication help or did you need to be hospitalized? Providing information of this kind can help your provider figure out the best ways to make you more comfortable.

## **1.4. How do I know if I have a cold**

It is sometimes difficult to figure out if a respiratory infection is a *cold* or the *flu*, or a respiratory infection for another reason. A cold or flu can often be the first sign of an exacerbation. The most common signs and symptoms of a cold start gradually and can include a runny nose, watery eyes, sneezing and/or a sore throat. You may or may not experience a fever, headache or extreme exhaustion with a cold. A cold is an infection caused by a virus. Colds are easily transmitted (passed from one person to another) between people who are infected. A cold is transmitted either by contaminated air we breathe, or by touching something

or someone with the virus. For example, a cold can be transmitted by inhaling the air of a person with a cold who coughs or sneezes near you. A cold can also be transmitted by shaking hands with someone with a cold and then touching your nose or eyes. Besides avoiding people with colds, a person with COPD should be careful to wash their hands after having contact with people with a cold or suspected of having a cold.

#### **1.4.1. Are colds dangerous?**

Respiratory infections from a cold are generally not dangerous. However, people who get a cold who have COPD, people who are very sick (receiving chemotherapy) or people who are weak (elderly) may become more ill if they get a cold

#### **1.4.2. What can I do to treat a cold?**

For most people, treating their symptoms of the cold is the best and only treatment that is needed. For example, if a cold causes your sputum to become thickened, drink large amounts of fluids. If your nose becomes congested, use a decongestant or nasal spray. Nasal decongestants should only be used for several days. Avoid giving your cold to others by not having contact with others for 3–4 days.

#### **1.4.3. When should I call my healthcare provider about my cold?**

Call your provider if the symptoms continue to worsen. Signs of worsening are when the mucus from your lungs turns deep yellow, your shortness of breath becomes more severe than usual and won't go away, you develop a fever, or you are suddenly unable to get out of bed.

### **1.5. How do I know if I have the flu?**

The *flu* is caused by the *influenza* virus and can be confused with a cold or a respiratory infection. The flu is different from a cold in that the symptoms begin very suddenly. The most common signs and symptoms of the flu include more shortness of breath than usual, fever, extreme exhaustion, muscle aches (called myalgias) which can last 2–3 weeks, stomach upset, severe coughing without raising sputum and headache. The flu is easily transmitted between people. Like a cold, the flu can be transmitted in the air, or by touching something or someone contaminated with the virus. For example, the flu can be transmitted by inhaling the air near a

person with the flu who coughs or sneezes. The flu can also be transmitted by shaking hands with someone with the flu and then touching your nose or eyes. Besides avoiding people with the flu, a person with COPD should be careful to wash their hands after having contact with people with the flu or people suspected of having the flu.

### **1.5.1. Is the flu dangerous?**

The flu can be dangerous for those who are weak or those who get serious respiratory infections easily. People with very severe COPD should be careful not to expose themselves to the flu and should seek immediate medical attention if they have the flu.

### **1.5.2. How do I prevent the flu?**

Since avoiding people is not very practical, getting a flu shot can reduce your chances of getting the flu. The flu shot must be “renewed” every year because the type of virus causing the flu changes from year to year. The flu shot protects you from the types of viruses that are likely to cause the flu for that year. The shot is no guarantee that you will not get the flu, but it does reduce your chances of getting it.

#### ***1.5.2.1. Can I get the flu from the flu shot?***

No, you cannot “get” the flu from the shot. While in the past the flu shot contained the “live” or active form of the virus, this no longer occurs. The way the flu vaccine is now processed does not give people the flu. Sometimes, however, people who were already exposed to the flu get the flu after a shot, but this is a coincidence. It takes 1–2 weeks after you get the shot for the vaccine to give you protection. Soreness where the needle entered the skin or mild aches can occur for 1–2 days after the shot. The flu shot is no guarantee you will not get the flu, but if you get the flu, the seriousness of the flu is often less.

### **1.5.3. What can I do to treat the flu?**

You should discuss the treatment of flu with your healthcare provider. Some may want to see you at the first sign of the flu and prescribe medication. If your healthcare provider feels you can handle the flu, you should treat the symptoms by drinking eight glasses of liquids a day, taking acetaminophen/paracetamol for fever, headache and/or muscle aches, resting for exhaustion, and using your inhalers for chest discomfort/tightness.

### **1.5.4. When should I call my healthcare provider about the flu?**

Call your healthcare provider if your symptoms worsen despite treatment or if you cough up sputum that is deep yellow/green in color.

## **1.6. How do I know I have a pneumonia**

For people with COPD, it is sometimes difficult to know if their respiratory infection is the *flu*, a *cold*, a *respiratory infection (acute bronchitis)* or *pneumonia*. Acute bronchitis is the sudden swelling of the *bronchial* tubes from infection. Often, your provider may not be able to tell you what organism has caused the bronchitis, but antibiotics control the problem quickly. Conversely, pneumonia may begin like bronchitis, but does not go away with usual treatment. Common signs of pneumonia are more shortness of breath than usual, cough, increase (or sudden decrease) in the amount of sputum, a deep yellow, green or red color to the sputum, coughing blood, fatigue (extreme exhaustion), or fever. A chest x-ray is needed to diagnose pneumonia.

*Pneumonia* can develop in the lungs from an infection caused by any of several *organisms* (also called “germs” or “bugs”). These organisms can be a virus, bacteria or fungus. Organisms can grow in the lungs if the person’s immune system is too weak to fight off the organism’s growth. Our lungs, like our mouth and nose, normally contain organisms, but they are either harmless or are too few in number to be harmful. Harmful organisms are termed *pathogenic* (they cause infection whether in small or large amounts). People developing pneumonia are either not able to control the growth of these organisms or have inhaled pathogenic organisms that are quick to cause pneumonia.

### **1.6.1. Is pneumonia dangerous?**

Pneumonia can be dangerous, especially if the person is already very weak. People with COPD often become weak because of lack of exercise or nutritional problems. If pneumonia does occur, it can usually be treated at home with antibiotics. Sometimes your provider has to change the antibiotic if the organism does not go away with the first antibiotic. If you get too weak, or unable to breathe adequately because of the infection in the lungs, you may need to be hospitalized. Occasionally, people with pneumonia need to have their breathing assisted or controlled with a *ventilator* until the infection is controlled. Some people are too weak to fight the infection, even when a ventilator is used, and die from pneumonia. Pneumonia can be very dangerous if not treated early.

### **1.6.2. What can I do to treat the pneumonia?**

When antibiotics are prescribed, take them as directed, no more or no less than prescribed (unless they are causing side-effects). That means not only the dosage (for example “one tablet twice a day”), but also for the length of time outlined by your healthcare provider (for example “take for 7 days”). The length of time you are prescribed antibiotics varies with the medication and your provider’s evaluation. Therefore, some antibiotics are for 5 days and some for 14 days. The important thing is not to stop taking antibiotics because you “feel better”. There is no single antibiotic that is considered the “best” to treat all pneumonias. Your healthcare provider will decide which is best for you based on your history and chest x-ray. It is likely you will need to use your inhalers more frequently and possibly use inhaled steroids or steroid tablets for a short period of time in order to help you recover from the pneumonia.

### **1.6.3. When should I call my healthcare provider about pneumonia?**

You should call your healthcare provider if you suspect that you may have pneumonia. Signs of pneumonia are dark yellow or green sputum production in larger amounts than normal, a feeling of congestion that won’t go away, increasing shortness of breath, fever and increasing tiredness. Your provider will determine if you have pneumonia with a chest x-ray and antibiotics will be prescribed if you have. You should call your provider if the sputum does not improve in color or amount after several days of antibiotics. You should also call if your breathlessness worsens or fever does not improve. You can expect to be weak from

pneumonia. Weakness, however, that worsens despite treatment should be brought to the attention of your healthcare provider.

## **1.7. What is an exacerbation**

*Exacerbation* means worsening or a “*flare up*” of COPD. An exacerbation can be from an infection in the lung, but in some instances it is never known why people have a worsening of symptoms. An exacerbation is usually treated with antibiotics even if the reason for the exacerbation is not known. Some healthcare providers believe that early treatment with antibiotics may prevent the process from getting worse. Whatever the reason for your exacerbation, you should contact your healthcare provider if your symptoms worsen (breathlessness, cough, sputum production).

### **1.7.1. How do I know I’m having an exacerbation?**

Signs and symptoms of an exacerbation are similar to those of an infection or pneumonia. The amount and color of your sputum is important to note. A change in the amount of sputum (either bringing up more or bringing up less than usual), a change in the color of your sputum from clear to deep yellow, green, brown or red, and increasing shortness of breath are typical signs and symptoms of an exacerbation.

### **1.7.2. Will I be admitted to the hospital?**

While you may experience more shortness of breath than usual with an exacerbation, acute bronchitis or pneumonia, these conditions do not necessarily require hospitalization. Many medications are now available to prevent hospitalization. Your provider will determine whether you need to be hospitalized based on your history and symptoms.

### **1.7.3. If I am hospitalized, what can I expect?**

If you are hospitalized for complications of your COPD, you will probably be given antibiotics (and other medications intravenously), oxygen, have chest-x rays taken and several blood tests. These tests help guide your healthcare provider in how best to treat you. Sometimes, despite all treatment, the lungs are unable to adequately take in oxygen. In this case, you may require a *ventilator* to help you breathe (see [Planning for the Future](#)). Once on a ventilator, it may be a

slow process removing you from the ventilator. In some cases, when the infection begins to go away, a person can be removed from the ventilator in just a few days. At other times, it may take weeks or months for the lungs to gain the strength needed to breathe without the help of a ventilator. There are also times when the person is not able to breathe again without a ventilator. This condition is called *ventilator dependency*. You, your family and your healthcare provider should discuss what you would like done if you are ever in a position where you will require a ventilator temporarily or permanently. Your views and preferences for a ventilator or any other therapy can be outlined in documents called *advanced directives*.

## **1.8. How do I plan for the future**

Make sure that the care you receive now and in the future is what you want. Discuss with your family and provider what you would like done in the event you become ill and are unable to communicate for yourself. Advising your healthcare provider of your wishes/desires in the event you are unable to communicate is called giving “advanced directives”.

Advance directives describe two types of legal document that “direct” providers in your care when you are unable to speak for yourself. These documents are called a “living will” and a “medical power of attorney”. A living will is a document that outlines your wishes for care at the end of your life. A medical power of attorney or “healthcare proxy” names someone that you have chosen to make healthcare decisions for you when you are unable.

### **1.8.1. How do I know what type of care I will want?**

While many people find it uncomfortable, it is important to talk with your family about what you would like done in the event you are unable to speak for yourself. Don’t assume they know or burden them with the responsibility of guessing what you would like. Discuss with your healthcare provider what treatment is available under different circumstances. For example, what would you like done if you develop a problem breathing that requires a ventilator to breathe for you? Would you like to be placed on a ventilator? What if your lungs are damaged to the point that you will never be able to breathe without the assistance of a ventilator? It is important not only to discuss with your family and provider what can be done for you at end of life, but also what quality of life you desire.

### **1.8.2. When should I talk to my healthcare provider about end-of-life care?**

The best time to talk to your healthcare provider is before you get sick. Schedule a time with your provider when you can discuss your preferences for care. Bring a family member with you to help clarify questions and hear the discussion.

### **1.8.3. After I sign the document, can I change my mind?**

You can change your mind and rewrite your advance directives at any time. Always make copies of the document. If you are admitted to another hospital, have a family member bring a copy of the document.

### **1.8.4. Are advanced directives the same in every state/province and country?**

No, the documents can vary greatly. Your healthcare provider or local hospital can provide you with advance directive forms that apply to where you live.

### **1.8.5. What is the most important thing I should know about advance directives?**

You should understand the importance of having open and honest discussions with your family and healthcare provider so that they are all aware of your wishes. Also, know that you can change your advanced directives at any time and as many times as you desire.

## **1.9. What tests can be done to assess my breathing?**

Several tests can be done to find out if your health problem is related to your lungs. Each test serves a different purpose. Sometimes, only one type of test is needed. Other times, several tests might be needed to find out the source of your problem. These tests measure how much air you move in and out of your lungs, how successful your lungs are at getting oxygen into your blood stream or if there are problems in your lungs that can be seen on pictures of your lungs. Most tests require breathing through a mouthpiece and do not require needles for blood to be drawn. Tests are often repeated two to three times on the same visit to get the best test results. The most common problems people experience with these tests are light-headedness, dizziness or tiredness from the breathing maneuvers. You must not take certain medications or smoke before some of the tests. When you find out you will be having these tests, be sure to ask about any special instructions.

### **1.9.1. What is a pulmonary function test (PFT)?**

Pulmonary function tests (PFTs) are breathing tests to find out how your lungs function compared to people like yourself with normal lungs. Test scores vary depending upon a person's age, whether they are male or female, or short or tall. Spirometry, diffusion studies and body plethysmography may all be done as part of complete pulmonary functions testing or may each be done alone to find out detailed information about a specific breathing function.

### **1.9.2. What is spirometry?**

Spirometry is the most commonly ordered test for people with suspected breathing problems and is the test usually performed to find out if a person has COPD. The results, by themselves, may not totally explain your breathing problem, but are evaluated along with your history of health problems and other test results.

This test is done by having you breathe into a tube connected to a machine. This machine measures the amount of air you move in and out of your lungs and how well the air moves. You will be asked to perform a series of breathing maneuvers. Commonly, this includes breathing in and out normally, then exhaling all the air out that you possibly can, followed by inhaling as much as possible, then blowing out as hard and fast as you can.

#### ***1.9.2.1. Are there special instructions I need to follow before the test?***

You will often be asked not to use your inhaled bronchodilators, such as albuterol/salbutamol or metoprolol/terbutaline, and possibly to stop other medications for a specific amount of time before the test is done. Taking medications such as these affect the test results and may require you to repeat the test at another time. Always ask if there are any special instructions to be followed before taking the test.

### **1.9.3. What are diffusion studies?**

Diffusion tests (abbreviated  $DL_{CO}$  or  $TL_{CO}$ ) determine how well your lungs take in air and move the oxygen contained in this air into the bloodstream. Therefore, this test measures how well gases in the air enter the lungs, move into the alveoli and then into the blood stream surrounding these air sacs.

The diffusion test requires precise measurements and is done by breathing in and out through a mouthpiece connected to a machine. You will be asked to empty your lungs by blowing out. Then you will take a deep breath of a gas mixture and hold your breath for 10 seconds. Then you will be asked to breathe out.

**1.9.3.1. *Are there special instructions I need to follow before the test?***

If you smoke, or are exposed to smoke in your home or work, it is important not to smoke and/or stay away from smoke exposure for 4 hours before this test.

**1.9.4. **What are body box (plethysmography) (lung volume) studies?****

*Body plethysmography* is a test to measure not only the amount of air you breathe out of your lungs with each breath, but also to measure how much air is left in your lungs after a complete exhalation. No matter how hard we try, we can never exhale all of the air from our lungs. With COPD, the amount of air left in our lungs may be more than normal. Measuring the amount of air remaining in the lungs gives your healthcare provider information about the severity of your COPD and helps guide them in your treatment.

During the test, you sit in a large, see-through box. You will be asked to breathe through a mouthpiece while breathing normally. You will then be asked to take a deep breath, then exhale out as much air as possible. Before or after the deep breath, you will be asked to take short, shallow breaths.

**1.9.4.1. *Are there special instructions I need to follow before the test?***

If you are on oxygen, you will usually be asked to be off oxygen, but your oxygen level will be monitored during the test.

**1.9.5. **What are chest X-rays?****

Chest x-rays are a way of taking a picture of your lungs. Chest x-rays (also called chest films) are a standard test for evaluating COPD. These x-rays not only show the lungs, but the heart and several major blood vessels in the chest. Chest x-rays are useful if other conditions, such as pneumonia or lung tumors, are suspected. A chest x-ray, however, can also appear normal in

patients with milder forms of lung disease or with very small tumors. It is therefore not a precise test.

There is no discomfort with chest x-rays for those who can stand for a brief period of time. The risk of radiation from a chest x-ray is small. The amount of radiation you are exposed to during a chest x-ray is equal to a normal day's exposure to the sun.

#### ***1.9.5.1. Can a chest x-ray diagnose COPD?***

No, a chest x-ray can provide some guidance to your provider that you have COPD, but it is not used to diagnose COPD.

#### **1.9.6. What is a computed tomography (CT) scan of the lung?**

Computed tomography (CT) scans are specialized pictures of the lungs. While a chest x-ray takes one or two large pictures of the lungs, the CT scan takes many small pictures. A CT scan can find out if air sacs are enlarged, as commonly seen in emphysema. CT scans can also find small tumors, which may not be seen on chest x-ray.

Unlike a chest x-ray, a CT scan is not routinely ordered, because the additional detail it provides compared to a chest x-ray is only occasionally needed. A CT scan also exposes you to more radiation than a chest x-ray and is more expensive.

CT scans of the chest are done by having you lie down on a table while a large cylinder passes over your chest. Your head will not be covered in the device, but some devices will cover you from your neck to your legs. Multiple pictures (20–30 pictures, called “slices”) are taken during the 5–20 minutes of the test. Sometimes, an iodine dye may be injected into the vein in your arm. This dye allows the radiologist to evaluate the lungs differently from a test without the dye. Your healthcare provider will decide which of these two types of tests you should have. People allergic to iodine (or shellfish) or with kidney disease should discuss this with their healthcare provider or radiologist before having this test done.

Currently, “whole body” scans are being offered in the community to anyone willing to pay the cost. Before whole body scans became available, these scans were only done on people with a suspected abnormality and only on areas believed to be at risk. Never before were they done on so many “normal” people. As a result, many non-serious abnormalities are being found, such as small scars not requiring treatment. In most cases, it is not possible to determine whether a non-serious finding is present with one scan. This means that a whole body scan may lead to numerous additional scans to be certain that a serious abnormality is not present. It is not known whether the risk of added radiation exposure and additional tests (for example biopsies) resulting from these findings on CT are of value, given the few serious abnormalities that are found.

### **1.9.7. What is an exercise test?**

An exercise test is done in a laboratory, either by having you walk on a treadmill or pedaling a bicycle. As you exercise, you will usually be asked to breathe through a mouthpiece connected to a machine. This machine measures how much effort (energy expenditure) it takes you to exercise. You will be asked to exercise at faster and faster speeds while working against greater and greater resistance. On a bicycle, this means you will have a harder time pedaling. With a treadmill, the angle of the treadmill is made steeper, making it feel like you are walking uphill. The amount of exercise you will be asked to do will depend on how physically fit you are. To best understand your problem, it is important that you exercise as much as you possibly can. Frequently, you will also be connected to a heart and an oxygen monitor. Oxygen levels may be monitored for the entire test by a tube placed into your artery (called an arterial line). The heart monitor will measure the performance of your heart during strenuous exercise.

Exercise tests are done to stress your heart and lungs. Therefore, one of the after effects of the test should be breathlessness and tiredness. People with COPD having this test sometimes limit their performance during the exercise because of fears of developing breathlessness. This test is the perfect time to exercise as much as you possibly can in a safe, supervised setting.

### **1.9.8. What are arterial blood gases (ABGs)?**

Arterial blood gases (ABGs) evaluate several things in your blood. The ABG is the most precise and direct way of telling us how well your lungs are bringing oxygen into the blood and how well your lungs are getting rid of carbon dioxide. Unlike many blood tests that require a needle be placed into your vein, an ABG requires the needle to enter an artery. A needle placed into the artery can be more painful than a needle entering your vein because the arteries usually lie between muscles. To help make the needle stick less painful, the person doing the test may numb (or anesthetize) the area where the needle will enter the skin.

### **1.9.9. What is oximetry testing?**

Oximetry testing is a way of indirectly measuring oxygen levels in your blood. The test is done by placing a small strap around your finger or a clip on your ear. This test is not painful or dangerous since it measures oxygen with light rays. The oximeter test is done to find out how much of the oxygen (called oxygen saturation, abbreviated  $S_{a,O_2}$ ) in your body is in red blood cells. Unfortunately, oximetry machines can be unreliable. They may not read accurately depending on your skin color, if you have a low blood count, have poor circulation or if the device is not properly maintained. Therefore, when trying to make an important decision about how much oxygen is in your blood and whether to give you supplemental oxygen, an ABG is the preferred test.

## 2. Patients: medication

### 2.1. What do I need to know about the medication I am taking?

Breathing medications (also called drugs) open your breathing passages. By making your breathing passages larger, air can get in and out more easily. As COPD is a chronic condition, most breathing medications need to be taken daily, for life. Understanding medications, how they work, how often they should be taken and what kind of problems (side-effects) you may experience will help you control your breathing with the least amount of discomfort. Below you will find frequently asked questions and answers about breathing medications.

#### 2.1.1. What is the difference between a medication's brand and a generic name?

Medications have two names. The name in large print is usually the **brand** name. (In the tables in this Section generic names are in large print and brand names are in italics.) This name is decided upon by the company that makes the drug. Below this name, in smaller print, is the *generic* name. The generic name describes the main ingredient in the drug. The generic ingredient may be sold under several different brand names and may be called by different brand names in different countries. The generic name may also be different around the world. For example, one bronchodilator is sold in Europe under the generic name of *salbutamol*, while in the USA this drug is called *albuterol*. This same drug may be sold under the following brand names, depending on where you live: **Airomir**, **Buventol**, **Inspiryl**, **Proventil** and **Ventolin**. Pharmacies sometime substitute brand name drugs with generic drugs. This may be done in order to give you the drug that is least expensive. If you are traveling to another country, or even within your country, you should know the generic name of the drug you are taking.

#### 2.1.2. What are maintenance and reliever medications?

Medications can be used to either decrease or eliminate the symptoms of COPD. Some medications are needed for daily use, while others only need to be taken when symptoms occur. When medications are prescribed to keep day-to-day symptoms under control, they are called “*maintenance*” or “*controller*” drugs. Medications needed only periodically are called “*reliever*” or “*as-needed*” (often abbreviated PRN) medication. As COPD is a chronic

condition, daily maintenance drugs are usually needed. Usually, drugs which last longer are preferred because they provide a more steady, even delivery of the medication over a longer time period than short-acting drugs.

### **2.1.3. What is the difference between inhalers and pills?**

Most medications for COPD are given by inhalers. When the medication is inhaled, most of it goes directly to where it needs to work, the lungs. This also allows the medication to be given in smaller doses. When medications for COPD are taken by pill or liquid, they affect not only the lungs but also other organs (liver, heart, etc.) and the nervous system as well. These are called side-effects of a drug.

Inhalers dispense either a fluid or a powdered mist. The design of different inhalers and instructions for their use vary. It is very important to understand how to take inhalers, because if not taken properly, over 95% of inhaled medication may never reach the lungs. If you are taking an inhaler, review the inhaler technique for each device. Instructions given to you 2 years ago may not be the same today because of changes in inhaler design. You may be surprised how much more medication you will get by improving how you use your inhaler.

### **2.1.4. What is a metered-dose inhaler (MDI)?**

The metered-dose inhaler (MDI) is an aerosol and currently one of the most common types of inhaler. The medication comes out of the inhaler as a mist or spray. A wide range of medications may be delivered by MDI: *albuterol/salbutamol*, *beclomethasone*, *budesonide*, *fenoterol*, *fluticasone*, *ipratropium bromide*, *salmeterol*, *sodium cromoglycate*, *terbutaline*. Some people may have difficulties activating the canister. An attachment is available for some inhalers, which makes activating the inhaler easier.

Pharmaceutical companies will soon be required to change how inhaled medications are delivered because of concerns about environmental pollution from the propellants in inhalers. Companies are producing inhalers in many different forms. While there are more choices in how the medication must be taken, there are also more things for patients to learn about each

device. While each company might feel their device is better, inhalers are all probably equally good at delivering the medication. The problem is how good your inhaler technique is.

**2.1.4.1.            *Should I use a spacer/chamber device with my MDI/spray?***

A spacer/chamber or holding chamber is a device into which the inhaler is sprayed. Many inhaled devices delivering a liquid mist can be used with a spacer/chamber. The mist from the inhaler is sprayed into the spacer/chamber where the large and small particles separate. The large particles stick to the sides of the spacer/chamber while the small particles stay suspended for several seconds. This is a good thing because large particles are too big to enter the lungs. When large particles are inhaled, they only serve to create problems like a sore mouth, hoarse voice and fungal infections in the throat and mouth. Large particles are also absorbed into the body, increasing the chances of more side-effects. Conversely, the small particles stay suspended in the spacer/chamber, allowing you time to inhale the fine mist. This device has several advantages over using an MDI without a spacer/chamber. You no longer have to be as precise in coordinating activation of the spray from the canister while inhaling. You can first spray the medication into the chamber and then concentrate on inhaling the medication slowly.

**2.1.4.2.            *Are there different types of spacer/chamber devices?***

There are several different types of spacer/chambers which can be used with MDIs. Spacer/chambers are not designed to be used with dry-powdered inhalers. Spacer/chamber designs are categorized by the volume of medication they hold. The Aerochamber and Able Spacer/chamber are small volume spacer/chambers and can be used with all the different brands of medications delivered by an MDI. The large-volume spacer/chambers are made for a specific brand of medication. Ask a healthcare professional which spacer/chamber you can use with your MDI.

### 2.1.5. What are dry-powdered inhalers (DPIs)?

Dry powder inhalers (DPIs) are inhalers that deliver medication in a dry powder form. DPI medication is delivered by many different designs for inhalation. Examples of DPIs are: *Accuhaler/Discus, Aerohaler, Aerolizer, Clickhaler, Diskhaler, Easyhaler, Handihaler, Novolizer, Pulvinal, Rotadisk, Rotahaler*. The person taking DPI medication must empty the entire dose of medication from the inhaler in one or two breaths. This is sometimes difficult to judge if the device is not designed to be opened to determine that all the medication has been used. The following devices are used to deliver the medications listed.

- Accuhaler/Discus **GOLD**: *albuterol/salbutamol, beclomethasone, fluticasone, salmeterol and the combination fluticasone/salmeterol.*
- Aerohaler **GOLD**: *fenoterol and ipratropium bromide.*
- Aerolizer **GOLD**: *eformoterol.*
- Clickhaler **GOLD**: *albuterol/ salbutamol and beclomethasone.*
- Diskhaler/Rotadisk **GOLD**: *albuterol/ salbutamol, beclomethasone, fluticasone and salmeterol.*
- Easyhaler **GOLD**: *albuterol/ salbutamol and beclomethasone.*
- Handihaler **GOLD**: *tiotropium.*
- Novolizer **GOLD**: *albuterol/ salbutamol and budesonide.*
- Pulvinal **GOLD**: *albuterol/ salbutamol and beclomethasone.*
- Rotahaler **GOLD**: *albuterol/salbutamol, and beclomethasone.*
- Turbuhaler **GOLD**: *budesonide, formoterol, terbutaline, budesonide/formoterol combined*

### 2.1.6. What are breath-actuated inhalers?

Breath-actuated inhalers are inhalers that automatically release a spray of medication when the person begins to inhale. Examples of breath-actuated inhalers are: *Airmax, Autohaler* and *Easi-breathe*). Medications delivered by breath-actuated inhalers are as follows.

- Airmax **GOLD**: *budesonide.*
- Autohaler **GOLD**: *albuterol/salbutamol, beclomethasone, fenoterol/ipratropium combination and pirbuterol.*
- Easi-breathe **GOLD**: *albuterol/ salbutamol, beclomethasone.*

### **2.1.7. What is a nebulizer or JET inhaler?**

A nebulizer (or JET inhaler) is an electric or battery-powered compressor to which tubing is attached. The nebulizer tubing consists of a hollow tube connected to a nebulizer cup, which holds the liquid medication. When the compressor is turned on, air flows through the tubing to the cup, causing a mist (aerosol) of the medication. The medicated mist is inhaled through a mouthpiece or mask attached to the medication cup.

It is possible to administer higher doses of many drugs by a nebulizer. A nebulizer may also make it easier for some people to inhale their medications if they are having difficulty coordinating the MDI. Many different kinds of medications can be delivered through the nebulizer (*albuterol/salbutamol, terbutaline, ipratropium bromide, budesonide and fluticasone*). There are a variety of nebulizers and compressors available. In some countries nebulizers must be prescribed by a specialist, while in other countries patients may buy their own.

## **2.2. What kind of medications are there for COPD?**

Medications for treating COPD can usually be categorized as bronchodilators, steroids, antibiotics or mucolytics. They are all designed to open the breathing passages to make breathing easier, but they all accomplish this in different ways.

### **2.2.1. What are bronchodilators?**

Bronchodilators are medications that relax the bronchial muscles. Relaxing these muscles makes the airways larger, allowing air to pass through the lungs easier. This helps people with COPD breathe better. Many different kinds of bronchodilators are available. They can be grouped according to how long they work (called short- and long-acting drugs) or the way in which they widen or dilate the airways (beta-agonists, anticholinergics or theophyllines). While all bronchodilators widen the airways, they work in different ways to do so. It is therefore possible to combine bronchodilators in order to achieve maximal benefit. Many people with COPD experience constant breathing difficulty. Bronchodilators therefore need to be taken

regularly to keep breathing under control, this is called maintenance medication. Conversely, reliever medications are used for temporary breathless.

#### **2.2.1.1. *What kinds of bronchodilators are there?***

The three main groups of bronchodilators are beta-agonists, anticholinergics and theophyllines. Bronchodilators are important in treating the symptoms of COPD, such as breathlessness, cough and sputum production. People with COPD are generally prescribed at least one bronchodilator, however, sometimes two or three medications are needed to control symptoms. Bronchodilators can also be used to “relieve” worsening symptoms. Reliever drugs are usually short acting and, therefore, are not the best way to control day-to-day symptoms. In order to give you regular control or to maintain your breathing, these short-acting bronchodilators would have to be taken frequently, day and night, 24 hours a day. This is not very practical for most people.

It is unusual to find two people with COPD on the same program of medication. Some need bronchodilators from only one group, while some need bronchodilators from all three groups. For example, a person may need a beta-agonist as well as an anticholinergic and a theophylline drug. The number of different bronchodilators people with COPD need depends on how well their symptoms are controlled.

#### **2.2.2. *What are beta-agonists?***

Beta-agonists are medications that mainly affect the muscles around the airways (bronchi and bronchioles). When the lungs are irritated, bands of muscle around the airways tighten, making the airways narrower. This often results in breathlessness. Beta-agonists work by telling the muscles of the airways to relax, widening the airways. This results in easier breathing.

There are two different kinds of beta-agonist, grouped according to how long they work, which are short-acting or long-acting. Beta-agonists can be given in several ways but the most

common way is by inhalation. Pills, tablets and intravenous forms of the drugs are used but have more side-effects.

**2.2.2.1. What are short- and long-acting beta-agonists?**

Short-acting beta-agonists work quickly (within 3 to 5 minutes), but may only last 46 hours. These medications are often given as reliever medications because they bring such quick relief for breathlessness. They can also be used to prevent or reduce symptoms that are known to be caused by specific situations such as exercise, showering or going out in the cold air. Short-acting drugs are usually inhaled by a MDI, DPI or in liquid form from a nebulizer device. Some short-acting beta-agonists are also available in tablet form.

A list of short-acting beta-agonists

Generic name	Brand name	How it is given	Dosage*
<i>Albuterol/ Salbutamol</i>	Airolin	MDI <sup>a</sup>	1–2 puffs* every 4–6 hrs.
	Airomir	Breath-actuated MDI	
		MDI	1–2 puffs every 4–6 hrs.
	Asmasal	Breath-actuated MDI	
		DPI <sup>b</sup> Breath actuated	1-2 puff every 4–6 hrs.
	Buventol	DPI	4–8 mg every 12 hrs.
	Inspiryl	DPI	1-2 puffs every 4-6 hrs.
	Proventil	MDI	1–2 puffs every 4–6 hrs.
		DPI	1 puff every 4–6 hrs.
		Tablets	2-4 mg every 6-8 hrs.
	Salamol	Liquid for nebulizer	0.25–0.5 mL of 0.5% solution every 4–6 hrs.
		MDI Breath-actuated MDI	1–2 puffs every 4–6 hrs.
		MDI	1–2 puffs every 4–6 hrs.
	Salbulin	MDI	1–2 puffs every 4–6 hrs.
Salbutamol	MDI	1–2 puffs every 4–6 hrs.	
Ventodisk	DPI	1–2 puffs every 4–6 hrs.	
Ventolin	MDI	1–2 puffs every 4–6 hrs.	
	DPI	1 puff every 4–6	
	Tablets	2-4 mg every 6-8 hrs.	
	Liquid for nebulizer	0.25–0.5 mL of 0.5% solution every 4–6 hrs.	
<i>bambuterol</i>	Ventolin Evohaler	MDI	1–2 puffs every 4–6 hrs.
	Bambec	Tablets	10–20 mg every night

<i>fenoterol</i>	Berotec	MDI	1–2 puffs 2–3 times daily
		DPI	1 puff 2–3 times daily
		Liquid for nebulizer	0.2–0.4 mL with ns every 4–6 hrs.
<i>isoetherine</i>	Bronkosol	Liquid for nebulizer	0.25–0.5 mL in nebulizer with 2 mL ns
	Bronkometer	MDI	2 puffs every 4 hrs.
<i>isoproterenol</i>	Isuprel	MDI	1–2 puffs every 4–6 hrs.
		Liquid for nebulizer	0.25–0.5 mL with 2 mL ns
<i>levalbuterol</i>	Xopenex	Liquid for nebulizer	0.63–1.25 mg every 6–8 hrs.
<i>metaproterenol</i>	Alupent	MDI	1–2 puffs every 4 hrs.
		Tablets	20 mg every 6-8 hrs
		Liquid for nebulizer	0.2–0.3 mL 5% solution in nebulizer 3–4 times daily
	Metaprel	MDI	1–2 puffs every 4 hrs.
		Liquid for nebulizer	0.2–0.3 mL of 5% solution 3–4 times daily
	ProMeta	MDI	1–2 puffs every 4 hrs.
Liquid for nebulizer		0.2–0.3 mL of 5% solution 3–4 times daily	
<i>pirbuterol</i>	Maxair	MDI or autohaler	1–2 puffs every 4–6 hrs.
<i>terbutaline</i>	Brethaire	Tablets	2.5-5 mg every 8 hrs.
		Brethine	MDI
	Bricanyl	DPI	1 puff every 4–6 hrs.
		Tablets	2.5–5 mg every 8 hrs.
		Liquid for nebulizer	5 mg up to 4 times daily
		MDI	1–2 puffs every 6–8 hrs.
<i>tornalate</i>	Bitolerol	DPI	1 puff every 6 hrs.
		Tablets	2.5–5 mg every 8 hrs.
		Liquid for nebulizer	5 mg every 6-8 hrs.
<i>tornalate</i>	Bitolerol	MDI	1–2 puffs every 8 hrs.
		Liquid for nebulizer	0.5–1mL 3–4 times daily

<sup>a</sup>MDI= metered dose inhaler (aerosol/spray); <sup>b</sup>DPI= dry powder inhaler. The number of “puffs” needed, depends on how successful the person is inhaling the entire dose of medication.

\* Dosages may vary by generic product Higher dosages for one generic drug does not mean they are less strong than another generic product with a lower dosage.

\*\* Two numbers separated by a hyphen (-), indicate the lowest and highest amount that is usually ordered.

ns: normal saline.

Long-acting beta-agonists last about 12 hours and are considered maintenance drugs. Medications from this group are relatively new and therefore only two are currently available: *formoterol* (**Oxis, Foradil**) and *salmeterol* (**Serevent**). *Formoterol* is different from *salmeterol* in that *formoterol* is both a short- as well as a long-acting bronchodilator. *Formoterol* works soon after inhalation (3–5 minutes) and lasts for 4–6 hours, while the long-acting ingredient begins to work in 20 minutes and lasts 12 hours. Conversely, *salmeterol* contains only a long-acting ingredient. *Salmeterol* begins to work in about 20 minutes and lasts for 12 hours. The 12-hour protection of these drugs is an important feature in providing stable airways on a day-to-day basis. Some people with COPD sleep better at night or find they need to use their “reliever” medication less frequently because of this benefit.

### A list of long-acting beta-agonists

Generic name	Brand name	How it's Given	Dosage
<i>Formoterol</i>	<b>Foradil</b>	DPI	1 puff every 12 hrs.
	<b>Oxis</b>	DPI	1-2 puffs every 12 hrs.
<i>Salmeterol</i>	<b>Serevent</b>	MDI	2 puffs every 12 hrs.
		DPI	1 puff every 12 hrs.

#### 2.2.2.2. *What problems (side-effects) should I watch for with beta-agonists?*

Beta-agonists mainly affect the muscles in the airways. They may also affect the muscles in the heart and around the bones. When the muscles in the heart are affected, a fast heart beat and palpitations (fluttering feeling in the chest) may occur. These medications may also affect the muscles of the bones (called skeletal muscles), causing shakiness and cramping of the hands, legs and feet. Often this combination of a fast heart rate and shakiness causes anxiety (nervousness) and worsens breathlessness. These side-effects can last for a few minutes and may go away after a few days of regular use. Sometimes, the side-effects do not go away, and you may need to stop the drug and try another type or brand. Often these effects happen because too much of the medication coats the mouth and it gets absorbed instead of inhaled. This can be avoided by using a good technique, a spacer/chamber device and rinsing your mouth after use. Side-effects may also mean you are taking the medication more often than you should. For example, many short-acting beta-agonists should not be taken more than every 4

hours, unless otherwise instructed by your provider. Long-acting beta-agonists are generally not recommended more than every 12 hours. Taking beta-agonists more often causes side-effects with little improvement and sometimes worsening of your breathing.

#### **2.2.2.3.           *How often and how much should I take?***

How often you take your medication depends on how long the medication lasts and whether the medication is for maintenance or relief/rescue. For example, if you are prescribed a maintenance medication that lasts 6 hours (short-acting), then you will need to take the medication every 6 hours by dividing the hours you are awake into four parts. Now that long-acting beta-agonists are available, short-acting beta-agonists are being used by some providers mainly as a relief/rescue medication in the treatment of COPD. Reliever medications should be used before strenuous activity or at other times when symptoms worsen, such as during an exacerbation or worsening of your COPD. While short-acting beta-agonists act rapidly, they also leave the body rapidly (4–6 hours). Conversely, long-acting beta-agonists leave the body more slowly (12 hours) and therefore are taken every 12 hours (twice a day).

The amount of medication (dose of drug) you take will depend on the drug and how much your breathing is under control. Your provider will talk to you about the number of inhalers or tablets to take. It is important not to assume that just because a dose of one drug is higher than another that the higher-dosed drug is more powerful. Drug dosages will change with different chemical ingredients. If you have questions about the dose of your medication, discuss your concerns with your healthcare provider.

#### **2.2.2.4.           *What should I do if I forget to take my beta-agonist medication?***

If you forget to take your regular dosage of beta-agonist medication, do not try to “make up” for missing a dose by taking twice as much. Doubling your dose will probably not improve your breathing, but will most probably cause you to have side-effects.

#### **2.2.3.           **What are anticholinergic medications?****

Anticholinergic drugs are another group of bronchodilators that are different from the beta-agonists. While the beta-agonists affect the bronchioles (small airways), anticholinergics affect the muscles around the bronchi (large airways). When the lungs are irritated, these bands of

muscle can tighten, making the bronchi narrower. Anticholinergics work by stopping the muscles from tightening.

**2.2.3.1. What kinds of anticholinergics are there?**

There are two kinds of anticholinergics used to treat COPD. These are grouped according to how long they work and are called short-acting and long-acting anticholinergics. These medications can be delivered by either an inhaler or a nebulizer.

**2.2.3.2. What are short- and long-acting anticholinergics?**

Short-acting anticholinergic medications work in about 15 minutes and last for 6–8 hours. Some providers do not consider these drugs as reliever medication because they take longer to work than beta-agonist drugs. Conversely, because they are good bronchodilators with less side-effects than beta-agonist drugs, some believe these drugs should be the main drug given in the treatment of COPD.

**List of short-acting anticholinergics**

Generic name	Brand name	How it is Given	Dosage
<i>ipratropium bromide</i>	<b>Atrovent</b>	MDI	2–4 puffs 3–4 times daily
		DPI	40–80 µg 4 times daily
		Liquid for nebulizer	500 µg vial 4 times daily
<i>oxitropium bromide</i>	<b>Oxivent</b>	MDI	2 puffs 2–3 times daily
		DPI	200 µg twice daily

µg stands for micrograms.

There is, to date, only one long-acting anticholinergic drug available, called *tiotropium*. *Tiotropium* takes about 20 minutes to work and lasts for 24 hours, therefore, it is taken only once a day for maintenance.

**List of long-acting anticholinergics**

Generic name	Brand name	How it is Given	Dosage
<i>tiotropium</i>	<b>Spiriva</b>	DPI	Inhale contents of 1 capsule daily

**2.2.3.3.      *What problems (side-effects) should I watch for with anticholinergic drugs?***

Anticholinergic medication does not seem to have as many noticeable side-effects as beta-agonists. The side-effects that are experienced include dry mouth, blurred vision (if spray comes in contact with the eyes), worsening glaucoma and dry cough. Men with prostate problems may find more difficulty urinating.

**2.2.3.4.              *How often and how much anticholinergic medication should I take?***

Since the short-acting anticholinergics take 20–30 minutes to have a good effect, they are not considered the ideal “reliever” medication. However, since they last 6–8 hours, they can be taken 3–4 times a day for good maintenance coverage. The new long-acting anticholinergics are not yet available in all countries. Like the short-acting drugs, they take 20–30 minutes to have a good effect. They also are not considered the ideal “reliever” medication, however, because they last for 24 hours, they provide excellent coverage as a maintenance medication.

**2.2.3.5.              *What should I do if I forget to take my anticholinergic medication?***

Anticholinergic medications have minimal serious side-effects, therefore, if a person cannot remember if they’ve taken their dosage, they can usually take another dose of the drug without problems. However, as with any questions about taking medications, consult with your healthcare provider before making changes to how you take your medications.

**2.2.4.              *What is theophylline/theofylline?***

Theophylline medications are the third in the group of bronchodilators that affect the muscles in the breathing tubes. These drugs, however, are also believed to help decrease swelling in your lungs. When the lungs are irritated, the muscle bands around the breathing passages can tighten making the breathing tube smaller. Theophylline stimulates the muscles so that they relax, making the breathing tubes widen, making it easier to breathe.

**2.2.4.1. What kinds of theophylline medication are there?**

Like the other bronchodilators, there are short- and long-acting theophylline drugs. Short-acting theophylline drugs last 6–12 hours while long-acting theophylline drugs last 24 hours. Examples of short-acting theophylline drugs are **Theo Dur, Theofylline, Theolair** and **Theochron**, and long-acting are **Theo-24, Theolair retard** and **Uniphyll**.

**A list of short-acting theophyllines**

Generic Name	Brand Name	How it is given	Dosage <sup>#</sup>
<i>Theophylline</i>	<b>Choledyl, Elixophyllin, Neulin depot, Phyllocontin, Quibron-T Respbid, Slo-Bid, Slo-Phyllin, Theochron, Theo Dur, Theofyllin, Theolair, Uniphyllin</b>	Tablets Liquid	Up to 800 mg daily, but the amount must be carefully regulated

<sup>#</sup>: dosages may vary by generic product, *i.e.* higher dosages for one generic drug does not mean they are less strong than another generic product with a lower dosage. mg stands for milligram.

**A list of long-acting theophyllines**

Generic Name	Brand Name	How it is given	Dosage <sup>#</sup>
<i>Theophylline</i>	<b>Theo-24, Unidur, Theochron SR</b>	Tablets Liquid	Up to 800 mg daily, but the amount must be carefully regulated

<sup>#</sup>: dosages may vary by generic product, *i.e.* higher dosages for one generic drug does not mean they are less strong than another generic product with a lower dosage. mg stands for milligram.

**2.2.4.2. What problems (side-effects) should I watch for with theophylline?**

Theophylline dosages require careful management, since serious side-effects can occur from too much theophylline. A blood test is available to determine safe levels of theophylline in the

blood, however, various situations can cause levels to fluctuate. Other medications, smoking (or stopping smoking), alcohol, viral infections and heart failure can all cause levels to suddenly increase or decrease.

The most common side-effects are trembling, nausea, headache, dizziness, heartburn, stomach pain, loss of appetite, restlessness, nervousness and sleeplessness. More serious side-effects, such as vomiting, heart irregularities (arrhythmias) and seizures, can occur. If you experience any of these serious side-effects, you should seek medical care immediately.

#### **2.2.4.3.                    *How often and how much should I take?***

How often you take theophylline will depend on how long the drug lasts. A common dosage of theophylline is 200–400 mg twice daily, however, each person will vary. Theophylline drugs must be used only as prescribed because of the potential for serious side-effects. Blood levels of theophylline should be checked shortly after starting treatment, then regularly after that time.

Theophylline drugs are best taken on an empty stomach, either 1 hour before or 2 hours after a meal. If you experience a stomach upset when taking theophylline, taking the tablets with food may reduce the stomach upset. Theophylline drugs work best if they are taken at about the same time each day.

Long-acting capsules and tablets must be swallowed whole. If capsules are too large to swallow, the capsule can be opened and the contents mixed with jam. This mixture should be swallowed without chewing.

#### **2.2.4.4.                    *What should I do if I forget to take my theophylline medication?***

If you are not certain whether you have taken your dosage of theophylline, do not take any until the next dosage is due. If you have taken an extra dosage and notice side-effects, call your healthcare provider for advice. If you have taken an extra dosage and do not have side-effects, skip your next dose.

### **2.2.5. What are corticosteroid (anti-inflammatory) medications?**

Steroids or glucocorticosteroids are medications used in the treatment of COPD that control swelling. They are called anti-inflammatory drugs because they decrease swelling in the airways of the lungs. These drugs are not the same as anabolic steroids, which are used by “body builders” to build muscles.

#### ***2.2.5.1. What kinds of corticosteroid medications are there?***

Steroids are generally taken in tablet form or by inhalation. An intravenous form of steroids can be given but only in the hospital or an urgent setting. The different types of steroids in tablet form include: **prednisolone, prednisone** and **medrol**. Generic inhaled forms include: *beclomethsone, budesonide, flunisolide, fluticasone* and *triamcinolone*. Not all COPD patients benefit from treatment with steroids. One way your provider can determine if you will benefit is by trying the medication by the inhaled route or tablet form for 1–3 months. A limited period of oral steroids is also not uncommon to treat exacerbations or worsening of COPD.

Steroids used to treat COPD are usually given through inhalers. When the medication is inhaled, most of it goes directly to the lungs. This way the medication can be given in smaller doses, with fewer side-effects. Inhaled steroids, however, do not work quickly. It may take several days to weeks before benefits are felt.

Steroids taken as a tablet (also called taken systemically) require a higher dose of the medication in order to have the desired effects on the lungs. If taking an oral course of steroids, the tablets should be taken in one dose. Some patients find that taking their steroid tablets at mealtimes reduces stomach upsets.

#### ***2.2.5.2. What problems (side-effects) should I watch for with corticosteroid medications?***

Side-effects normally depend on the dosage of the medication. Side-effects from inhaled steroids are less likely than with the tablet form. The most common side-effects of inhaled steroids are a sore mouth, hoarse voice, and infections in the throat and mouth. These side-

effects can often be avoided or reduced by rinsing the mouth after taking the medication, or by using a spacer/chamber device. The high doses of steroids in tablet form (or in smaller doses given for long periods of time) may cause problems including: bruising of the skin, weight gain, weakening of the bones (osteoporosis), high blood sugar levels (diabetes), cataracts, swelling of the ankles or feet, and, while these side-effects can produce significant problems for patients, the lack of steroids to treat COPD can create severe, life-threatening problems. You should discuss any concerns about taking steroids with your provider in order to weigh the benefits against the risks.

#### **2.2.5.3. *How often and how much should I take?***

The amount of steroids you are prescribed will depend on your provider's evaluation. In some instances steroids in tablet form are needed to control exacerbations or pneumonia. The dosage will vary depending on how well your symptoms are controlled.

#### **2.2.5.4. *What should I do if I forget to take my corticosteroid medication?***

If you forget to take your steroids, take another dose as soon as you remember. If your next dose is due in a few hours, however, do not take an additional dose. If you cannot remember when you last took a dosage of medication contact your healthcare provider for instructions.

### Listing of inhaled steroids

Generic name	Brand name	How it is given	Dosage
<i>beclomethasone</i>	<b>Aerobec</b>	MDI or breath-actuated inhaler	100–800µg
	<b>Aerobec Forte</b>	MDI or breath-actuated inhaler	250 µg
	<b>Asmabec</b>	Breath-actuated inhaler	200–400 µg
	<b>Beclazone</b>	MDI or breath-actuated inhaler	250–500 µg
	<b>Becloforte</b>	MDI or breath-actuated inhaler	250–500 µg
	<b>Beclomet</b>	DPI	200 µg
	<b>Beclovent</b>	MDI	252–672 µg
	<b>Beclodisk</b>	DPI	100–400 µg
	<b>Becodisk</b>	DPI	100–400 µg
	<b>Becotide</b>	MDI or DPI	100–800µg
	<b>Filair</b>	MDI	50–25 µg
	<b>Qvar</b>	MDI or breath-actuated inhaler	200–400 µg
	<b>Rotahaler</b>	DPI	250–500 µg
<i>budesonide</i>	<b>Pulmicort</b>	MDI, DPI or liquid solution	200–400 µg
<i>flunisolide</i>	<b>Aerobid</b>	MDI	250 µg
	<b>Flunitec</b>	MDI	250–500 µg
	<b>Rhinalar</b>	MDI	250 µg
<i>Fluticasone</i>	<b>Flixotide</b>	MDI or DPI	100–500µg
	<b>Flovent</b>	MDI	44, 110, 220 µg
<i>triamcinolone</i>	<b>Azmacort</b>	MDI	200 µg

µg stands for micrograms. The doses are average doses and are normally taken twice daily.

### Listing of steroid tablets

Generic name	Brand name	How it is given	Dosage
<i>Methylprednisolone</i>	<b>Medrol</b>	Tablet	4–48 mg
<i>Prednisolone/prednisolon</i>	<b>Prelone</b>	Tablet	2.5–60 mg
<i>Prednisone</i>	<b>Deltasone</b>	Tablet	5–60 mg

mg stands for milligram

## **2.2.6. What are combination drugs?**

Combination drugs are medications that contain two different types of medication in the same inhaler or nebulizer solution. For example, an inhaled steroid may be combined with a long-acting beta-agonist. While each of these medications can be taken in separate inhalers, it is often more convenient for some people to take both drugs in a single inhaler. There is some evidence that combining medications may increase the widening of the airways more than by using either of the two drugs alone.

### **2.2.6.1. *What kinds of combination drugs are there?***

There are only a few types of combination medications currently available. The most common combination medications contain a combination of the following:

- short-acting beta-agonist and short-acting anticholinergic;
- long-acting beta-agonist and inhaled corticosteroid.

### **2.2.6.2. *What problems (side-effects) should I watch for with combination drugs?***

The types of side-effects that can occur depend on which medications are in the combination. The side-effects for the different types of medications are described in the specific sections for each of these medications.

### **2.2.6.3. *How often and how much should I take?***

Your healthcare provider will talk to you about the dosage of medication to take. These medications are fixed combinations of drugs and dosages, and it is therefore important to take the medications as prescribed.

### Listing of combined short-acting beta-agonists with anticholinergics

Generic name	Brand name	How it is given	Dosage
<i>Albuterol(salbutamol) + ipratropium</i> <i>fenoterol + ipratropium</i>	<b>Combivent</b>	MDI	2 puffs 4 times daily
	<b>DuoNeb</b>	Liquid for nebulizer	2.5 mL 4 times daily
	<b>Berodual</b>		1–2 puffs 4 times daily 4 mL as needed
	<b>Duovent</b>	Breath-actuated MDI	2 puffs 4 times daily, as needed

### Listing of combined long-acting beta-agonists with inhaled steroids

Generic name	Brand name	How it is given	Dosage
<i>salmeterol + fluticasone</i>	<b>Advair/Seretide</b>	DPI	1 puff 2 times daily
		MDI	2 puffs 2 times daily
<i>formoterol + budesonide</i>	<b>Symbicort</b>	DPI	1–2 puffs 2 times daily

#### 2.2.7. What are antibiotics?

Antibiotics are medications that fight infections caused by bacteria. Respiratory infections commonly experienced by people with COPD are often referred to as exacerbations (worsening) of COPD. Many times an infection starts with a simple cold. Signs of an infection can be increased mucus or phlegm production, breathlessness and cough. Mucus that is usually clear may change color to yellow, green or brown.

Antibiotics are not generally useful for treating common colds. In addition, antibiotics are not always needed for treating worsening of symptoms (exacerbations), such as breathlessness and cough, unless there are signs of an infection.

##### 2.2.7.1. What kinds of antibiotics are there?

There are many different kinds of antibiotics. The type of antibiotics you take depends on the type of infection you have and what kind of antibiotics are known to be effective in treating

common infections in your community. Examples of some common antibiotics include: *amoxicillin, ampicillin, amoxicillin-clavulanate, azithromycin, doxycycline, tetracycline and trimethoprim/sulfamethoxazole.*

**2.2.7.2.                    *What problems (side-effects) should I watch for with antibiotics?***

The most common side-effects from antibiotics are nausea, diarrhea, stomach distress and skin rashes. Some people can develop a serious allergic reaction to antibiotics. If any of these develop, contact your healthcare provider.

**2.2.7.3.                    *How often and how much should I take?***

The dosage and how often you take the antibiotics will vary depending on the specific antibiotic your healthcare provider prescribes you and the type of infection you have. Depending on the kind of antibiotics you are given, you may be asked to take them for a few days to several weeks. Once you have started a course of antibiotics, you must take them for the number of days that your healthcare provider has prescribed, no more or less. By stopping the antibiotics sooner than the prescribed length of treatment, you may cause the bacteria to return and become more difficult to control.

Antibiotics can be taken either before or during a meal. Follow the directions that your healthcare provider or pharmacist gives you. Some antibiotics should not be taken with milk , milk products or antacids.

**2.2.7.4.                    *What should I do if I forget to take my antibiotics?***

If you forget to take your antibiotics, take the next dose as soon as you remember and re-adjust your schedule. This may mean extending the amount of time you take your antibiotics by several hours to half a day. For example, if you usually take your antibiotic at 8 am daily, but forget and remember to take your medication at 2 pm, take your antibiotic at about 2 pm daily from then on. While it is not good to miss a dose of antibiotics, a missed dosage can be compensated for by extending the length of treatment by a dose.

### **2.2.8. What are mucolytic agents?**

Mucus may narrow or block the airways, making it difficult to breath. Mucolytic drugs are designed to help loosen and clear the mucus from the airways by breaking up the sputum. The most common type of mucolytic is a medication called *N-acetylcysteine*. This medication is available in tablet or inhaled form. The inhaled form is given by a nebulizer. *N-acetylcysteine* is more commonly used by patients in European countries than in patients in the USA.

#### **2.2.8.1. *What kinds of mucolytic agents are there?***

Mucolytic agents come in both tablet form and liquid solution to be taken by mouth or for inhalation. A few examples are listed in the following table.

### Listing of mucolytic agents

Generic name	Brand name	How it is given	Dosage
<i>Erdosteine</i>	<b>Erdostin</b>	Capsules, syrup	300 mg twice daily
	<b>Mucotec</b>	Capsules, syrup	300 mg twice daily
<i>Acetylcysteine</i>	<b>Bronkyl</b>	Tablets	200 mg twice daily
	<b>Fluimucil</b>	Tablets	600 mg daily
	<b>Mucomyst</b>	Tablets / Liquid solution	200 mg twice daily
<i>Bromheksin</i>	<b>Bisolvon</b>	Tablets	8–16 mg, 4 times daily
		Liquid solution	6-10 mL of 10%, or 3-5 mL of 20% every 6-8 hrs.
<i>Carbocysteine</i>	<b>Mucodyne</b>	Syrup, capsules	375 mg
<i>Guiafenesin</i>	<b>Breonesin</b>	capsules	200-300 mg 4 times daily
	<b>Guiatuss</b>	Tablets	200–400 mg or
		Liquid solution	30 mg, 4 times daily
	<b>Humibid</b>	Tablets	200–400 mg or
		Liquid solution	30 mg, 4 times daily
	<b>Humibid LA</b>		600 mg
	<b>Hytuss</b>	Tablets	200–400 mg or
		Liquid solution	30 mg, 4 times daily
<b>Robitussin</b>	Tablets	200–400 mg or	
	Liquid solution	30 mg, 4 times daily	
iodinated glycerol	<b>Solvipect</b>	Liquid solution	200 mg, 3–5 times daily
	<b>Expigen</b>		

#### 2.2.8.2. *What problems (side-effects) should I watch for with mucolytic agents?*

The liquid solutions such as **mucomyst** can cause breathing spasms, nausea and rashes. The tablets can cause nausea and diarrhea.

**2.2.8.3.                    *How often and how much should I take?***

The amount prescribed will vary on your need. It is important to discuss the usefulness of dose of the mucolytic agent with your healthcare provider. You may be the best judge of this since you'll know if the medication is making the mucus easier to cough out or not.

Find out from the pharmacist the type of tablet you are taking. Some tablets must be dissolved before use (**bronkyl, mucomyst**) while others can be swallowed whole. Likewise, some liquid solutions (**mucomyst**) must be nebulized in a device, while other liquid solutions can be swallowed in tablet or liquid form (*guaifenesin*).

**2.2.8.4.                    *What should I do if I forget to take my mucolytic agents?***

If you forget to take your mucolytic agent, you may take the medication when you remember and then resume your usual schedule. It is not critical if you miss a dose.

Also see [www.goldcopd.com](http://www.goldcopd.com) for instructions on various inhaler and spacer/chamber devices and the Canadian lung association website [www.lung.ca/drugs/pages/generic.htm/](http://www.lung.ca/drugs/pages/generic.htm/) for more detailed descriptions of many (but not all) of the medications listed here.

## **3. Patients: Other treatments**

### **3.1. What other treatments are available?**

Many treatments are available, including educational programs, such as pulmonary rehabilitation, and different surgical procedures. All treatments should be reviewed with your healthcare provider and options should be discussed. The information in this treatment section is meant to give you basic information that will prepare you for that discussion.

#### **3.1.1. What is pulmonary rehabilitation?**

Pulmonary rehabilitation is a program of education and exercise classes that teaches you about your lungs, how to exercise and how to do activities with less shortness of breath, and how to “live” better with your lung condition.

##### ***3.1.1.1. How will pulmonary rehabilitation help me?***

By attending education classes, you will learn many things about your lungs. For example, the following topics will be discussed: what is wrong with your lungs, what your medicines do, when to call your healthcare provider and how to keep from being hospitalized. During group meetings, you will meet others with breathing problems. This gives you time to share concerns and approaches to living with breathing problems.

The exercise classes will help you to be more active with less shortness of breath. Usually, you will be exercising both your arms and legs. The exercise classes will help you feel better and become stronger by helping you get into better shape.

##### ***3.1.1.2. What should I look for in a pulmonary rehabilitation program?***

You should look for a program that is designed for people with lung problems. The program should be run by healthcare providers who have experience in caring for people with chronic lung conditions. The classes may be in a group setting or customized for the needs of one person. In either case, the classes should be tailored to your needs.

**3.1.1.3. *What is the cost of a pulmonary rehabilitation program?***

The cost of a pulmonary rehabilitation program can vary greatly depending on where you live. If more than one program is available in your area, compare the costs and the services offered.

**3.1.1.4. *Is pulmonary rehabilitation covered by insurance?***

Insurance coverage is different between rehabilitation programs and insurance policies. Contact your insurance company or speak to the staff about program coverage.

**3.1.1.5. *Can I enter pulmonary rehabilitation if I smoke?***

Some programs offer help with quitting smoking as part of the pulmonary rehabilitation program. Others require that you stop smoking before beginning the program. Rehabilitation and medications cannot reverse the damage caused by smoking. If you smoke, make a serious effort to quit. Get help if needed. Stopping smoking is an important part of getting stronger and healthier (see [Management of stable COPD: smoking cessation](#)).

**3.1.1.6. *How do I enroll in a pulmonary rehabilitation program?***

Begin by talking to your healthcare provider about your interest in pulmonary rehabilitation. He or she can give you a referral to a program.

**3.1.1.7. *What happens after I finish the program?***

What you learn and practice during the program should carry over into your daily life after the program ends. If you stop exercising after the program, the improvements you have made will soon be lost. The staff will work with you to design a long-term plan of exercise. The staff will guide you how and when to exercise at home. Many programs offer a “maintenance” plan so that you can continue to exercise with others with breathing problems.

**3.1.1.8. *What if I cannot afford pulmonary rehabilitation or a program is not available in my community?***

If you do not have a program in your area, there are many things you can do on your own. Your quality of life can be improved by stopping smoking, learning how to correctly use inhaled medicines and by exercising regularly. Below is a simple exercise plan for a person

with a lung condition. Talk with your healthcare provider, however, before starting an exercise plan.

One of the most important exercises for someone with lung problems is walking regularly. Begin walking slowly at a very comfortable pace for a period of time (say 5–10 minutes daily) 3–5 days a week. Do not increase the time you are walking until you can walk the entire time without stopping. When you can walk without stopping to rest, increase the time you are walking by 1–2 minutes each week. For example, if you can walk nonstop for 5 minutes a day for 5 days in one week, increase your walking to 7 minutes each day. Many people with severe lung disease can reach the goal of walking 30 minutes without stopping. Some people with lung problems require oxygen during exercise. If you have been prescribed oxygen for regular use, be sure to use it with exercise. If you are not sure about using oxygen, talk with your healthcare provider. Some of the resources listed below may help you either find a program or provide you with more information about lung conditions.

### **3.1.1.9. *Resources for finding the right pulmonary rehabilitation program***

Pulmonary rehabilitation programs are found in many parts of the world. There are both national and state organizations and societies that can help you find a program and information about your breathing problem.

Groups to contact for finding a program in the USA are:

- American Lung Association, telephone 1-800-LUNGUSA or [www.lungusa.org](http://www.lungusa.org), or contact your State or local chapter of the Lung Association.
- American Association for Cardiovascular and Pulmonary Rehabilitation (AACVPR), telephone 312-644-6610 or [www.aacvpr.org](http://www.aacvpr.org) (go to “program directory”).
- American College of Chest Physicians  
[http://www.chestnet.org/health.science.policy/patient.education.guides/living\\_well/](http://www.chestnet.org/health.science.policy/patient.education.guides/living_well/)
- Canadian Lung Association <http://www.lung.ca>
- The Pulmonary Education and Research Foundation (PERF)  
[www.perf2ndwind.org](http://www.perf2ndwind.org)

### **3.1.2. Is surgery useful in COPD?**

Surgery for people with COPD may be useful for those with large, isolated areas of emphysema in their lungs. Emphysema, however, comes in many types. One type of emphysema, seen in some patients with COPD, is emphysema affecting mostly the top portion of the lungs. If the enlarged air sacs caused from emphysema get outsized, the sacs are called bullae. Bullae may press down on the healthy parts of the lung that are near the bullae and a bullectomy may be needed. In some cases when damage to the lung has occurred mainly in the upper parts of the lung, lung volume reduction surgery (LVRS) may be needed. Only a small number of people with COPD actually have the kind of emphysema that requires and benefits from surgery.

#### **3.1.2.1. *What is a bullectomy?***

A bullectomy is the removal of overinflated air sacs called bullae. These sacs are made up of what remains of hundreds of destroyed alveoli. These alveoli become destroyed from emphysema. In the patient with COPD, a bullectomy helps restore the work of the good parts of the lungs and removes the large, useless airsacs caused by emphysema. Most people with COPD have many good sacs available throughout the lungs and therefore would not benefit from surgery, or they may have many bullae in the lung that are small in size and cannot be surgically removed.

#### **3.1.2.2. *What is lung volume reduction surgery (LVRS)?***

Lung volume reduction surgery (LVRS) was first performed in the 1930s and was considered “experimental” surgery. It was not until the 1990s that surgeons improved the surgical technique to make it available for some patients. Like the surgery for a bullectomy, LVRS involves removing useless air sacs. However, unlike the bullectomy, LVRS removes about one third of the upper portion of each lung (the upper lobes). This third of the lung may include some good tissue, but mostly useless tissue. As it is a major procedure, the circumstances must be just right for it to be done. Only people with a lot of emphysema in the upper lungs (seen on

a CT scan) will benefit. The individual must have a strong heart and a healthy remaining lung after the procedure to justify the risk of the surgery. They must also show that they are willing to keep physically fit. For this reason, many surgeons require a person to stop smoking and complete a program of pulmonary rehabilitation before having the surgery. The success of this surgery depends on the type of surgery, severity of the patient's lung and heart disease, and the person's motivation to work to get well after the surgery.

### **3.1.2.3.            *What about lung transplantation?***

Lung transplantation is the removal of one or both lungs. The lung, or both lungs, are replaced with someone else's lung (lungs). Most patients with COPD will do better without a lung transplant. Common reasons for unsuitability for a lung transplantation include lung disease that is not severe enough to justify the risk of a transplant, health that is not strong enough to undergo the procedure or other organs in their body (*e.g.* heart, liver) that are not functioning properly.

### **3.1.2.4.            *What if I need general surgery for some other condition?***

The older we get, the more likely it is that we will need to have surgery for one reason or another. People with COPD may therefore need surgery at some time in their life. Like anyone else, the more health problems you have, the greater the risk of complications during or after surgery. The lungs are affected by any surgery near the lungs and the anesthesia. Therefore, there are greater risks with surgery if you have COPD. Some people with COPD do very well during and after surgery, others do not. Your healthcare provider will evaluate you, the type of surgery you will have and will determine the need to do tests to find out if the surgery is a reasonable risk for you.

### **3.1.2.5.            *Are there tests or treatments I should have before any general surgery?***

Before surgery, it is important to know the current state of your lungs. One or more breathing tests may be ordered for this evaluation. Before the surgery, you may need to be placed on additional medications such as steroids or antibiotics, as a precaution. Your healthcare provider may also be in contact with your surgeon to discuss your situation if they believe they need

more information about the surgery. Besides the strength of your lungs, the healthcare team will want to be reasonably certain that you are in good overall physical health to undergo surgery. Some will recommend you undergo pulmonary rehabilitation in order to get you as physically fit as possible. If you can, you should begin an exercise program of your own, to build up your strength. Walking is a good form of exercise. If you smoke, you must stop at least 2 weeks before surgery, and then, hopefully, for good.

## **3.2. What happens if I have to go to the hospital because I have difficulty breathing?**

If you are hospitalized for complications of your COPD, you may be given antibiotics (and other medications intravenously), have your blood oxygen level measured, have chest-x rays taken and several blood tests. These tests will help to guide your healthcare provider in how best to treat you. Sometimes, despite all treatment, the lungs are unable to adequately take in oxygen. In this case you may require help to breathe. You may be given oxygen through a nasal cannula (tube in your nose), through a loose-fitting mask over your nose and mouth, through a tight fitting mask, such as those used in non-invasive ventilation, or through a tube down your trachea (windpipe) and connected to a ventilator.

### **3.2.1. Will I require a breathing machine?**

If you are unable to keep a safe oxygen level using a nasal cannula or loose-fitting oxygen mask, additional help to get oxygen into your system will be needed. This means a machine will be used to assist your breathing. The two types of breathing assistance are non-invasive ventilation and a ventilator.

#### **3.2.1.1. *Non-invasive ventilation***

Non-invasive ventilation is an approach to blow air into your lungs without having to put a tube into your trachea (intubation). A tight-fitting mask over your nose and/or mouth is used for a machine to blow air into your lungs. This additional air with oxygen may be just the help

needed to bring your oxygen level back into the normal range. This type of ventilation can be done in a normal hospital room or in the intensive care unit.

### **3.2.1.2.            *Ventilator***

A ventilator is a device used to control your breathing. In order for the ventilator to work, a tube must be put into the trachea. This tube can be an endotracheal tube, which is inserted into the nose or mouth, or a tracheostomy tube, which requires an incision into the neck. A ventilator is a machine that “breathes for you” by pushing air into your lungs, followed by a time for your lungs to empty. Other names for a ventilator are a respirator or breathing machine.

Some people with COPD develop severe pneumonias or other life-threatening conditions that prevent them from breathing normally. Ventilators are used in this case because the person either cannot breathe on their own or they have difficulty breathing effectively. The ventilator is a way of delivering oxygen, getting rid of carbon dioxide and making breathing more comfortable. A ventilator may only be required temporarily to assist with breathing. However, in some cases, the person may not ever be able to breathe without a ventilator, even after the pneumonia or other condition improves. Advanced directives are important because they provide “direction” to your healthcare provider regarding whether or not you want treatment with a ventilator.

### **3.2.2.            **What happens if my lung collapses?****

With any lung surgery there may be a temporary collapse of the lung. A collapsed lung can be re-expanded by placing a tube into the chest to release the air. In some cases, even without surgery, COPD may lead to lung collapse from air escaping from the lung into the space surrounding the lung (that is, the air does not escape through the wall of the chest to the outside air, but stays inside the chest). For a small collapse, nothing needs to be done and the hole in the lung heals. A large collapse may require hospitalization and a chest tube will need to be inserted so the escaped air can be removed. A procedure, which may be done to keep the lung

from collapsing again, is scarring of the sac covering the lung (called pleuridesis). This is done if the lung repeatedly collapses or does not re-inflate with the chest tube.

### **3.3. How can I stay healthy?**

For anyone with COPD it is important to keep as healthy and active as possible. You can do many things to keep yourself healthy. Quitting smoking and rigorous activity are the most important.

#### **3.3.1. Do I really need to stop smoking?**

Smoking is the single greatest reason people develop COPD, but smoking itself is also a condition that requires special treatment. It is well known that smoking can cause lung cancer, heart and lung disease. About 90% of people with COPD get COPD from damage caused by smoking. Nevertheless, stopping smoking can help patients, even in severe cases. For example, everyone loses lung tissue as they get older. People with COPD who smoke, however, lose lung tissue at a much faster rate. Stopping smoking can slow the rate of loss to a normal rate. In addition, smoking causes swelling and irritability in the breathing passages. Some of these changes will no longer happen or will be less severe when smoking is no longer irritating the breathing passages.

##### **3.3.1.1. *Is it too late to stop?***

No, it is never too late to stop for the reasons mentioned above. While stopping smoking will not make the lungs normal again, stopping smoking slows the damaging process from getting even worse.

##### **3.3.1.2. *What are some tips that can help me to stop smoking?***

**Tip 1:** for those who are having trouble stopping smoking on their own, medication can help.

**Tip 2:** no single treatment is right for everyone. If the first approaches you take fail, try to figure out why. Speak with your healthcare provider about other options.

**Tip 3:** don't be discouraged if your first attempts to quit fail. It may be that you need a different form of treatment, or that you weren't quite ready to give up smoking.

**Tip 4:** avoid being in situations where people are smoking until you feel strong enough to resist the temptation.

**Tip 5:** never give up trying to stop. Most smokers try several times before successfully quitting for good!

### **3.3.1.3. *Tell me more about the process of stopping smoking?***

Stopping smoking is a two-part process. One part is the nicotine dependence developed from smoking, the other is the habit of smoking. Nicotine leaves the body 24–48 hours after the last cigarette, but withdrawal symptoms may continue after the nicotine has left the body. Usually, cravings are less frequent and less strong after 2 weeks. The other part that smokers need to deal with is the connections their brains have made with multiple doses of nicotine throughout the day. Someone once said “anything you do 500 times a day, 365 days a year has got to be addictive, regardless of what it is!”. While most people who smoke stop smoking by their own method, some do better with the help and support of family and healthcare providers, and medication.

### **3.3.1.4. *What treatments are available to help me stop smoking?***

Smoking cessation support groups are available through many hospitals, clinics or other sites. Studies show that smokers benefit most from the combination of a support group and medication. It is well known that the more support you receive when quitting smoking, the better success you will have. While therapies such as biofeedback and hypnosis have also been used to treat smoking, their usefulness is less clear. Ask in your community if a “Quit Line” is available. Having telephone access to support is very helpful.

### **3.3.1.5. *What medications might help me stop smoking?***

Medications to help people stop smoking vary and the cost can be a factor for some people. When considering the cost of a treatment or medication, however, the smoker should consider the ultimate cost they will pay by continuing to worsen their chronic lung condition.

Nicotine replacement therapy includes gum, lozenges, patches, nasal spray and inhalers. Nicotine gum and patches are often available over the counter, while the nasal spray and inhalers are available by prescription, depending on where you live. Nicotine replacement therapy provides low levels of nicotine in order to decrease the withdrawal symptoms from nicotine addiction. Heavy smokers may require higher doses. This low dose of nicotine gives the smoker time to adjust to stopping smoking.

Because nicotine replacement can affect your heart and blood pressure, these medications should not be taken if you have had a heart attack in the past month or have significant heart irregularities. Discuss the use of these products with your provider if you have recently experienced a heart attack, have chest pains, heart irregularities or you are having difficulty controlling your blood pressure.

You should stop smoking when using these substances, since the combination of smoking and these medications reduce your chances of stopping successfully. You and your provider may find that using two types of nicotine replacement products (for example using the gum along with patches) helps control your desire to smoke. This combination therapy should be done under the supervision of your provider.

#### **What is nicotine gum?**

Nicotine gum (Nicorette, Nicotinel) is a way of providing the body with nicotine without the harmful effects of smoke. Nicotine gum releases nicotine slowly when chewed. Gum must be chewed until a tingling sensation in the mouth occurs, the gum should then be “parked” between the cheek and gums until the tingling or taste goes away. Repeat the chewing until the

tingling reappears. Repeat this process for 30 minutes, then discard the gum in a safe place, away from children and animals. Continual chewing may cause the jaw to be sore, upset the stomach, cause hiccups or a sore throat.

### **What is a nicotine inhaler?**

Nicotine inhaler (Nicotrol inhaler, Nicorette inhaler) is another way of providing the body with nicotine without the harmful effects of smoke. This inhaler is different from bronchodilator inhalers. It is a small tube containing a cartridge of nicotine. The individual slowly inhales on the tube/holder and the nicotine is absorbed in the mouth. It is not inhaled into the lungs. This delivers a low level of nicotine similar to nicotine gum. Some people find that holding something in their hand and putting a tube in their mouth is helpful during withdrawal. This can be used at regular times throughout the day or when one anticipates a craving.

### **What is a nicotine patch?**

Nicotine patches (Habitrol, Nicoderm CQ, Nicotrol, Nicorette, Nicotinell, Niquitin CQ and ProStep) are a way of providing the body with nicotine without the harmful effects of smoke. How often you use them will vary. Most patches are worn for 24 hours, except for Nicotrol, which is worn for 16 hours. The patch provides a low level of nicotine over time and “takes the edge off” withdrawal symptoms. Since the nicotine dose delivered at night may interfere with sleep, patches are sometimes removed at bedtime. However, nicotine craving on awakening is then worsened. While patches are well tolerated, skin irritation is a common problem. This problem can be reduced by placing the patch at a different place on the skin every day.

### **What is a nicotine spray?**

Nicotine nasal spray (Nicotrol NS, Nicorette) is a way of providing the body with nicotine without the harmful effects of smoke. The spray delivers nicotine through a spray and is absorbed in the nose. It is not inhaled like other nasal sprays. One to two doses are used per hour as needed. Most need nine to 12 sprays per day. The spray should be used for at least 3 months but for no longer than 6 months.

### **What are nicotine lozenges?**

Nicotine lozenges (Niquitin CQ, only available in some European countries, Commit is available in the US) deliver nicotine through a tablet. The tablet is placed under the tongue when the desire to smoke arises and is allowed to dissolve. One to two lozenges can be taken every hour, with a maximum of 20 lozenges a day. Lozenges should be taken for 3 months, when the number of lozenges used daily should be reduced. Lozenges should be stopped when only one to two lozenges per day are being used.

#### **3.3.1.6. *Are there other medications besides nicotine replacement that can help me to stop smoking?***

Yes, two other medications have been used to help individuals stop smoking.

**Bupropion (Zyban)** was originally used as a medication to treat depression. It was later found to be particularly helpful for people trying to stop smoking. This medication does not contain nicotine. It is a tablet taken once or twice a day. You and your healthcare provider will decide the best amount for you. Generally, 2–3 months of treatment are needed. Those who should not take this medication include those who are at risk for seizures, eating disorders or use MAO inhibitors (a special class of medications to treat depression). If you are taking any medication to treat depression, including Bupropion, tell your physician before you begin taking Zyban.

**Clonidine (Catapres)** and **nortriptyline (Aventyl, Pamelor)** have also been used to assist smokers stop smoking, but these drugs have not had as wide a use and study as bupropion.

These medications can be used alone but may be more effective if used with some form of nicotine replacement.

#### **3.3.1.7. *Where do I get help to stop smoking?***

Many organizations want to help. In addition to the clinic or hospital where you are being seen, call your local Lung Association, or refer to the following sites:

- [www.lungusa.org](http://www.lungusa.org)
- [www.lung.ca/copd/tofc.html](http://www.lung.ca/copd/tofc.html)
- <http://www.surgeongeneral.gov/tobacco/consquits.htm>

### **3.3.2. Should I get the flu and/or pneumonia vaccination?**

Unless told otherwise by your healthcare provider, and you are not allergic to eggs, you should receive both the flu and pneumonia vaccination. The flu shot is available each Fall and you should get one every year. There are no live viruses in the shot, so you will not get the flu from the shot. As with any shot, it may make your arm tender.

You should get the pneumonia shot at least once a lifetime. If you have had the pneumonia shot 6–8 years ago or have had pneumonia since you first got the shot, ask your healthcare provider if you should get another one. Like the flu shot, there are no live viruses in the shot, but it may make your arm tender.

### **3.3.3. Is it normal to get depressed?**

Having COPD and being unable to do what you want to do because of shortness of breath can be a reason for depression. Depression is a treatable condition and should not be ignored. Some patients find that being enrolled in a pulmonary rehabilitation program and having contact with others can lessen depression. Others require medications to treat their depression. Discuss your feelings with your healthcare provider. Depression is not a condition that is always obvious to those caring for you.

### **3.3.4. What should I know about osteoporosis?**

You should know that both men and women get osteoporosis (weakening of the bones). This occurs in many people as they grow older or because of medication. A common medication taken by patients with COPD, steroids, can increase your chances of getting osteoporosis. Your healthcare provider can monitor the strength of your bones (bone density) with a bone density scan. There are medications that can slow the progress of bone loss and in some cases actually strengthen the bones.

### **3.3.5. Is there a special diet for patients with COPD?**

There is no special diet for people with COPD. At one time, it was felt that people with COPD should avoid carbohydrates found in sugars and starches. This theory has never been shown to be true for patients not hospitalized. In addition, people with COPD can experience two very different problems with weight. Some people with COPD gain weight and others have difficulty maintaining their weight.

While COPD does not cause weight gain, some medications used to treat COPD, such as steroids, may cause some people to gain weight. Being overweight will make the symptoms of COPD worse. Carrying the added weight requires more work for the body and keeps the lungs from expanding fully. The result can be greater breathlessness and increased tiredness because the person is less active. People who are overweight often lose their motivation to exercise. The challenge for these patients is to lose weight and exercise. Those needing to lose weight should be actively involved in a weight loss program that is no different than a person without lung disease.

Some people with COPD may have serious problems maintaining their normal weight. Weight loss comes from not having enough calories to simply keep up with the daily demands of the body. Additional calories are needed to make up for those they burn with the act of breathing. They, therefore, do not have any “extra” calories to use in order to maintain their normal weight. The challenge for these patients is to eat enough calories to maintain their weight. Those who are underweight need to consume as many calories as possible. Therefore, foods that are high in calories, but easily swallowed and digested, are best. In some instances, medications to stimulate the appetite may be needed.

Whether a person with COPD is overweight, underweight or their ideal body weight, they all can lose muscle function from nutritional imbalance and lack of exercise. The way to reverse this process is to exercise and eat a balanced diet.

### **3.3.6. Are there activities that I should not do?**

After stopping smoking, keeping active is the second most important thing you can do to help your breathing problem. The kind and amount of activity is almost limitless, for example play golf, shop, take hikes or garden. In order to do these exercises without causing severe breathlessness, you need to learn to pace your breathing with the activity. Paced breathing helps you breathe in coordination with your activity. One of the biggest adjustments patients with COPD must make is to pace their breathing, economize their motion and slow their pace. These techniques are taught in pulmonary rehabilitation programs and at COPD support groups.

It is very unusual for people with breathing problems to “over exert” themselves. Usually, people who feel that they are over exerting are experiencing the normal symptom of breathlessness. With the exception of activities that may expose you to environmental irritants or a cold or flu, you should be involved in physical activities every day.

### **3.3.7. Can I travel?**

People with COPD should not avoid traveling because they have a breathing problem. In some cases, those with COPD are advised to avoid traveling to higher altitudes (elevation) because of decreased oxygen levels at altitude. They may be prescribed oxygen when traveling at altitude. If you choose to travel to a higher altitude, discuss your oxygen needs with your healthcare provider.

Flying does not “hurt” the lungs. The major concern is the pressure in the airplane and your need for oxygen in flight. If you are receiving oxygen for any reason, discuss the possible need for oxygen with your provider before flying (see [Oxygen](#) section).

### **3.3.8. Why do I sometimes have trouble sleeping?**

COPD sometimes affects a person's sleep. People with COPD may experience sleep problems for a variety of reasons, including sleep apnea, low levels of oxygen at night, medications and cough. Low oxygen levels may disrupt sleep. Those with disrupted sleep because of low oxygen levels may or may not be aware of a low oxygen level. Your healthcare provider may refer you for a sleep evaluation. There are a number of medications that are used to treat COPD that may interfere with sleep. Most bronchodilators including beta-agonists and theophylline are stimulants. Taking these medications near bedtime may make it difficult to fall asleep. Cough may awaken patients resulting in disrupted sleep. Coughing that awakens you should be discussed with your healthcare provider so that they can evaluate and treat it. Patients with severe difficulty breathing may develop fears of falling asleep. This should also be discussed with your healthcare provider since it is easy to develop poor sleep habits

Signs of sleep problems that should be discussed with your healthcare provider include difficulty getting to sleep or staying asleep, awaking with headaches, awaking with shortness of breath and complaints by your sleep partner that you stop breathing during sleep. When evaluating your sleep problem, your provider will want to know all medications you take before going to sleep.

### **3.3.9. What about sex?**

Your lung disease does not directly affect your sexual ability. However, the symptoms of your lung disease, such as shortness of breath, fatigue and the emotional reactions of having a chronic disease, may interfere with your ability to perform and enjoy sexual activity. Many people with COPD have concerns about the effect of sexual activity on their lungs. Sex, like other physical activities, is not harmful to your lungs.

The medications you are taking for your lung disease, such as bronchodilators and steroids, have not been documented to cause difficulties with sexual functioning. Other medications you are taking for another health problems could possibly cause difficulty with sexual activity.

Pulmonary rehabilitation programs usually have a class that discusses issues related to sexual functioning or you can discuss your concerns with your healthcare provider.

### **3.3.10. How often should I see my healthcare provider?**

Your healthcare provider will schedule regular visits with you, either every year or every 2–3 years, depending on how well your COPD is under control. Between these regularly scheduled visits, you should see your healthcare provider when you have an increase in your symptoms that you are unable to control with your “action plan”.

### **3.3.11. What is an “action plan”?**

An “action plan” is a strategy that you and your healthcare provider develop to handle increased symptoms, such as increased shortness of breath, increased cough or greenish sputum. This plan should outline how often you can use your bronchodilators, when and how much steroids to take, and specifically when you should call your healthcare provider.

## **3.4. Why do I need oxygen therapy?**

To answer the questions about why you might need oxygen you need to understand what oxygen is, what it does in your body, who needs it in general and many other questions that will be answered on this webpage.

### **3.4.1. What is oxygen?**

Air is a mixture of gases. Oxygen and nitrogen are the two main gases in the air we breathe. Oxygen accounts for about 21% of gas in air. The abbreviation for oxygen is O<sub>2</sub>. Every cell in our body needs oxygen to live. In order for oxygen to get to these cells, it must be transported through the airways of the lungs. If there is a blockage in the airways from mucus or narrowing of the airways from swelling or constriction, air may not reach enough alveoli to deliver oxygen. In some COPD patients, adequate air is brought into the alveoli, but the oxygen contained in the air is not able to pass into the capillaries surrounding the alveoli. This results in low oxygen levels and is called hypoxemia. By breathing even small amounts of additional

oxygen, the oxygen level in the air rises above 21% to 23 or 24%. This small amount is enough to help “push” the oxygen into the capillaries. Since the body cannot store oxygen, oxygen needs to be given whenever the body is low on oxygen. In some instances, this means that the COPD patient must use oxygen 24 hours a day. The need for continuous oxygen is called long term oxygen therapy (LTOT). Oxygen therapy is important to understand because oxygen is not useful for everyone with COPD. In fact, oxygen is probably one of the least understood and misused therapies for people with COPD.

### **3.4.2. How do I know I need oxygen?**

The need for oxygen is found by measuring the amount of oxygen in your blood stream. If your oxygen level is below a critical level at rest, then you need oxygen close to 24 hours a day. Some people with COPD do not need oxygen when they are inactive, such as when sitting, but need oxygen when exercising, such as walking, or with eating and/or sleeping. Breathlessness is not a reliable way of determining if you need oxygen. Sometimes, you can be very short of breath and not need oxygen; other times your breathing may feel okay, but you are not getting enough oxygen. Oxygen is not given to treat breathlessness. Although some patients feel some relief in their breathlessness from the flow of oxygen on their face, less expensive ways of getting this same relief can be obtained with a fan.

Your healthcare provider will find out if you need oxygen therapy by taking a blood sample from your artery. This test is called an arterial blood gas (ABG) and it measures carbon dioxide and pH in addition to oxygen. This can be done in the office, clinic or hospital, wherever the arterial blood equipment is available. When making an important decision, such as who needs oxygen, the best evaluation is with an ABG. Measuring oxygen levels can also be done with a pulse oximeter. Oximetry is performed by attaching a clip to your finger that shines a light through it. A tiny computer in the oximeter then determines your oxygen level by the color of the light that shines through from the other side. Oximetry only measures one characteristic of the oxygen in your body and, since it is not as precise as an ABG, should only be used as a guide to oxygen therapy.

### **3.4.3. How much oxygen should I take?**

Oxygen is a medication prescribed by your healthcare provider. Optimally, the amount is carefully decided based on an ABG and then guided by oximetry. Once the amount of oxygen you need is decided, your provider will advise you of the rate at which the oxygen should be set. It is very important that you only use the amount that your doctor or nurse has prescribed, no more or no less. The treatment goal is to keep your oxygen at a level that meets your body's need for oxygen, usually above 89%. Taking too much oxygen sends a message to your brain to slow your breathing. Whereas too little may deprive the tissue in your brain and heart of oxygen and result in memory loss or changes in your heart.

### **3.4.4. How many hours a day will I need oxygen?**

In some cases, you may only need to use oxygen when you are exercising or sleeping. However, in most cases, oxygen should be used as close to 24 hours a day as possible. If your oxygen level is found to be low, using less than 15 hours a day has not been shown to provide a benefit, and does not protect your heart, brain and other organs of the body. If you are instructed to use continuous oxygen and choose to go off oxygen temporarily, it is best to do so only while resting quietly, not while sleeping, walking or exerting yourself.

During exercise you use more energy and therefore need more oxygen. To find out how much oxygen is needed during exercise, an exercise stress test or a timed walk test is usually done. It is important that the test be performed while using the type of delivery device that is going to be used at home.

The immediate benefits of using oxygen during exercise may be relief of breathlessness (also called dyspnea) and an improvement in your ability to walk or do activities.

### **3.4.5. Will I need oxygen when I sleep?**

During sleep, you slow down your breathing. People have low oxygen levels while awake are usually also lacking oxygen during sleep. In some cases, people that may not require oxygen while awake may require extra oxygen while sleeping. Your healthcare provider will determine if and how much oxygen you should take at night. Your needs may be determined by using an oximeter that will record your oxygen level while you sleep in your home or you may be asked to sleep at a sleep laboratory.

### **3.4.6. What kind of devices provide oxygen?**

There are several types of oxygen devices. The type of device you are given will depend on where you live and on the purpose of your oxygen. Oxygen can be delivered by three types of devices: oxygen concentrator, liquid system or oxygen in a metal cylinder.

#### **3.4.6.1. *What are oxygen concentrators?***



A concentrator draws in air from the room/environment (which contains 21% oxygen) and passes the air through a special filter collecting only the oxygen into a reservoir. When the machine is turned on, this process of collection takes place. The reservoir and the concentrator have limited storage, so virtually all the oxygen saved is released into the oxygen tubing for delivery to the patient. The concentration of oxygen delivered by a concentrator is 90–95%. The concentrator is run by electricity. The concentrator weighs about 50 pounds (23 kg) and is usually on wheels so that it can be easily moved in the home from room to room. The machine should be located where there is good circulation and away from furniture and walls. There is a compressor inside the machine that makes a regular noise that can be distracting to some. The device is not intended to be portable, however, recently, a new type of concentrator has been developed that makes it possible to fill portable cylinders from a concentrator. Also in development is a concentrator that weighs less than 10 pounds (5 kg) and runs off of a battery.

### **What maintenance do oxygen concentrators require?**

Concentrators have an air inlet and a filter in front of the air inlet. Make sure that the air inlet is not covered and that it allows fresh air into the concentrator. This filter should be washed once a week in dishwasher detergent. After washing it should be thoroughly rinsed and completely dried before re-inserting. The instruction manual will outline how many filters your concentrator has and how often each of these should be changed. Your concentrator should be serviced after approximately 10,000 hours of use or annually. At that time it should be checked to assure that it is producing the right amount of oxygen. Improper maintenance may result in low concentrations of oxygen being delivered.

#### **3.4.6.2. *What is liquid oxygen?***



Liquid oxygen is oxygen that is cooled to -183° C (-297°F), at which point it becomes a liquid. When in liquid form, the oxygen takes up much less room and can be stored in specially designed containers. The concentration of oxygen delivered from liquid oxygen is 100%. Most hospitals use

oxygen in liquid form. The gas molecules in the container are in constant movement, allowing for the liquid to slowly turn into a gaseous form. This results in a build up of pressure in the container, which is either delivered to the patient or released by a ventilation valve. Liquid oxygen is stored in the home in large storage reservoirs. The patient uses a smaller tank to fill for portability. You will need to be instructed on how to fill the smaller tank from the larger storage tank. Your oxygen delivery service will routinely fill the larger tank, every 1–2 weeks, depending on the flow rate you use.



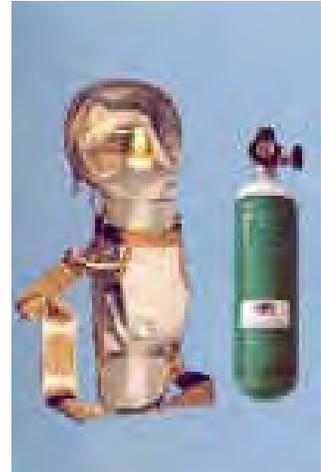
### **What maintenance do liquid oxygen devices require?**

The stationary tank should be placed on a level surface so there is minimal chance of the tank tipping. Little maintenance is required. If a bottle is attached to the tank for collecting

condensed water, it must be emptied and cleaned regularly. The outside of the tank can be cleaned with a damp cloth when necessary. In addition to instructions for transferring the oxygen from the large tank to the smaller tank, instruction should be received in what should be done if any part of the system should freeze.

#### **3.4.6.3.            *What are oxygen cylinders?***

This is the oldest method for delivering oxygen. Oxygen is compressed into a steel cylinder under high pressure, often a pressure of about 200 atmospheres. Like liquid oxygen, the concentration of oxygen delivered from cylinders is 100%. Oxygen is stored in large or small cylinders. Large cylinders are very heavy and have to be changed often as the contents are quickly used. Smaller cylinders are therefore emptied more quickly than larger cylinders, but are portable. Smaller aluminum cylinders are also available for portability. When using oxygen-sparing tubes or oxygen-conserving devices, these small cylinders can last for up to 8 hours. The small cylinders are usually used for portability when an oxygen concentrator is the main source of oxygen in the home.



#### **What maintenance do oxygen cylinders require?**

The pressure valves must be checked frequently. When the cylinders are empty, the regulator must be removed and placed on a full cylinder.

#### **3.4.7.            *What about hoses or tubes attached to the oxygen device?***

The main tubing attached to the different systems can be up to 15 meters/50 feet long to allow for mobility. The length of the tubing should only be as long as necessary in order to be mobile, for example long enough to get from one end of the house to the other. Having excess tubing may become a hazard to yourself and others. Long tubing also increases chances of knotting and cutting off the flow of oxygen. The tubes should be changed every 6–12 months.

The tubing must be the right dimension. The inner diameter should be at least 5 mm to ensure the resistance is minimal.

**3.4.7.1. *What is a nasal cannula?***

A nasal cannula is a dual-pronged tube attached to the oxygen device for delivering oxygen through the nose. These tubes come in different sizes and lengths. Make sure that the one you have fits you well. The typical length of the tubing is about 2 meters (6 feet). The nasal cannula should be changed approximately once a month due to the plastic nasal cannula becoming hard and stiff. The part of the cannula that is situated in the nose may be washed and the rest of the cannula may be wiped with a damp cloth.

**3.4.7.2. *What are oxygen sparing/conserving devices?***

Oxygen-sparing/conserving devices are devices used to reduce the amount of oxygen needed from the oxygen source (liquid, concentrator or cylinder). These devices improve the efficiency of the delivery of oxygen, reducing the amount of oxygen that is used. This is accomplished by increasing the flow of oxygen on inhalation and limiting the flow of oxygen on exhalation. By increasing the delivery of oxygen when you breathe in, and reducing or stopping the delivery when you are breathing out, less of the oxygen is wasted. This makes it possible to use smaller and lighter ambulatory systems or standard systems. In addition, the delivery systems (liquid or cylinders) last longer. There are three types of oxygen-sparing/conserving devices: the on-demand device, reservoir cannula and transtracheal oxygen.

**What is an on-demand device?**

On-demand oxygen delivery devices deliver a small amount of oxygen, usually when you begin to take a breath in through your nose. The delivery device is connected to the oxygen source by the nasal cannula. The device senses the start of inhalation (through the nasal cannula) and immediately gives a short pulse of oxygen.

Nose congestion and mouth breathing may make it hard for the delivery device to sense inhalation. If the level of inspiration through the nose is very low, no oxygen may be delivered. Some types of devices have an alarm that goes off if no breathing activity is detected. Most of the on-demand devices are battery driven and the batteries need to be replaced every couple of weeks.

### **What are reservoir cannulas?**

A reservoir cannula operates by storing oxygen in a small chamber. Storage of oxygen takes place while you are breathing out. This stored oxygen is available when you breathe in. This may allow you to require lower oxygen flow rates while still receiving the same amount of oxygen. There are two types of reservoir devices, the Oxymizer and the Pendant Oxymizer. The differences in the two devices are the location where the storage chamber is located.

### **What is transtracheal oxygen?**

Transtracheal oxygen is oxygen delivered through a catheter placed directly through the neck into the trachea (windpipe). Delivery of oxygen directly into the trachea provides higher amounts of oxygen to be delivered because little is wasted. Flow rates of oxygen can often be reduced by close to 50% at rest and 30% during exercise, as compared with oxygen delivered *via* a standard nasal cannula. A cosmetic advantage of transtracheal oxygen therapy is that the tubing is not as visible as with standard devices.

Not everyone is a candidate for transtracheal oxygen delivery (TTOD). Candidates must be evaluated, educated and monitored by a trained team of healthcare providers. Complications from TTOD are not frequent, but can be serious.

### **3.4.8. Do I need a humidifier on my oxygen system?**

If you use transtracheal oxygen, humidification of the oxygen is important. With other delivery systems at less than 4 liters per minute, humidification is not usually necessary or beneficial. If you have dryness in your nose, you can use a saline (salt water) spray. If this does not help, a

humidifier can be attached to the oxygen system. The humidifier is a bottle filled with sterile or distilled water. The oxygen passes through the water to gather moisture. Water from the humidifier should be changed every 1–2 days.

### **3.4.9. What should I watch for while I am on oxygen?**

In some cases too much oxygen may lead to an increase of carbon dioxide in your blood. This can give symptoms like drowsiness and difficulty keeping awake. Receiving too much oxygen while sleeping can also result in a morning headache. A sign of receiving too little oxygen is a general feeling of fatigue. If any of these problems occur, contact your healthcare provider.

### **3.4.10. What safety precautions should I use when on oxygen?**

Oxygen used properly is safe. **DO NOT SMOKE NEAR OXYGEN!** Also, stay away from open flames. It is important that no oil or grease is used on any of the oxygen equipment. Oxygen cylinders should be secured and placed in an area where they will not fall. Cylinders are under high pressure and a crack in the cylinder can be lethal. Remember to turn off all equipment when not in use. Oxygen containers should not be stored near water heaters, furnaces, or other sources of heat or flame. Oxygen containers and the storage room should be properly marked/labeled. There should be good ventilation around oxygen equipment. Your oxygen supplier should provide you with a complete list of instructions and safety precautions.

#### **3.4.10.1. *Do I have to worry about oxygen exploding or burning?***

- Oxygen alone will not explode and does not burn but oxygen will feed a flame.
- Keep oxygen at least 2 meters or 6 feet away from an open flame.
- Do not smoke while using oxygen, as clothing and hair can easily be ignited.
- Stabilize all cylinders by placing carts in a safe area or by securing them to a wall.

### **3.4.11. In case of an accident what should I do?**

In case of fire, evacuate immediately. Contact the fire department. Understand your oxygen system and what you need to do if there is a problem. Also, you should always have emergency telephone numbers in a central location, such as on the refrigerator. Emergency numbers should include 911 (or country code), your healthcare provider and your oxygen supplier.

### **3.4.12. Can I travel with oxygen?**

It is safe to travel with oxygen, however, various transports have different regulations about their use with oxygen. Contact the appropriate business (airport, boat, train, bus) about their regulations well in advance of travel. Make sure that you have plenty of oxygen with you in case of delays or emergencies. Carry the contact numbers of your healthcare provider and oxygen supplier; you never know when you might need them. General information is listed below. More specific information on traveling with oxygen is available at [www.oxygen4travel.com](http://www.oxygen4travel.com).

When traveling by car, oxygen equipment must be fastened securely in an upright position so that the equipment is stable during the trip.

When traveling by boat, ferry, train or bus take the same considerations as traveling by car. Contact the boat, ferry, train or bus company a few weeks before traveling to find out which rules apply.

When traveling by plane you should plan your trip weeks in advance and inform the airline and check their regulations. Obtain an oxygen prescription from your doctor that provides your diagnosis, your present condition, a statement that it is safe for you to travel and your oxygen prescription. Your oxygen company can help to arrange for oxygen at the airport and travel destinations. You should book a direct flight for several reasons: some airlines charge for oxygen by each leg of the trip, you will be off oxygen during part of your layover and travel is much less tiring when you do not have to make a connection. Make sure you keep a copy of your oxygen prescription, medication prescriptions, know the health facilities and healthcare

providers at each travel destination, and take extra medicines on the plane with you, Your oxygen company can be a great source of help for travel.

### **3.5. Other medications**

#### **3.5.1. Leukotriene modifiers**

Leukotriene modifiers have not been properly tested in COPD patients and, therefore, cannot be recommended for routine use at this time.

#### **3.5.2. Antidepressants**

Many people with COPD experience depressive symptoms. Antidepressants may help some people with symptoms of depression. If you feel you need antidepressants, discuss this with your healthcare provider.

#### **3.5.3. Complementary**

Herbal medicine, acupuncture and homeopathy have not been adequately tested in COPD patients and, therefore, cannot be recommended at this time.

#### **3.5.4. Anti-oxidants**

Anti-oxidants include glutathione, selenium, and Vitamin C and E and medications with anti-oxidant properties (*N-acetylcysteine*). Of these, only *N-acetylcysteine* has been shown to reduce the number of *Exacerbations* or worsening of COPD. However, more research needs to be done to evaluate these benefits and side-effects before the routine use of anti-oxidants is recommended.