

# Respiratory disorders

## Learning guide

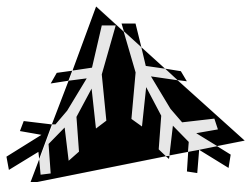
**Respiration means breathing.** In this lesson you will learn about the **respiratory tract**, also called the **respiratory system**. This is the passage that air goes through as we breathe in and out. The respiratory tract contains these important parts:

### The upper respiratory tract

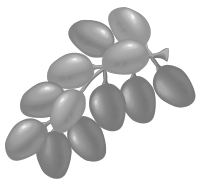
- Nose—warms the air breathed and filters out bacteria and debris. Nasal breathing is important for best lung function.
- Sinuses—cavities (holes) in the skull. They connect to the nasal passage and are lined with nasal tissue.
- ↓ Pharynx—passageway that conducts air from the nose to the voice box. The pharynx also conducts food from the mouth to the esophagus, the tube that leads to the stomach.
- ↓ Epiglottis—flap that covers the entrance to the voice box when we swallow. It prevents food and liquids from getting into the lungs.
- ↓ Larynx—the voice box, located between the pharynx and the windpipe (trachea).
- ↓ Trachea—windpipe. This is the airway connecting the larynx to the tubes leading to the lungs (bronchi).



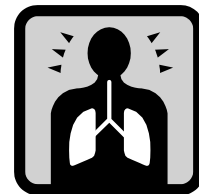
### The lower respiratory tract



- ↓ Lungs—pair of large spongy organs that take oxygen out of the air we breathe and exchange it for carbon dioxide in our blood.



- ↓ Alveoli—millions of tiny air sacs in the lungs, surrounded by tiny blood vessels called *capillaries*. This is where the exchange of oxygen and carbon dioxide takes place. These sacs look like bunches of grapes.



- Pleura—a membrane that covers the lungs and helps them move freely.

# How the Respiratory System Works

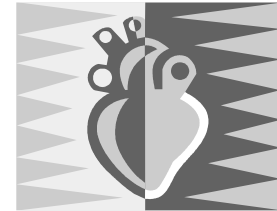
The respiratory tract inhales oxygen into the lungs, transfers the oxygen to the blood, and exhales carbon dioxide. Breathing is usually automatic, controlled subconsciously by the respiratory center at the base of the brain. The brain senses when oxygen levels are too low or carbon dioxide levels are too high and increases the speed and depth of breathing. Normal respiration occurs 12–20 times a minute.

All cells in the body need oxygen. They get oxygen when the body breathes in air that the blood can circulate to all parts of the body. Breathing is accomplished with the help of the *diaphragm*, a set of muscles lying across the bottom of the chest cavity. Oxygen is pulled into the lungs when the diaphragm contracts. Carbon dioxide is pumped out when the diaphragm relaxes.

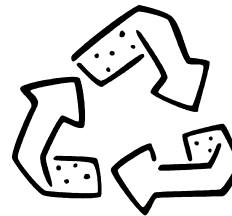
Air inhaled through the nose is filtered, moistened and warmed in the nasal passages. Air goes down the pharynx, into the trachea, through the larynx and into the two large bronchi. The bronchi branch into smaller airways that conduct the air into the

lungs. The inhaled oxygen diffuses into the blood through the many capillaries. The blood exchanges carbon dioxide for oxygen. The carbon dioxide is then exhaled.

Oxygenated blood travels from the lungs through the pulmonary veins and into the left side of the heart, which pumps the blood to the rest of the body.



The blood delivers its oxygen to the tissues and picks up and distributes nutrients and waste products, then returns to the heart and gets pumped back to the lungs to pick up oxygen and get rid of carbon dioxide.



Elimination of carbon dioxide is just as important as getting oxygen. A buildup of carbon dioxide leads to headaches, drowsiness, and even death.

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## Fast facts:

Chronic Obstructive Pulmonary Disease (COPD) accounts for more than 100,000 deaths every year. It is the fourth most common cause of death in the U.S.

People with asthma are almost 60% more likely to develop lung cancer.

Each year more than 25,000 people in the U.S. get tuberculosis (TB).

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## Problems that develop in the respiratory tract

There are many disorders and infections of the respiratory system. Infections occur more frequently in the respiratory tract than in any other organ in the body. Examples of upper respiratory infections include the common cold, sinusitis, and influenza (flu). Lower respiratory problems include infections such as bronchitis and pneumonia and disorders like emphysema and asthma. Some of the more serious ones are described in the following pages.

## Upper respiratory infections



### **Influenza (Flu)**

Influenza is a **highly contagious** infection of the upper respiratory tract. It is caused by a virus and spreads easily through coughing and sneezing. Influenza can lead to pneumonia and death and is responsible for epidemics that occur almost every winter. Flu vaccine can prevent influenza.

Influenza virus is generally passed from person to person by airborne transmission. However, the virus can live for a short time on objects such as pens, pencils, keyboards, and telephone receivers. Touching those objects can transmit the virus.

Symptoms of influenza include high fever, headache, sneezing, coughing, sore throat, severe aches and pain, and fatigue. The most *common* complications of flu are respiratory disorders, especially bronchitis. Pneumonia is the most *serious* complication.

Treatment includes bed rest and increased fluids, antiviral drugs, and medication to relieve aches and fever. Most people recover in a week, but many flu victims feel exhausted for 3–4 weeks. Getting the annual flu shot, washing hands frequently, and avoiding contact with infected persons can prevent influenza.



## Lower respiratory infections

### **Pneumonia**

Pneumonia is the most common and most serious type of lung infection. It can be caused by a virus that is inhaled or by bacteria that gets in through the mouth. Pneumonia causes the alveoli to fill with liquid that blocks the exchange of oxygen in the lungs. The lack of oxygen combined with the spread of infection can cause death.

Pneumonia caused by bacteria is spread from person to person through secretions from the nose, mouth, and throat. Symptoms may include high fever, chills, severe chest pain, and a cough that produces mucus. Bacterial pneumonia can come on gradually or suddenly. It often follows what appears to be an ordinary respiratory infection.

Bacterial pneumonia can develop 4–14 days after an apparent recovery from the flu, especially in people with heart disease. Fever returns, along with a cough that produces mucus. This disease can progress rapidly from flu to serious pneumonia, and it often causes death.

Pneumococcal pneumonia is the most common type of bacterial pneumonia. It can be prevented with immunization and hand washing.

Pneumonia caused by a virus resembles the flu at first, with fever, dry cough, headache, muscle pain, weakness, and shortness of breath. Careful hand washing can help prevent its spread.

## Tuberculosis (TB)

Tuberculosis is a chronic bacterial infection that affects the lungs. TB germs are airborne, causing illness when they are inhaled.

TB is usually passed to those who share breathing space for a prolonged time with someone with contagious TB disease. The most common places for becoming infected are the home and workplace. TB usually does not result from brief casual contact. Adequate ventilation is the best way to prevent transmission. Those who care for people with TB may have to wear special masks to protect themselves by filtering out the TB bacteria from the air they breathe.

A skin test called a PPD is recommended for people who are at risk for TB. This includes healthcare workers, the elderly, people in group settings such as long-term care facilities, people who work or live with a person with active TB disease, people with AIDS or impaired immune systems, the homeless, and those who abuse alcohol or drugs.

A positive PPD means that the immune system is reacting to TB germs located somewhere in the body, so that person is at increased risk for developing TB disease unless preventative treatment is given. A positive PPD does *not* mean that one has TB disease or is contagious to others. Most people who become infected never develop active TB. A person with TB usually is not contagious once treatment has begun. To treat the disease, medications are given for 6–9 months. The entire treatment must be given or the person can become ill again.

A cough that won't go away is usually the first symptom of TB. This table shows what happens with exposure to tuberculosis, TB infection, and active disease.

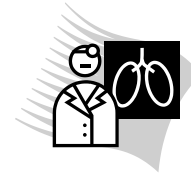
	PPD	Chest x-ray	Symptoms	Contagious	Medication for treatment
<b>Stage 1: Exposure</b>	Negative	Normal	None	No	No
<b>Stage 2: TB infection</b>	Positive	Normal	None	No	Special antibiotic might be given for prevention of active TB
<b>Stage 3: Active disease</b>	Positive	Abnormal	Cough, wt. loss, fever, fatigue, loss of appetite, night sweats, coughing up blood	Yes	Curable in most cases by treatment with several medications taken by mouth for 6–9 months

## Lung disorders

### Asthma

Asthma is a long-term chronic breathing problem that can affect people of any age. It may be inherited, or may be caused by allergies to pollen, pets, dust, or medications. Smoking increases the risk of developing asthma, and stress may make it worse. Persons with asthma can live normal lives with medication and proper care.

A person with asthma has sensitive bronchi that react to triggers such as smoke, air pollution, cold weather, exercise, or allergies. The bronchi may tighten or narrow, becoming inflamed and swollen, making it harder to breathe fresh air in and exhale the stale air. Sometimes it is harder to exhale than inhale. Symptoms of asthma are wheezing, dry cough, or sometimes a cough with mucus, shortness of breath, and chest tightness.



Medications may include an inhaler, puffer, or pills. Some medicines reduce the swelling and inflammation in the bronchi, helping to prevent asthma attacks from starting, but they do not stop an attack once it has started. Inhalers work quickly, opening the narrowed airways. They help stop an attack once it has begun and are used as needed. Some asthma drugs may cause irregular heartbeats.

Blood pressure medicines, sleeping pills, tranquilizers, sedatives, or aspirin may cause a problem in older people with asthma. These drugs make one breathe more slowly and less deeply, which can be dangerous if one has asthma.

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### Common symptoms of respiratory problems

These symptoms should be reported to your supervisor:

- ❑ *Cough*—varies with type of problem. Take notice of these things:
  - Is the cough dry, without sputum?
  - If there is sputum with the cough, what color is it? Is there any blood in the sputum? Is the sputum thick or thin?
  - What factors affect the cough, such as walking, talking, eating, etc.?

Two kinds of medicines are used to treat coughs. *Antitussives* suppress the cough, and *expectorants* help loosen mucus so it can be coughed up.

- ❑ *Shortness of breath* (SOB, dyspnea) is the unpleasant sensation of breathlessness or difficulty in breathing. Shortness of breath may happen mostly during activity, when it is often called *distress on exertion*, or DOE. Some people feel short of breath all the time because of narrowed airways. Sometimes shortness of breath occurs when lying down. This is usually due to heart failure and is relieved by sitting up.
- ❑ Breathing that is *abnormal*—too fast, too slow, irregular, shallow, or gasping.
- ❑ *Pleurisy* is a sharp pain caused by an irritation in the lining of the lungs. It is made worse by deep breathing and coughing. Sometimes the area is sore to the touch.
- ❑ *Cyanosis* is a bluish color of the lips, nails, and skin caused by lack of oxygen.

## Chronic Obstructive Pulmonary Disease (COPD)

COPD is the name for reduced airflow in to and out of the lungs. It is associated with diseases such as **emphysema** and **chronic bronchitis**. Smoking is the cause of 80%–90% of COPD. Other causes include heredity, second-hand smoke, and air pollution. There is no cure.

**Bronchitis** is an inflammation of the bronchi. In chronic bronchitis the airways become narrow, scarred, and partly clogged with mucus, making it difficult to breathe. There may be a cough that lasts for months and returns often, lasting longer each time.

**Emphysema** occurs when some of the air sacs deep in the lungs are damaged, often because of long-term infection and irritation. When lung tissue is damaged, the airways collapse, trapping stale air and blocking intake of fresh air. The lungs try to take in more air and become over-inflated and stretched out, gradually getting so big they completely fill the chest cavity. Many with severe emphysema develop a barrel-shaped chest because of this.

The stretched-out lungs cannot effectively exhale, creating the feeling that something is blocking the airway. Stale air is never completely replaced with fresh air, and less oxygen gets into the blood. Emphysema makes the heart work harder, eventually leading to heart failure.

Many people with emphysema lose 50–70% of their lung tissue before they are aware of symptoms. A daily morning cough with clear sputum is the earliest symptom. Gradually the morning cough becomes an all-day cough. Sometimes the first symptom people notice is breathlessness, especially with activity. Other symptoms of COPD include chest tightness and increased mucus.

### Care measures for COPD:

- Medications.
- Oxygen therapy.
- Good nutrition and correct body weight.
- Good ventilation. People with COPD often like to have a fan blowing air toward them.
- Rooms should be at a comfortable, moderate temperature, not too hot, too cold, or too humid. Showers and baths should be quick if moisture in the air makes breathing difficult.
- Loose-fitting clothes are best.
- Avoid dust, allergens, air pollution, smoke, and other irritants. Animal hair, scented soaps, colognes, perfumes, powders, cleaners, aerosol sprays, glues, and paints can all cause problems with breathing.
- Exercise can strengthen, improve well being, and reduce shortness of breath.
- Drinking lots of water will keep secretions thin and easy to bring up.
- Tasks should be broken into short segments with frequent rest periods of at least 5–15 minutes.
- Sit when performing tasks if possible.
- Relaxation exercises and special breathing techniques can help the COPD client feel better.
- Caregivers must give frequent support, encouragement, and reassurance.
- Be patient, be complimentary, and keep a positive attitude with COPD clients. They often feel anxious and irritable. Lack of oxygen in the blood can cause fatigue, forgetfulness, depression, confusion, poor appetite, moodiness, agitation, frustration, and sleeplessness.

### **Breathing techniques and relaxation exercises that help those who feel breathless**

***Pursed-lip breathing*** is helpful in many cases of shortness of breath. It improves ventilation, reduces air trapped in the lungs, relaxes the client, and eases the effort of breathing. This is especially good to do while exercising or performing any physical activity:

- An erect, upright posture is best for full lung and chest expansion.
- Breathe in slowly through the nose for 1 count. Feel lungs fill with air.
- Purse lips slightly as if to whistle.
- Breathe out gently and slowly through pursed lips for 2 slow counts.
- Do not force the air out; let it escape naturally.
- Keep doing this until breathing eases.

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Clients can learn **controlled coughing** techniques to help clear the breathing passages:

- Take a slow, deep breath and hold for 2 seconds.
- Cough twice, with mouth slightly open. The first cough should loosen mucus, and the second should push it out of the lungs.
- Pause. Sniff gently. Do not take a deep breath, as this may push mucus back to the lungs.

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The **orthopneic position** can help clients with enlarged lungs breathe better by stabilizing the chest and shoulders and helping the client use other muscles to support breathing:

- Sit leaning forward. Support the arms on a surface in front. An overbed table provides good support and can be adjusted to the right height. Arms can also be supported on the knees.

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**Relaxation and visualization exercises** can calm anxiety and agitation:

- Sit in a chair with eyes closed and do pursed lip breathing for a minute or two.
- Frown, tightening the muscles in the forehead. Hold for 3 seconds and then relax.
- Clench jaw by tightening the muscles in the lower jaw. Hold for 3 seconds and relax.
- Tighten and relax arms and hands, then buttocks, then legs and feet.
- Let the body go limp.
- Imagine the most peaceful scene you can think of.
- Visualize the scene with you in it. Think of as much detail as possible.
- Think about how relaxing it is to be in that place and how easily you can breathe there.

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**Energy conservation measures** can help clients accomplish tasks with less effort:

- Push or slide objects instead of lifting them. Wheeled carts are helpful.
- To stand, take several slow, deep breaths, then stand while breathing out through pursed lips.
- Always exhale when lifting or pushing heavy objects or when doing an action or exercise.
- When climbing stairs, use pursed-lip breathing, stop often to rest, and use the rail for support.