5.3: Diseases of the Respiratory System

Allergies

Allergies occur when your immune system reacts to a foreign substance—such as pollen, bee venom, pet dander, or food—that doesn’t cause a reaction in most people.

Your immune system produces substances known as antibodies. When you have allergies, your immune system makes antibodies that identify a particular allergen as harmful, even though it isn’t. When you come into contact with the allergen, your immune system’s reaction can inflame your skin, sinuses, airways, or digestive system.

The severity of allergies varies from person to person and can range from minor irritation to a potentially life-threatening emergency. While most allergies can’t be cured, treatments can help relieve allergy symptoms.

Allergy symptoms, which depend on the substance involved, can affect airways, sinuses, and nasal passages, skin, and the digestive system.[1]

Hay fever, also called allergic rhinitis, can cause:

- Sneezing
- Itching of the nose, eyes, or roof of the mouth
- Runny, stuffy nose
- Watery, red or swollen eyes (conjunctivitis)

A food allergy can cause:
• Tingling in the mouth
• Swelling of the lips, tongue, face, or throat
• Hives
• Anaphylaxis

An insect sting allergy can cause:

• Large area of swelling (edema) at the sting site
• Itching or hives all over the body
• Cough, chest tightness, wheezing, or shortness of breath
• Anaphylaxis

A drug allergy can cause:

• Hives
• Itchy skin
• Rash
• Facial swelling
• Wheezing
• Anaphylaxis

Atopic dermatitis, an allergic skin condition also called eczema, can cause skin to:

• Itch
• Redden
• Flake or peel

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**Anaphylaxis**

Some types of allergies, including allergies to foods and insect stings, can trigger a severe reaction known as **anaphylaxis**. As a life-threatening medical emergency, anaphylaxis can cause a patient to go into shock. Signs and symptoms of anaphylaxis include:

• Loss of consciousness
• Drop in blood pressure
• Severe shortness of breath
• Skin rash
• Lightheadedness
• Rapid, weak pulse
• Nausea and vomiting
Asthma

Asthma is a common condition that affects the lungs in both adults and children. Approximately 8.2 percent of adults (18.7 million) and 9.4 percent of children (7 million) in the United States suffer from asthma. In addition, asthma is the most frequent cause of hospitalization in children.

Asthma is a chronic disease characterized by inflammation, edema, and bronchospasm of the airways, which inhibits air from entering the lungs. In addition, excessive mucus secretion can occur, which further contributes to airway blockage. Cells of the immune system, such as eosinophils and mononuclear cells, may also be involved in infiltrating the walls of the bronchi and bronchioles.

Bronchospasms occur periodically and lead to an “asthma attack.” An attack may be triggered by environmental factors such as dust, pollen, pet hair, or dander; changes in the weather; mold; tobacco smoke; respiratory infections; exercise; and stress. [2]

See Figure 5.5 [3] for an illustration of how asthma affects the airways.

![Asthma and Your Airways](https://med.libretexts.org/Bookshelves/Nursing/Nursing_Pharmacology_(OpenRN)/05%3A_Respiratory/5.03%3A_Diseases_o...)

Figure 5.5 How Asthma Affects the Airways

Symptoms of an asthma attack involve coughing, shortness of breath, wheezing, and tightness of the chest. Symptoms of a severe asthma attack that requiring immediate medical attention include difficulty breathing that results in cyanotic lips or face, confusion, drowsiness, a rapid pulse, sweating, and severe anxiety.

The severity of the condition, frequency of attacks, and identified triggers influence the type of medication that an individual may require. Long-term treatments are used for patients with severe asthma. Short-term, fast-acting drugs are used to treat an asthma attack and are typically administered via an inhaler or nebulizer. [4] View the following video for additional insight into how asthma works.

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Bronchitis

Bronchitis is an inflammation of the lining of the bronchial tubes, which carry air to and from the lungs. People who have bronchitis often cough up thickened mucus, which can be discolored. Bronchitis may be either acute or chronic.

Often developing from a cold or other respiratory infection, acute bronchitis is very common. Acute bronchitis, also called a chest cold, usually improves within a week to 10 days without lasting effects, although the cough may linger for weeks.

Chronic bronchitis, a more serious condition, is a constant irritation or inflammation of the lining of the bronchial tubes, often due to smoking. Chronic bronchitis is one of the conditions included in COPD.[6]

Symptoms for either acute bronchitis or chronic bronchitis may include:

- Cough
- Production of mucus (sputum), which can be clear, white, yellowish-gray, or green in color — rarely, it may be streaked with blood
- Fatigue
• Shortness of breath
• Slight fever and chills
• Chest discomfort

Cold

The common cold is a viral infection of the upper respiratory tract. Many types of viruses can cause a common cold. Children younger than 6 are at greatest risk of colds, but healthy adults can also expect to have two or three colds annually. Most people recover from a common cold in a week or 10 days. Symptoms might last longer in people who smoke.

Symptoms of a common cold usually appear one to three days after exposure to a cold-causing virus. Signs and symptoms, which can vary from person to person, might include:

• Runny or stuffy nose
• Sore throat
• Cough
• Congestion
• Slight body aches or a mild headache
• Sneezing
• Low-grade fever
• Generally feeling unwell (malaise) [7]

Chronic Obstructive Pulmonary Disease

Chronic Obstructive Pulmonary Disease (COPD) is a chronic inflammatory lung disease that causes obstructed airflow out of the lungs. Symptoms include breathing difficulty, cough, mucus (sputum) production, and wheezing. It is often caused by long-term exposure to irritating gases or dust, and most often occurs due to smoking. People with COPD are at increased risk of developing heart disease, lung cancer, and a variety of other conditions.

Emphysema and chronic bronchitis are the two types of COPD. Emphysema is a condition in which the alveoli at the end of the smallest air passages (bronchioles) of the lungs are destroyed and hyperinflated. Chronic bronchitis is inflammation of the lining of the bronchial tubes, characterized by daily cough and mucus (sputum) production. See Figure 5.6 for an illustration of normal lungs compared to lungs with COPD. [8]
COPD is treatable but not curable. COPD symptoms often don’t appear until significant lung damage has occurred, and they usually worsen over time, particularly if smoke exposure continues.

Other signs and symptoms of COPD may include:

- Shortness of breath, especially during physical activities
- Wheezing
- Chest tightness
- Chronic cough that may produce mucus (sputum) that may be clear, white, yellow, or greenish
- Cyanosis
- Frequent respiratory infections
- Lack of energy
- Unintended weight loss (in later stages)

Unlike some diseases, COPD has a clear cause and a clear path of prevention. The majority of cases are directly related to cigarette smoking, and the best way to prevent COPD is to never smoke — or to teach patients to stop smoking now.

Interactive Activity

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Everyday Connection

The Effects of Second-Hand Tobacco Smoke

The burning of a tobacco cigarette creates multiple chemical compounds that are released through mainstream smoke, which is inhaled by the smoker, and through sidestream smoke, which is the smoke that is given off by the burning cigarette. Second-hand smoke, which is a combination of sidestream smoke and the mainstream smoke that is exhaled
by the smoker, has been demonstrated by numerous scientific studies to cause disease. At least 40 chemicals in sidestream smoke have been identified that negatively impact human health, leading to the development of cancer or other conditions, such as immune system dysfunction, liver toxicity, cardiac arrhythmias, pulmonary edema, and neurological dysfunction. Furthermore, second-hand smoke has been found to harbor at least 250 compounds that are known to be toxic, carcinogenic, or both. Some major classes of carcinogens in second-hand smoke are polyaromatic hydrocarbons (PAHs), N-nitrosamines, aromatic amines, formaldehyde, and acetaldehyde.

Tobacco and second-hand smoke are considered to be carcinogenic. Exposure to second-hand smoke can cause lung cancer in individuals who are not tobacco users themselves. It is estimated that the risk of developing lung cancer is increased by up to 30 percent in nonsmokers who live with an individual who smokes in the house, as compared to nonsmokers who are not regularly exposed to second-hand smoke. Children are especially affected by second-hand smoke. Children who live with an individual who smokes inside the home have a larger number of lower respiratory infections, which are associated with hospitalizations, and higher risk of sudden infant death syndrome (SIDS). Second-hand smoke in the home has also been linked to a greater number of ear infections in children, as well as worsening symptoms of asthma.

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