The Respiratory System and the Role of the Medical Assistant
Learning Objectives

• Compare and contrast infections and inflammations of the respiratory system.
• Describe the diagnosis and treatment of tuberculosis.
• Summarize the disorders associated with chronic obstructive pulmonary disease and their treatments.
• Teach a patient how to use a peak flow meter.
• Perform a nebulizer treatment.
• Detail patient teaching for the use of a metered-dose inhaler.
Respiratory System

• The respiratory system
  – Exchanges oxygen from the atmosphere for carbon dioxide waste
    • External
    • Internal
  – Maintains acid-base balance
  – Ventilation process controlled by respiratory center in the CNS and assisted by the costal and diaphragm muscles
Upper and Lower Respiratory Tracts

• Upper—nose, pharynx, larynx; air filtered by cilia in nose, warmed by capillaries, and moistened by mucous membrane; epiglottis protects opening into larynx; vocal cords vibrate when air is exhaled to create sound

• Lower—trachea, bronchial tubes, lungs, bronchioles, and alveoli; lined with mucous tissue and cilia to filter and moisten air
Lungs

- Right—three lobes; greater volume capacity than left lung
- Left—two lobes; longer and narrower
- Each lung encased in the double-layered pleural membrane
  - visceral and parietal layers
  - pleural fluid
Lungs

- Right lung
- Mediastinum
- Right bronchus
- Terminal bronchiole
- Left lung
- Diaphragm
Respiration and Circulation

• The respiratory and circulatory systems work together to supply body cells with oxygen and remove metabolic wastes.
• The bronchioles deposit oxygenated air into the alveoli. Surrounding each alveolus is a network of pulmonary capillaries filled with waste air.
• The oxygenated air moves through the single-celled walls of the alveoli and through the single-celled walls of these capillaries. Carbon dioxide is forced out of the capillaries, into the alveoli, and then into the bronchioles.
Ventilation

• This exchange of gas is referred to as ventilation.
• The movement of oxygen from the atmosphere into the alveoli is called inspiration.
• The movement of the waste gases from the alveoli back into the atmosphere is called expiration.
Bronchioles and Alveoli
Major Diseases of the Lungs: Chronic Obstructive Pulmonary Disease

- Chronic obstructive pulmonary disease (COPD) is a group of diseases with chronic airway obstruction.
- Among these diseases are chronic bronchitis, asthma, and emphysema.
- The patient with COPD is unable to ventilate the lungs freely, resulting in an ineffective exchange of respiratory gases and air trapping.
Asthma

- A condition in which your airways narrow and swell (inflammation) and produce extra mucus.
- Makes breathing difficult and trigger coughing, wheezing and shortness of breath.
- Inflammation causes edema and mucous secretion in the bronchioles.
- Bronchospasms cause air to be trapped in lungs.
- Diagnosed with Spirometry tests and X-rays.
What Triggers Asthma?

“Triggers” are what causes inflammation and bronchospasm.

Triggers:

• Pollen, dust mites, mold, and pet dander.
• Irritants such as smoke, pollution, fumes, cleaning chemicals, and sprays.
• May be exercise-induced.
Signs, Symptoms, & Treatment of Asthma

• Nonproductive cough, wheezing, chest tightness, tachycardia, pallor, diaphoresis.

• Asthma symptoms can be substantially reduced by avoiding exposure to known “triggers.”

• Treatments include bronchodilators (nebulizer treatments), steroid inhalers, daily asthma medication, and evaluation of peak flow values.
Peak Flow Meter
Emphysema

- Destruction of alveoli because of overinflation and difficulty of exhalation of air.
- Progressive and irreversible.
- Causes—cigarette smoking, pollutants, chronic bronchitis or asthma
- Signs and symptoms—dyspnea, SOB, wheezing, thick mucus, fatigue, anorexia, persistent cough, peripheral cyanosis, clubbing of fingers
- Treatment: oxygen therapy, nebulizer treatments, high-calorie diet, pursed-lip breathing.
Clubbing of Digits
Emphysema and Cigarette Smoking

- Cigarettes contain many hazardous substances that damage the lungs when inhaled, including tar, nicotine, carbon monoxide (CO).
- CO blocks the absorption of oxygen in the blood thus prevents RBC’s to carry nutritional O2 to lungs tissues.
- Studies have shown that long-term exposure to secondhand tobacco smoke can increase a person's risk for chronic obstructive pulmonary disease.
Emphysema Death

• Slow and suffocating
• Patients feel as if they are breathing through a straw.
• No sigh.
• Oxygen dependent.
Emphysema Patient
Emphysema

From Damjanov IL: Pathology for the health-related professions, ed 3, Philadelphia, 2006, Saunders.
Diagnostic Tests

- **Respiratory system diagnostic procedures**
  - Pulmonary function tests—performed with a spirometer; used to diagnose a pulmonary abnormality and/or determine the extent of a pulmonary disease
  - Pulse oximetry—a noninvasive method of evaluating the oxygen saturation of hemoglobin in arterial blood and the pulse rate
  - Cultures—performed on expectorated sputum to identify infectious pathogens
  - Bronchoscopy—viewing the larynx, trachea, and bronchi with a flexible fiberoptic instrument through which the physician can collect biopsies or bronchial washings for cytology or culture
Spirometry

• Spirometry is a painless study of air volume and flow rate within the lungs.
• Frequently used to evaluate lung function in people with obstructive or restrictive lung diseases such as asthma or cystic fibrosis.
Hand-held Pulse Oximeter
Metered Dose Inhaler Patient Education

- Shake drug canister vigorously and place it into mouthpiece.
- Open mouth and hold inhaler approximately 1 inch away.
- Exhale normally, and while beginning to slowly inhale, depress the canister, releasing a metered dose of medication.
- Breathe in until lungs are full, hold breath to count of 10, and breathe out normally.
- If second dose is prescribed, wait at least 1 minute between puffs.
- Spacer may be used for children or older patients who have difficulty managing the technique.
Patient Education

• The medical assistant can play a vital role in allaying patient fears by explaining diagnostic tests, making certain the patient understands how to prepare for the examination and what will be expected of him or her during the procedure.

• Provide literature.

• Answer questions.