LESSON ASSIGNMENT

LESSON 2
Nursing Care Related to the Respiratory System.

TEXT ASSIGNMENT
Paragraphs 2-1 through 2-50.

LESSON OBJECTIVES
After completing this lesson, you should be able to:

2-1. Describe the components of the respiratory system.

2-2. Describe the physiology of respiration.

2-3. Describe the mechanics of respiration.

2-4. Describe the factors involved in an accurate respiratory assessment.

2-5. State the purposes of percussion.

2-6. Describe the procedure used to administer percussion.

2-7. Explain the purpose of incentive spirometry.

2-8. Name one method used in the nursing management of epistaxis.

2-9. Identify the types of devices used to administer oxygen to a patient.

2-10. Describe the steps for suctioning the nasopharynx or oropharynx.

2-11. Describe the steps for endotracheal suctioning.

2-12. State three reasons for endotracheal intubation.

2-13. List the postoperative nursing management considerations for a patient undergoing tonsillectomy and adenoidectomy.
2-14. List the nursing considerations involved in the care of a patient with a new tracheostomy.

2-15. Describe the steps used in tracheostomy suctioning.

2-16. Explain the principle of underwater seal drainage.

2-17. Describe three systems used for underwater-seal drainage.

2-18. Discuss the nursing techniques used in management of underwater-seal drainage.

2-19. Discuss the nursing management of a patient with a chest tube.

2-20. State the purpose of thoracentesis.

SUGGESTION

After studying the assignment, complete the exercises at the end of this lesson. These exercises will help you to achieve the lesson objectives.
LESSON 2

NURSING CARE RELATED TO THE RESPIRATORY SYSTEM

Section I. ANATOMY AND PHYSIOLOGY

2-1. INTRODUCTION

a. The respiratory tract is the most common portal of entry and exit of microscopic disease agents. Many of these microorganisms leave the body of the infected person by means of droplets and by nose and throat secretions. Droplets are exhaled in coughing, sneezing, talking, or simply breathing. These droplets do not always fall to the ground immediately, but may remain suspended in the air for many hours and can be inhaled by a well person, who may then become infected. The infection may also be spread to a well individual who improperly handles secretions of the nose and throat of an infected person. Many respiratory diseases are infectious in nature and are easily spread.

b. Medical intervention and skilled nursing care are employed in treating respiratory infections. Skilled nursing care includes knowledge of the duration and stages of the disease, isolation procedures, infection control policies, comfort measures for the patient, therapeutic measures, and observation of signs, symptoms, and potential complications.

2-2. THE RESPIRATORY SYSTEM

a. The cells of the body require a constant supply of oxygen to carry on the chemical processes necessary to life. As a result of these processes, carbon dioxide, a waste product, is formed, and must be removed from the body. Oxygen and carbon dioxide are continually being exchanged, both between the body and the atmosphere and within the body. This process is known as respiration, and the body system that performs this exchange of gases is the respiratory system.

b. The respiratory system is a continuous series of passages that begins with the nose and ends in the alveoli of the lungs. The upper respiratory system includes the nose, pharynx, larynx, and the trachea. The lower respiratory system includes the right and left bronchi, their subdivisions, and the lungs. Review Figure 2-1 as you read the next paragraph.
Figure 2-1. The human respiratory system.
2-3. STRUCTURE AND FUNCTION

a. Nose. Inhaled air is warmed, moistened, and filtered in the nasal cavities. Filtering is done by the cilia (tiny hair-like projections) of the mucous membrane lining the nasal passages.

b. Pharynx. The pharynx, or throat, connects the nose and mouth with the lower air passages and the esophagus. It is divided into three sections, the nasopharynx, the oropharynx, and the laryngopharynx. Both air and food pass through the pharynx. Air passes from the nose and mouth to the larynx, while food passes from the mouth to the esophagus. The walls of the pharynx contain masses of lymphoid tissue called the adenoids and tonsils.

c. Larynx. The larynx, or voice box, connects the pharynx with the trachea. Two membranous bands in the wall of the larynx are called vocal cords. Vibrations of the vocal cords produce sound.

d. Trachea. The trachea, or windpipe, is a tube that carries air from the larynx to the bronchi. It is held open by cartilaginous rings and is lined with cilia and mucous glands to keep dust and dirt out of the lungs.

e. Bronchi. The trachea divides to form the two main bronchi. One bronchus enters each lung and divides into many smaller air passages called bronchioles. The bronchioles terminate in the final air spaces, called the alveoli.

f. Lungs.

(1) The lungs are the organs of respiration. They are elastic structures contained within the thoracic cavity. The upper, pointed border of each lung, called the apex, extends above the clavicle. The lower border, or base, rests upon the diaphragm. Each lung is divided into sections called lobes. The right lung has three lobes, termed upper, middle, and lower. The left lung has only two lobes, referred to as upper and lower. Inside each lung, millions of tiny air sacs, called alveoli, are interlaced in a network of capillaries. Certain cells in the alveolar walls secrete a lipid-rich material called surfactant. Surfactant helps to maintain the elastic quality of the alveolar membrane and assists with the transfer of gases.

(2) Oxygen-poor blood is pumped from the heart's right ventricle, through the right and left pulmonary arteries, and into the lungs. Paralleling the branching of the respiratory tree, the arteries divide and subdivide within the lungs. Arteries divide into arterioles, and arterioles divide into the capillaries that surround the alveoli.

(3) Each lung is enclosed by a membranous sac formed of two layers of serous membrane called pleura. One layer covers the lungs and is called the visceral pleura. The other lines the chest cavity and is called the parietal pleura. The space between the two layers, the pleural cavity, contains a small amount of fluid that
lubricates the surfaces. Between the two lungs is the mediastinum, the central thoracic cavity containing the heart, the great vessels, the esophagus, and the lower trachea.

2-4. PHYSIOLOGY OF RESPIRATION

  a. The walls of the alveoli are composed of a thin, permeable membrane. It is here that oxygen passes from the alveoli into the tiny capillaries that surround each alveoli. Carbon dioxide in the blood passes from the capillaries into the alveoli to be exhaled. This exchange of oxygen and carbon dioxide in the lungs is called external respiration.

  b. The oxygen that enters the capillaries is carried by the red blood cells in a chemical combination with hemoglobin. This blood, now oxygenated, returns to the heart to be pumped out to the body through the arteries. The oxygen passes part of the blood into the cells of the body, while carbon dioxide waste from the cells is passed into the blood that returns to the heart. This exchange of gases between the capillary blood and the cells of the body is called internal respiration.

2-5. MECHANICS OF RESPIRATION

  a. The act of breathing, the cycle of inspiration and expiration, is repeated about 16-20 times per minute in a resting adult. Breathing is regulated by the respiratory center in the medulla of the brain. The level of carbon dioxide (CO) in the circulating blood is one of the major influences upon the respiratory reflex. The respiratory center is sensitive to changes in blood composition, temperature, and pressure, and will adjust the rate and depth of breathing to accommodate the body's needs.

  b. The physical conditions that control the flow of air into and out of the lungs are referred to as the mechanics of ventilation. Air flows from an area of higher pressure to an area of lower pressure. During inspiration, contraction of the diaphragm and intercostal muscles increases the size of the thoracic cavity. This causes the pressure within the thoracic cavity to become less than that of the atmosphere, and air is drawn through the air passages into the alveoli. During normal expiration, relaxation of the same muscles will cause the thoracic cavity to decrease in size, thereby increasing the pressure within the thoracic cavity to that which is greater than atmospheric pressure. Air will then flow out of the lungs into the atmosphere.

Section II. PHYSICAL EXAMINATION

2-6. NOSE AND SINUSES

  a. Physical examination of the nose and sinuses should begin with an overall observation for general deformity or irregularity. Watch the patient breathe through both the mouth and nose. Do the nostrils flare with inspiration? Is the sense of smell intact? The nasal passages should be clear and unobstructed, with no discharge present. Observe the nasal septum. It is normally straight and un-perforated, dividing the nasal cavity into two chambers of relatively equal size and shape. The mucous membranes should be pink.
b. Examine the sinuses for tenderness. Avoiding the eyes, use the fingertips to direct manual pressure upward over the frontal sinuses. With the thumbs, direct pressure upward over the lower edge of the maxillary bones to examine the maxillary sinuses.

2-7. MOUTH AND THROAT

a. When examining the mouth and throat, begin with a general observation of the voice quality. Are raspines or hoarseness detected in the voice? Make a note of the breath odor. Observe the lips for moisture, color, and the presence of abnormalities such as masses, lesions, or discolorations.

b. Using a tongue depressor and penlight, examine the inside of the mouth.

(1) Note the number and condition of the teeth.
(2) Note the color and texture of the gums and look for the presence of swelling or discharge.
(3) Observe the pharynx, looking for masses, exudate, or inflammation.
(4) Observe the tonsils for inflammation or exudate.
(5) Observe the protruded tongue for size, color, moisture, symmetry, and the presence of any abnormal lesions.

2-8. RESPIRATIONS

a. The normal resting adult breathes 16-20 times per minute. Except for an occasional deeper breath (sigh), breathing is maintained at a fairly regular rate, rhythm, and depth. Any disease or injury that affects the respiratory system, the chest wall, or the oxygen carrying ability of the blood will usually affect the respiratory rate or the effort required to breathe. If breathing movements are painful, breathing may become irregular or the patient may be reluctant to take a breath of sufficient depth to aerate the lungs.

b. When observing a patient's respirations, the following should be noted.

(1) **Rate.** The number of breathes per minute.
(2) **Rhythm.** The pattern or regularity of the breathing.
(3) **Depth.** Shallow or deep inspiration.
2-9. **ABNORMAL RESPIRATIONS**

a. **Dyspnea.** Difficult or labored breathing, normally requiring considerable exertion by the patient.

b. **Apnea.** Temporary cessation of breathing. A period of apnea may last for 30-60 seconds.

c. **Tachypnea.** Quick, shallow breathing.

d. **Bradypnea.** Abnormal slowness of breathing.

e. **Hypoventilation.** A state in which there is a reduced amount of air entering the pulmonary alveoli.

f. **Hyperventilation.** A state in which there is an increased amount of air entering the pulmonary alveoli.

g. **Stertorous Respiration.** Breathing accompanied by abnormal snoring sounds.

h. **Cheyne-Stokes Respiration.** An irregular rhythmic breathing pattern that begins with slow, shallow respirations that increase in rate and depth and then gradually decline again. A period of apnea lasting 10-60 seconds follows, and the pattern then repeats itself.

2-10. **CHEST AUSCULTATION**

a. Auscultation (listening with a stethoscope) aids in assessing air flow through the lungs and determining the presence of fluid or mucus. Breath sounds vary according to the proximity of the large bronchi. Sounds are louder and courser near the large bronchi and over the anterior chest in general. Peripherally, the sounds are softer and finer.

b. To auscultate the chest, have the patient sit erect, or position the patient first on one side and then on the other if the patient is unable to sit. With a stethoscope, listen to the lungs as the patient breathes in and out with the mouth open. Follow a methodical pattern, comparing symmetrical areas on the left and right, traveling from apex to base. Listen both anteriorly and posteriorly.

c. Breath sounds, the sounds of air moving into the lungs during inspiration and out during expiration, should be clearly heard over all lung fields. Normal breath sounds are smooth and clear. Wheezing, rattling noises, or the absence of sound over a particular area is abnormal.
d. Nursing personnel should always auscultate the patient's lungs before and after percussion or coughing and deep breathing exercises. In this way, an observation regarding the effectiveness of the treatment can be made.

Section III. DIAGNOSTIC STUDIES

2-11. LABORATORY STUDIES

a. Sputum is collected and studied for the presence of white blood cells, bacteria, and abnormal cells. Cultures of sputum may be done to determine sensitivity or resistance to drugs when the physician must choose an antibiotic therapy.

b. Pleural fluid will accumulate in the parietal cavity in abnormal amounts in certain disease conditions. The fluid is studied to determine the cause of the abnormal accumulation. Pleural fluid is normally obtained by aspiration. This procedure is called thoracentesis and will be discussed in another section.

c. Arterial blood gas (ABG) studies provide a means of assessing the adequacy of ventilation and oxygenation, and help assess the acid-base state of the body.

2-12. OTHER STUDIES

a. X-rays of the chest show the position of normal structures within the thorax. Displacement of structures, abnormal shadows, or abnormal densities are indicative of some abnormal pathology.

b. Pulmonary function tests (PFTs) are ventilatory function tests done to detect and measure abnormalities in respiratory function. These tests involve measurement of the amount of air the patient is able to inhale and exhale.

c. Bronchoscopy is the direct visualization of the larynx, trachea, and bronchi through an instrument called a bronchoscope. Bronchoscopes may be flexible or rigid.

The bronchoscope is used not only to examine, but also to diagnose bleeding sites, to excise lesions, to remove obstructions or secretions, and to collect specimens for biopsy, cytologic, or bacteriologic study.

Section IV. SPECIAL NURSING MANAGEMENT

2-13. COUGHS AND DEEP BREATHE

a. Unless contraindicated, coughing is encouraged in order to clear mucous secretions from the trachea and bronchi. If secretions are allowed to accumulate, they block the air passages and prevent air from reaching lung tissue. Effective coughing, deep breathing, and change of position are all measures that help to promote complete aeration of lung tissue in bedridden, debilitated, and postoperative patients. When
coughing is prescribed, teach and assist the patient to cough effectively. It can often be a painful experience, and the patient may try to suppress the cough, give a small "hacking" cough, or merely clear his throat. The patient can cough most effectively in the sitting position.

b. Using good body mechanics assist the patient to sit upright in bed or in a stable straight-backed chair. If the patient is unable to sit up, assist him to a supine position and raise the head of the bed if permissible. Provide tissue and an emesis basin for the expectorated secretions. Instruct the patient to inhale deeply, cough on exhalation, and expectorate the coughed-up secretions into the tissue or basin. Repeat the procedure several times in order to clear the air passages. Assist the patient into a comfortable position and document the results of the procedure.

2-14. PERCUSSION

a. Percussion, a method of tapping massage, is done to mobilize secretions, to aid in expansion of lung tissue, and to promote efficient use of respiratory muscles.

b. Prior to administering percussion, review the patient's chart to determine the reason or purpose for the treatment. Familiarize yourself with the patient's diagnosis and condition. Discuss the procedure with the patient and assemble the necessary equipment.

   (1) Suction equipment, if necessary, to remove secretions that cannot be expectorated.

   (2) Towels.

   (3) Tissues.

   (4) Toothpaste, toothbrush, basin.

   (5) Pillows to help support the patient in the desired position.

2-15. PRECAUTIONS

When administering percussion, it is necessary to observe the following precautions:

a. Avoid fatiguing the patient by modifying positions according to the patient's tolerance.

b. Avoid performing percussion immediately before or within one hour after meals to avoid nausea, vomiting, and aspiration.

c. Avoid percussing over the spine, liver, kidneys, or spleen to avoid injury.
d. Avoid percussing over a female patient's breasts.

e. Place a towel over the bare skin or percuss over the patient's clothing. Do not percuss over buttons, snaps, or zippers.

f. Remove rings or any other jewelry that might scratch or bruise the patient.

2-16. PERCUSSION PROCEDURE

a. Prior to the start of the treatment, auscultate the patient's lungs to locate the areas of congestion. Position the patient in the posture that best facilitates drainage of the areas to be percussed. Instruct the patient to breathe slowly and deeply to promote relaxation.

b. Hold your hands in a cupped shape with the fingers flexed and the thumbs pressed tightly against the index fingers.

c. Using a tapping or clapping movement of your cupped hands against the torso, percuss the selected area in a rhythmic manner. A hollow sound indicates correct performance of the technique. Percuss each area one to two minutes.

d. After completion of percussion, instruct the patient to breathe deeply and cough to remove loosened secretions.

e. Auscultate the patient's lungs to evaluate the effectiveness of the treatment.

2-17. INCENTIVE SPIROMETRY

a. An incentive spirometer is a device that stimulates the patient to achieve maximum voluntary lung expansion. The purpose of the device is to help the patient achieve deeper inspirations.

b. In performing the exercise, the patient places his lips securely over the mouthpiece of the spirometer and inhales as deeply as possible. At maximum inflation there should be a slight pause, and the patient then relaxes and exhales.

c. The spirometer is normally equipped with a visual reinforcement device for patient encouragement. For example, a light may come on at maximum inspiration or the patient may watch a plastic ball rise to the top of a chamber during inspiration.

d. The patient should be encouraged to cough and expectorate any secretions loosened by the deep breathing.

2-18. OXYGEN THERAPY

a. Oxygen is a colorless, tasteless, odorless gas that is slightly heavier than air. Oxygen may be delivered by various administrative devices. The method of delivery
selected depends upon the condition of the patient, the concentration of oxygen required, and the preference of the physician. The following equipment will be necessary:

1. Oxygen source (O2 tank or piped-in wall outlet)
2. A cylinder regulator (O2 tank) or a flow meter (wall O2)
3. Humidifier.
4. Sterile or distilled water.
5. Administration device.

b. Administration devices include:

1. A nasal cannula is a rubber or plastic tube with short curved prongs that extend into the nostrils about 1/4 to 1/2 inch. The cannula is held in place with an elastic band that fits around the patient’s head. It is used to administer low to medium concentrations of oxygen. A flow rate of 2-6 liters/minute should provide an oxygen concentration of 25-35 percent. Start the oxygen flow prior to inserting the prongs into the patient’s nostrils.

2. A venturi mask is a facemask designed to deliver precisely controlled oxygen concentrations by providing oxygen mixed with room air. A fixed flow of oxygen is mixed with a flow of air to produce a constant oxygen concentration regardless of rate of breathing. Masks are designed to provide 24 percent, 28 percent, 31 percent, 35 percent, 40 percent, and 50 percent oxygen concentrations. The mask should be assembled according to the manufacturer’s instructions for the oxygen concentration prescribed by the physician. Start the oxygen flow at the specified flow rate and adjust the mask over the patient’s nose and mouth.

3. A simple facemask is designed to provide low to medium oxygen concentration using liter flow rates of 2-8 liters/minute. Simple masks come in many sizes and configurations. Follow the manufacturer’s instructions for use of the mask. Always begin the oxygen flow prior to placing the mask over the patient’s nose and mouth.

4. Re-breathing masks are designed for inhalation of moderately high concentrations of oxygen from a reservoir bag. A partial re-breathing mask has perforations on both sides of the mask that serves as exhalation ports. Inspired oxygen concentrations of 50-60 percent can be achieved. The non-re-breathing mask differs from the partial re-breathing mask in that it has a one-way valve between the mask and the reservoir bag that ensures that the patient receives only 100 percent oxygen from the reservoir bag. The mask has two flapper valves over the exhalation ports that allow the patient to exhale, but prevent inhalation of room air that would dilute the oxygen concentration.
(5) A T-tube is a device that connects directly to an endotracheal or tracheostomy tube to deliver humidified oxygen. Connecting tubing runs from the T-tube to the humidification device, which is connected to the oxygen source.

c. Safety precautions associated with the use of oxygen include:

(1) Post "Oxygen" and "No Smoking" signs wherever oxygen is stored or in use. Oxygen supports combustion, so things that burn slowly in normal air will burn violently or explosively in the presence of increased oxygen.

(2) Inform the patient and visitors of requirement for no smoking and no open flames. Enforce this rule.

(3) Ensure that oil or grease isn’t used around the oxygen fittings, as petroleum-based products will burn.

(4) Ensure that all electrical equipment is properly grounded and in good condition.

(5) Avoid the use of static-generating materials such as nylon and wool. This applies to uniforms, pajamas, and bedding.

(6) If an oxygen tank is used, secure it away from doors and high traffic areas to reduce the possibility of the cylinder being knocked over and the valve being damaged.

(7) When transporting an oxygen cylinder, strap it to the carrier. An unsecured cylinder may drop or fall, causing injury to patients or staff, and damaging equipment, walls, and flooring. If the valve should break, the sudden release of the high pressure could cause the cylinder to become a high velocity missile. A full oxygen cylinder has enough force to penetrate a concrete wall.

2-19. NASOPHARYNGEAL AND OROPHARYNGEAL SUCTIONING

a. The nose, mouth, and throat may be cleared of mucus, vomitus, blood, or other material by a procedure called suctioning.

(1) Material that accumulates in the mouth and throat can usually be expectorated. Mucus accumulations in the nostrils can be removed by blowing the nose. If the patient is unable to cough, expectorate, or otherwise clear the upper air passages effectively, there is a danger that the accumulated material may be aspirated into the lower air passages (trachea, bronchi, and lungs).

(2) These suctioning procedures may be carried out using medical asepsis (clean technique) since the nostrils, mouth, and throats are not sterile areas. In specific cases, such as isolation, sterile technique may be required.
b. Wash your hands and assemble the necessary equipment. Set it up at the patient’s bedside.

   (1) Set up the suction apparatus (portable suction machine or in-wall suction) and connect a sufficient length of tubing to reach easily from the suction source to the patient.

   (2) Place a container of water (or normal saline solution), 4x4 gauze squares, an emesis basin, and tissues on the bedside table.

   (3) Select the appropriate size catheter (14 or 16 French for adults, 10 or 12 French for children) and attach it to the suction tubing. If the catheter does not have a thumb control suction valve, attach it to the tubing with a Y-connector.

   (4) Turn on the suction apparatus and check the suction and the patency of the tubing by aspirating some of the water through the catheter. Do this by inserting the free end of the catheter into the container of water. Apply suction by placing your thumb over the suction control (thumb control valve or Y-connector).

c. Suction of the nasopharynx and nostrils:

   (1) Moisten the catheter in the water.

   (2) With suction diverted, insert the catheter gently through a nostril to the back of the throat (about 3-5 inches).

   Note: If an obstruction is met, or if the patient’s cough reflex is stimulated, remove the catheter and wait a moment before reinserting.

   (3) Apply suction and slowly remove the catheter, using a rotating motion. Remember: You are suctioning oxygen as well as secretions, so suction for only 5-10 seconds at a time.

   (4) Clear the catheter by aspirating some water through it. Thick secretions adhering to the outer surface of the catheter should be removed with moistened gauze.

   (5) Repeat the procedure through the other nostril.

d. Suction of the oropharynx and mouth:

   (1) Moisten the catheter in the water.

   (2) With suction diverted, insert the catheter gently into the mouth toward the back of the throat. Note: If gag or cough reflexes are stimulated, remove the catheter and wait until gagging or coughing subsides before reinserting.
(3) Apply suction and rotate the catheter to suction the secretions. Suction for only 5-10 seconds at a time. Do not push the catheter in and out against the wall of the throat as this may injure the mucous membrane.

(4) Withdraw the catheter and clear it by aspirating water through it. Thick secretions adhering to the outer surface of the catheter should be removed with moistened gauze.

(5) Repeat the procedure, suctioning around the teeth and gums and under the tongue if secretions have accumulated in these areas.

(6) For suctioning of the mouth, a firm metal suction tip may be used instead of a soft catheter. One such tip is the Yankauer. Care must be taken when using a rigid suction tip to avoid injury to the oral mucosa.

   e. Bulb syringe suctioning is used to clear secretions from the nose and mouth of infants.

   (1) Grasp the bulb syringe firmly and squeeze the bulb to expel the air.

   (2) Very gently, insert the tip into the mouth or nostril of the infant, taking care not to injure the delicate mucosa.

   (3) Release the pressure on the bulb. As the air returns into the bulb, it creates a sucking action that will withdraw the secretions.

   (4) When the bulb has inflated, remove the tip from the infant’s mouth or nose. Dispose of the secretions into a basin or piece of gauze by squeezing the bulb, forcing out the air and secretions.

   (5) Repeat the procedure as necessary.

   (6) Rinse the syringe as necessary and at the end of the procedure. Squeeze the bulb, insert the tip into a basin of water, and release the bulb to aspirate the water. Remove the tip from the basin and squeeze the bulb to expel the water.

2-20. ENDOTRACHEAL SUCTIONING

   a. The procedures for endotracheal (within the trachea) suctioning are similar to those used for naso and oropharyngeal suctioning with two major differences.

   (1) Endotracheal suctioning, unlike naso- and oropharyngeal suctioning, is done as an aseptic, or sterile, procedure.

   (2) Suctioning the trachea interferes greatly with oxygenation. A high suction pressure and a lengthy suctioning time will greatly decrease the amount of
oxygen in the alveoli. If the patient is old or greatly debilitated, suctioning has the potential to set off cardiac arrhythmias.

b. Wash your hands, then assemble and set up the suction equipment.

(1) Check the suction and the tubing by aspirating water through the connecting tubing.

(2) On the bedside table, place an open package of 4x4 gauze, a sterile suction catheter, a suction set or sterile basin, a container of sterile water or normal saline, and sterile gloves.

(3) Set up the suction set or sterile basin. Fill the sterile container with the sterile water or normal saline.

c. Using aseptic technique, open the catheter package just enough to expose the connecting end and connect the catheter to the suction tubing. Don the sterile gloves. Using aseptic technique, remove the catheter from the package and hold it in your dominant hand. Test the catheter by aspirating some of the sterile solution.

d. Pick up a piece of the gauze with your non-dominant hand and grasp the patient's tongue. Gently pull the tongue out of the mouth. This will provide a view of the oropharynx and at the same time raise the epiglottis to permit easier insertion of the catheter into the trachea. As an alternative method, the catheter may be introduced through the nose.

e. As the patient inhales, introduce the catheter (with suction diverted) toward the posterior of the mouth and down the throat into the trachea. The patient will probably cough at this point. If coughing brings up sufficient secretions to clear the air passages, the procedure may be discontinued at this point. If not, relax the tongue a bit and instruct the patient to breathe normally.

f. Apply suction and gently rotate the catheter to aspirate secretions. Remember to suction for only 5-10 seconds at a time. Withdraw the catheter and rinse between suctioning by aspirating sterile solution. This will keep the catheter moist and free of secretions that may block the lumen.

g. Repeat the procedure until the secretions have been cleared. Remember that frequent catheter introductions irritate the tracheal mucosa, so suction thoroughly to avoid repeated insertions.

h. Observe the patient closely for changes in color or respiration, disorientation, or agitation. These could be signs of anoxia. Listen to the patient's breath sounds, which should become quieter as secretions are removed.
2-21. ENDOTRACHEAL INTUBATION

a. An endotracheal tube may be inserted through the nose or mouth into the trachea. This procedure is normally done by a physician or a nurse anesthetist. Endotracheal intubation may be done during surgery to facilitate anesthesia and control respirations, to bypass an upper airway obstruction, or to permit connection of the patient to a resuscitation bag or mechanical ventilator.

b. Endotrachial (ET) tubes generally have an inflatable cuff, which holds the tube in place in the trachea and prevents aspiration of upper respiratory tract secretions into the lower respiratory tract. The cuff must be deflated periodically to prevent injury to the trachea.

c. If intubation is necessary for an extended period of time, a tracheotomy is performed and the patient is intubated with a tracheostomy tube. This surgical procedure will be discussed in section VI.

2-22. MECHANICAL VENTILATION

a. When a patient is unable to maintain appropriate levels of arterial oxygen and carbon dioxide by normal breathing, some sort of mechanical assistance becomes necessary. A mechanical ventilator is a positive pressure-breathing device that maintains respirations automatically. Ventilators may be used for complete or partial control of a patient's respirations.

b. Mechanical ventilators are used in three modes of operation: assist, control, and assist-control. Determination is made by the physician according to the needs of the patient.

(1) Control mode is used for the patient whose respiratory drive is absent or excessive. The ventilator initiates breathes at a pre-set rate and will not respond to any patient attempts to initiate a breath.

(2) Assist mode is used for the patient who is able to make an inspiratory effort, but is unable to inhale an adequate amount of air. The patient initiates each breath and the ventilator then augments the breath to achieve a preset volume of air.

(3) Assist-control mode is used for the patient who has an erratic respiratory pattern. The ventilator will function in assist mode as long as the patient maintains an adequate respiratory rate. If the patient's respiratory rate falls below a preset level, the machine will switch to control mode and initiate breaths. The ventilator will switch from assist to control as determined by the needs of the patient.

c. The ventilator settings are determined by the physician.

(1) Tidal volume--The amount of air delivered for each inhalation.
(2) **Respiratory rate**--The number of breathes per minute.

(3) **Minute volume**--The amount of air delivered each minute (tidal volume multiplied by respiratory rate).

(4) **Oxygen concentration**--Percentage of oxygen mixed with room air.

d. Management of the ventilator and the ventilator patient is normally done by a physician, a respiratory therapist, and specially trained professional nurses. Paraprofessional nursing personnel assigned to patient care areas where ventilator patients are managed will receive special training in the principles of mechanical ventilation.

**Section V. PULMONARY DRAINAGE**

**2-23. THORACENTESIS**

a. **General.** Thoracentesis is the procedure in which a puncture is made into the chest wall to withdraw fluid or air from the pleural cavity for diagnostic or therapeutic purposes. A thoracotomy needle is inserted through the intercostal area into the pleural cavity. Suction is then applied by syringe to aspirate the accumulated fluid or air. The procedure is usually done at the patient's bedside.

b. **Assembling the Necessary Equipment.** Assemble the following:

   (1) Sterile thoracentesis tray (obtain from CMS).
   
   (2) Calibrated drainage bottle.
   
   (3) Sterile gloves.
   
   (4) 4x4 gauze compresses.
   
   (5) Prescribed local anesthetic.
   
   (6) Alcohol prep sponges.
   
   (7) Adhesive tape.
   
   (8) Mobile table or stand.
   
   (9) Waste receptacle.
c. **Preparation for the Procedure.**

(1) Check clinical record for signed SF 522 (Authorization for Administration of Anesthesia and for Performance of Operations and Other Procedures).

(2) Obtain chest X-rays, if requested.

(3) Explain the procedure to the patient, stressing the importance of remaining immobile during the procedure.

(4) Take and record TPR and blood pressure (BP).

(5) Screen the patient. Remove pajama jacket to expose chest. The site of the puncture will depend upon the location of the fluid or air that is to be aspirated.

(6) Position the patient as directed by the physician. The position may be either one of the following or a similar position, as directed by the physician.

(a) Seat the patient on the side of the bed, facing away from the physician, with feet supported on a chair and the head and arms resting on an overbed table padded with pillows. The arms are elevated slightly to widen the intercostal spaces.

(b) Place the patient in a semi recumbent position, facing away from the physician, resting on the non-affected side, with the head of the bed elevated about 45 degrees. A pillow is placed under the chest to widen the intercostal spaces. The arm of the affected side is placed above the head to elevate the ribs, thereby making the insertion of the needle easier.

d. **Assisting with Thoracentesis.**

(1) Place the thoracentesis tray on instrument table. Open sterile wrapper cover to provide a sterile field.

(2) Place other supplies on adjacent bedside stand or over bed table. Open glove wrapper.

(3) Assist with handling of local anesthetic vial. Hold vial with label uppermost so that the physician can personally check the label before withdrawing any of the solution. Cleanse stopper with alcohol sponge. Invert vial and hold firmly while the doctor, with gloved hands, withdraws the required solution.

(4) Support and help patient to avoid moving and coughing while the thoracentesis needle is introduced.

(5) Assist as directed with collection of specimens as the physician manipulates the syringe, the stopcock, and drainage tubing. Use care not to
contaminate the end of the tubing, the cap, or the open end of the specimen tubes. Cap the tubes and place them upright in a clean glass provided for this purpose. Label each tube as directed by the physician.

(6) If drainage of a large amount of accumulated fluid is necessary, assist the doctor by placing the free end of the tubing in the drainage bottle.

(7) Watch the patient's color; check pulse and respiration. Immediately report any sudden change, as this may indicate damage to the visceral pleura from a nick or puncture by the needle.

(8) After the needle is withdrawn, apply a sterile dressing over the puncture site.

(9) Position patient comfortably (usually Fowler's position).

e. Follow-up Procedures.

(1) Remove equipment from bedside to utility room.

(2) Complete entries on appropriate laboratory request forms as directed.

(3) Send properly labeled specimens with completed request forms to laboratory immediately.

(4) Measure and record amount of fluid withdrawn and discard this fluid unless directed otherwise.

(5) Discard disposables, place all linen in hamper, and return appropriate items to CMS.

(6) Continue to observe patient for respiratory difficulty: persistent cough, dyspnea, or the presence of blood in the sputum. Take and record vital signs q4h (every 4 hours), or as ordered.

(7) Obtain post-procedural chest X-rays, if ordered.

(8) Enter the following information on Nursing Notes: date and time, procedure, by whom performed, amount and type of fluid withdrawn, patient's reactions, and specimens sent to laboratory.

2-24. CHEST TUBE INSERTION

a. General. Chest tube insertion (tube thoracotomy) is the insertion of one or more flexible tubes into the pleural space to remove air, blood, or fluid. This procedure is done by the physician.
b. **Assembling the Necessary Equipment.** Assemble the following:

1. Thoracotomy tray (obtain from CMS).
2. Sterile gloves.
3. Padded hemostats.
4. Suture material.
5. Local anesthetic.
7. Chest drainage system: connecting tubing and collection bottles, or commercial system.
8. Suction apparatus (if ordered).
9. Mobile table or stand.

c. **Preparation for the Procedure.**

1. Explain the procedure to the patient.
2. Obtain and record vital signs.
3. Assemble the drainage system.
4. Set up and test the suction apparatus if one is ordered.
5. Screen the patient and remove pajama coat to expose the chest. The insertion site will depend upon the presence of air or fluid.
6. Position the patient as directed by the physician.

d. **Assisting with Chest Tube Insertion.**

1. Set up the thoracotomy tray on the instrument table, using sterile technique.
2. Using sterile technique, place other supplies on the sterile field.
3. Assist the physician with the skin prep and administration of local anesthetic as for thoracentesis.
(4) Assist the physician with tube insertion, as directed. There are varying methods of introducing a tube into the pleural space. The method used depends upon the size of the tube to be inserted, the equipment available, and the physician's preference.

(5) The physician connects the patient's chest tube and the drainage tubing, checks the entire system to verify all connections, and tapes the connections to ensure an airtight system. He will then unclamp the chest tube. The clamps are never removed until the drainage system is airtight and ready to function.

(6) The chest tube is normally sutured in place and covered with a sterile dressing.

(7) Arrange for a follow-up chest X-ray, if ordered.

e. Follow-up Procedures.

(1) Remove equipment from bedside and care for properly.

(2) Observe patient for respiratory difficulty.

(3) Continue to observe the drainage system for proper function.

(4) Tape the padded hemostats and a package of sterile vaseline gauze to the head of the patient's bed. This equipment must be available for emergency use should the chest tube become dislodged or the drainage system opened.

(5) Record the procedure in the Nursing Notes. Note the patient's tolerance to the procedure.

2-25. WATER-SEAL CHEST DRAINAGE

a. General. Underwater-seal chest drainage is a closed (airtight) system for drainage of air and fluid from the chest cavity.

(1) The underwater-seal system is established by connecting a catheter (chest tube) that has been placed in the patient's pleural cavity to drainage tubing that leads to a sealed drainage bottle.

(2) Air and fluid drain into the bottle, but water acts as a seal to keep the air from being drawn back into the pleural space.

(3) By keeping the drainage bottle at floor level, fluid will be prevented from being siphoned back.

(4) As air and fluid are drained, pressure on the lungs is relieved and re-expansion of the lung is facilitated.
b. **Selection of the System.** The physician will specify the drainage setup he prefers to use. It is a nursing responsibility to be familiar with the various systems and their operation.

(1) When the physician specifies his preference, the nursing personnel will obtain, assemble, and check the system, maintaining asepsis within the system.

(2) Chest drainage can be organized into three types of systems. Each can be used with or without suction. Refer to Figure 2-2 as you read the descriptions that follow.

![Figure 2-2. Water-seal drainage system](image)

**c. The Single-Bottle Water-Seal System.**

(1) Connecting or drainage tubing joins the patient's chest tube with a drainage tube (glass rod) that enters the drainage bottle.

(2) The end of the glass rod is submerged in water, extending about 2.5 cm (1 inch) below the water level.

(3) The water seal permits drainage of air and fluid from the pleural space but does not allow air to reenter the chest.

(4) Drainage depends upon gravity, the mechanics of respiration, and, if ordered, the addition of controlled suction.
(5) The second tube in the drainage bottle is a vent for the escape of any air drained from the lung. If suction is ordered, it is attached here.

(6) Bubbling at the end of the drainage tube may or may not be visible. Bubbling may mean persistent air leaking from the lung or a leak in the system.

(7) The water level in the bottle fluctuates as the patient breathes. It rises when the patient inhales and lowers when the patient exhales.

(8) Since fluid drains into this bottle, be certain to mark the water level prior to opening the system to the patient. This will allow correct measurement of patient drainage.

d. The Two-Bottle Water-Seal System.

(1) The two-bottle system consists of the same water-seal bottle plus a fluid collection bottle.

(2) Pleural fluid accumulates in the collection bottle, and not in the water-seal bottle (as in the single-bottle system).

(3) Drainage depends upon gravity or the amount of suction added to the system.

(4) When suction is added, it is connected at the vent tube in the water-seal bottle.

e. The Three-Bottle Water-Seal System.

(1) This system consists of the water-seal bottle, the fluid collection bottle, and a third bottle which controls the amount of suction applied.

(2) The third bottle, called the manometer bottle, has three tubes. One short tube above the water level comes from the water-seal bottle. A second short tube leads to the suction. The third tube extends below the water level and opens to the atmosphere outside the bottle. It is this tube that regulates the suction, depending upon the depth the tube is submerged. It is normally submerged 20 cm (7.6 inches).

(3) The suction pressure causes outside air to be sucked into the system through the tube, creating a constant pressure. Bubbling in the manometer bottle indicates the system is functioning properly.


There are several disposable commercial drainage systems available. They are plastic devices, divided into chambers for fluid collection, water-seal, and suction control. Follow the manufacturer's instructions for commercial drainage systems used at your facility.
2-26. CARING FOR THE PATIENT WITH WATER-SEAL CHEST DRAINAGE

a. When using suction with water-seal drainage, the system should be open to the atmosphere when the suction is turned off for any reason. This will allow intrapleural air to escape from the system. To do this, simply detach the tubing from the suction port to create an air vent.

b. Observe the water-seal chest drainage system for patency to ensure that it is functioning properly.
   (1) Fluid in glass rod (or water seal chamber of commercial devices) should rise and fall with respirations.
   (2) Fluctuation should continue until the lung has re-expanded.

c. Observe amount, color, and consistency of chest drainage at ordered time intervals and record results in patient's clinical record.
   (1) Notify charge nurse immediately if chest drainage exceeds 100 cc/hour.
   (2) Notify charge nurse immediately if chest drainage color changes to indicate an active bleeding problem.
   (3) Mark the level of drainage on a piece of adhesive tape affixed to the drainage system every shift, or as ordered; include date, time, and your initials.
   (4) Do not empty the drainage system unless directed to do so by the physician.

d. Observe drainage tubing for any kinking.
   (1) Do not allow drainage tubing to loop below drainage system entry level.
   (2) Fasten the tubing to the draw sheet with rubber bands and safety pins so the flow by gravity will occur.

e. Milk the chest tube, as ordered by the physician, in the direction of chest drainage to promote chest tube patency.
   (1) Lubricate the drainage tubing with lubricant (water-soluble) for approximately 12 inches.
   (2) Pinch the tubing above the lubrication with one hand; with the other hand compress the tubing, allowing the fingers to slide over the lubrication toward the drainage bottle and release both hands.
f. Observe the patient carefully for any signs of respiratory difficulty, cyanosis, chest pressure, crepitus, and/or hemorrhage.

   (1) Monitor vital signs every 4 hours, or as ordered, and record.
   (2) Auscultate patient’s lung sounds every 4 hours and record findings.

g. Check to see that the drainage bottle is secured to the floor or is in a special holder.

   (1) Prevent bottle from being kicked or tipped over.
   (2) Caution visitors against handling equipment.

h. Observe the dressing at the chest tube insertion site for air leakage or excessive drainage and record findings.

   (1) Dressing changes are performed only according to physician's orders.
   (2) Observe skin condition during dressing changes and record.

i. Encourage the patient to cough and deep breath at least every 2 hours or as ordered.

   (1) Patient should be assisted to a sitting position if possible to promote effective deep breathing and coughing.
   (2) A pillow or blanket should be used to splint the affected area.

j. Encourage the patient to change position every 2 hours to promote drainage and prevent complications; make sure tubing remains free from kinks and is in proper position.

k. Encourage the patient to perform range of motion exercises for the affected upper extremity to maintain joint mobility.

l. Transport or ambulate a patient with a chest tube carefully, keeping the water-seal unit below chest level and upright at all times.

   (1) Assist or instruct personnel from other departments in transporting or ambulating the patient.
   (2) Nursing staff should accompany the patient.
   (3) Disconnect the closed chest drainage system from suction for transportation or ambulation; make sure air vent rod is open.
(4) Attach hemostats (Kelly Clamps) to the patient's hospital gown during transportation or ambulation for emergency use.

m. As indicated, provide emergency care to the patient if the water-seal unit becomes broken or emptied.

(1) Clamp the chest tube unless there has been a large air leak; chest tube with a large air leak should be left open, since clamping may cause a rapid pneumothorax.

(2) Reestablish a closed drainage system.

(3) Remove clamps, if applied.

(4) Notify the professional nurse/physician, as indicated.

(5) Observe the patient for respiratory distress.

n. As indicated, provide emergency care to the patient if the chest tube becomes disconnected from the drainage system.

(1) Clamp the chest tube.

(2) Cleanse the end of the tubing with an antiseptic solution and reconnect or cut off the contaminated tips of the chest tube and tubing and insert a sterile connecting piece.

(3) Securely tape the connection.

(4) Notify the professional nurse/physician, as indicated.

(5) Observe the patient for respiratory distress.

o. As indicated, provide emergency care to the patient if the water-seal unit is tipped over.

(1) Return unit to upright position.

(2) Instruct the patient to deep breathe and cough to force air out of the pleural space.

(3) Notify the professional nurse.

(4) Assess the patient for respiratory distress.

p. As indicated; provide emergency care to the patient whose chest tube has accidentally been pulled out of the chest wall.
(1) Cover the site with sterile 4"x4" gauze sponges and tape occlusively.

(2) Notify the professional nurse/physician immediately.

(3) Monitor the patient for respiratory distress.

q. Record significant nursing observations in the patient's clinical record and report the same to the professional nurse.

(1) Amount, color, and consistency of chest drainage.

(2) Presence or absence of air leaks or bubbling in the water-seal unit.

(3) Presence or absence of fluctuation in the glass rod of the water-seal unit.

(4) Time and results of chest tube milking. Specific observations about the patient, such as vital signs, breathe sounds, and skin color.

(5) Results of deep breathing and coughing.

(6) Position changes or activity, including range of motion.

(7) Condition of chest tube insertion site and dressing.

Section VI. DISORDERS INVOLVING THE UPPER RESPIRATORY SYSTEM

2-27. EPISTAXIS

Nosebleed, called epistaxis, is caused by the rupture of the tiny blood vessels in the nose. Most often, the vessels ruptured are those in the mucous membranes of the nose.

a. Epistaxis may be caused by injury, such as a blow to the nose, "picking" the nose, or forceful blowing of the nose. Nosebleed may also occur as the result of disease or may occur as a symptom of conditions such as sinusitis, bleeding disorders, or hypertension.

b. Epistaxis can often be managed conservatively by compressing the nostril of the affected side against the nasal septum for 5-10 minutes. A cold compress over the nose is also effective in the reduction of both bleeding and swelling. Position the patient with the head forward to allow blood to drain from the nose and not down the throat. Swallowing the blood may lead to nausea and vomiting. Instruct the patient to breathe through the mouth. If the source of the bleeding cannot be seen, the physician may spray the interior of the nose with an epinephrine solution, which will constrict the blood vessels, and pack the interior of the nose with gauze, which will act as a pressure dressing.
2-28. ALLERGIC RHINITIS

Rhinitis is the inflammation of the mucous membrane of the nose. Allergic rhinitis is a general term used to describe any allergic reaction of the nasal mucosa.

a. Non-seasonal (perennial) allergic rhinitis is an allergic rhinitis that may occur intermittently or continuously all year round. It is caused by exposure to an allergen such as house dust, animal dander, or food. It is characterized by sudden attacks of sneezing, swelling of the nasal mucosa with watery discharge, and itching of the eyes with lacrimation.

b. Seasonal allergic rhinitis (hay fever) is a seasonal variety of allergic rhinitis caused by a specific allergen such as a particular pollen. It is characterized by acute conjunctivitis with itching and lacrimation, swelling of the nasal mucosa with watery discharge, sudden attacks of sneezing, and quite often with asthmatic symptoms.

2-29. SINUSITIS

Inflammation of a sinus may be acute or chronic. It usually occurs with other upper respiratory infections since mucous membranes of the nasal cavities are continuous with the sinuses. Sinusitis may also occur from obstructions that block drainage from the sinuses. An untreated acute sinusitis may become chronic or may lead to a more serious condition such as brain abscess, meningitis, or septicemia.

a. Sinusitis is characterized by pain and nasal congestion. The location of the pain is diagnostically important. Frontal pain or headache indicates frontal sinus involvement. Pain in and around the eyes is associated with the ethmoid sinuses. Maxillary sinusitis is characterized by pain lateral to the nose, sometimes accompanied by aching in the upper teeth. In sphenoid sinusitis, an occipital headache may occur.

b. Treatment involves rest and measures to facilitate sinus drainage. Increased humidity, increased fluid intake, and steam inhalation will help to liquify and loosen secretions. Nasal and/or oral use of vasoconstricting drugs is indicated. Antihistamines and antibiotics may also be used depending upon the causative agents involved.

2-30. PHARYNGITIS

Inflammation of the pharynx is caused by several viruses and bacteria. It is characterized by pain in the throat, dysphagia, red and inflamed mucosa, and enlargement of the tonsils and cervical lymph nodes.

a. Throat culture is used to determine the causative organism. If the condition is caused by bacteria such as streptococcus or staphylococcus, the symptoms may be more severe and complications such as sinusitis, mastoiditis, and otitis media may occur.
b. Treatment involves warm saline gargles and irrigations. An ice collar may be used to reduce pain and swelling. Analgesic and antitussive medications are given to alleviate pain and coughing. Antibiotics will be prescribed for a bacterial causative organism.

c. Because of throat discomfort and difficulty swallowing, the patient should be given a soft or liquid diet while symptoms are severe. Fluids should be encouraged.

2-31. TONSILITIS

Tonsilitis is inflammation of the palatine tonsils, a pair of lymphatic tissue structures, and one located on each side of the oropharynx. Enlargement of the adenoids, a large mass of lymphoid tissue at the posterior wall of the nasopharynx, often accompanies acute tonsilitis.

a. Symptoms include a painful and inflamed throat, difficulty swallowing, and enlarged tonsils with exudate that appears as white or yellow spots.

b. Treatment includes warm throat irrigations and analgesics. A throat culture at the tonsillar site is done to determine the type of bacteria present, and antibiotic therapy is initiated.

c. Tonsillectomy and adenoidectomy are indicated when treatment is unsuccessful and antibiotics cannot control frequent recurrent infections or when hypertrophy or peritonsillar abscess threaten to occlude the airway.

2-32. LARYNGITIS

Inflammation of the larynx, or voice box, is most commonly caused by voice abuse, excessive use of tobacco, or as a result of infection.

a. It is characterized by a sore and dry throat, cough, and hoarseness or loss of voice.

b. Treatment involves voice rest and restriction from smoking. Steam inhalation therapy is often indicated. Antibiotic therapy should be initiated if the laryngitis is a result of bacterial infection.

2-33. ACUTE CORYZA

The "common cold" is the term used to refer to afebrile, infectious, acute coryza, which is caused by many different viruses. Colds are highly contagious. Symptoms do not appear until 24-48 hours after exposure to the virus, yet during this time the exposed individual is already contagious.
a. Symptoms may include nasal congestion and discharge, sneezing, sore throat, fever, chills, and malaise. Nasal congestion causes pressure that results in headache. As a cold progresses, a cough may develop. Symptoms last about 1-2 weeks if the infection remains uncomplicated.

b. Treatment is symptomatic, involving the use of analgesics, decongestants, and expectorants. Warm salt-water gargles may relieve sore throat pain. Adequate rest, plenty of fluids, and vitamin C are routinely included in the treatment of a cold.

2-34. CARE FOLLOWING SURGERY OF THE NOSE

a. Surgery of or through the nose may be required to correct the results of trauma to the nose and related structures; to correct deformities that interfere with breathing, such as a deviated septum, hypertrophy of the turbinates, or polyps; and to relieve the effects of sinusitis. Surgery of the nose may also be done for cosmetic reasons.

b. Epistaxis is usually the most serious complication of surgery of the nose. If bleeding occurs postoperatively, attempt to control the bleeding with compression of the nostrils and utilization of cold compresses. If nasal packing is in place, bloody sputum or bloody vomit may be considered signs of nasal bleeding. The nursing personnel must be alert for excessive or continuous bleeding, restlessness, breathing irregularities, cyanosis, and tachycardia. If these signs and symptoms are noted, the professional nurse must be notified immediately. If the physician must be called, make ready a head mirror, light, nasal speculum, packing forceps, and packing material.

c. Quite often, the patient's nose will be packed at the termination of the surgery. This may cause an intense fear of suffocation. The patient must be reassured that mouth breathing will supply sufficient air. Continued mouth breathing will cause dryness of the lips and mouth. Ointment such as petrolatum should be applied to the patient's lips and fluids given as tolerated to moisten the mouth. The patient may have the urge to blow his nose to relieve the sense of fullness caused by the packing. Instruct the patient not to blow his nose, as this may cause bleeding and would be ineffective in relieving the sense of fullness.

2-35. TONSILLECTOMY AND ADENOIDECTION

a. Removal of the tonsils and adenoids is indicated in cases of recurrent infections or in cases of swelling that threatens to obstruct the airway.

b. Postoperative nursing management involves maintenance of a patent airway and observation for bleeding and aspiration.

(1) If the operation was done under a local anesthetic, place the patient in a sitting position to maintain airway patency.
If the operation was done under general anesthesia, place the patient in a lateral recumbent position with the head extended. This will allow drainage through the nose and mouth.

Observe vital signs closely and be alert for changes that may indicate bleeding, such as gurgling respirations or excessive swallowing.

Keep the patient as quiet as possible.

Place an ice collar around the neck to constrict blood vessels and reduce pain.

c. An unconscious or bleeding patient should never be left alone. Suction equipment should be available for use. If suctioning is necessary, it should be done carefully and gently to avoid disturbing the operative sites.

d. Encourage the patient to take the diet prescribed by the physician. For the first few days the diet will probably be liquid or semisolid. All foods and fluids should be bland, avoiding citrus, acidic foods, and spices. Diet should be advanced as patient tolerance dictates.

e. Utilize prescribed analgesics, since the throat will be sore for several days postoperatively.

2-36. LARYNGECTOMY

a. Surgery of the larynx is done most often to remove a tumor or growth that may be malignant.

(1) A malignant growth may occur on the vocal cords (intrinsic) or on another part of the larynx (extrinsic). The type of surgery done depends upon the location and involvement of the growth.

(2) Newly developed surgical procedures are being used in the management of laryngeal growths. Some procedures involve resection of the larynx or formation of an air passage from the trachea to the pharynx. The objective of these procedures is to preserve the voice.

b. Partial laryngectomy is the removal of that portion of the vocal cord that is involved with abnormal growth. A tracheostomy tube may be left in the neck wound for a few days postoperatively. The neck wound will eventually heal, and the normal respiratory system and voice are preserved.

c. Total laryngectomy is the removal of the larynx, vocal cords, thyroid cartilage, and the epiglottis. The trachea is sutured to the anterior surface of the neck as a permanent tracheostomy. The patient breathes exclusively through the neck opening
(stoma) and is referred to as a total neck breather, since the airway between the mouth, nose, and throat has been completely closed.

(1) Total laryngectomy with laryngoplasty involves the formation of a tube that leads from the upper trachea to the lower pharynx. This "speaking" tube allows for speech that sounds almost normal. A patient having this type of laryngectomy is referred to as a partial neck breather, since the tube allows the passage of air from the nose and mouth into the trachea.

(2) When the patient has a total laryngectomy, the surgeon will most likely place a laryngectomy tube in the newly formed stoma. This tube may be removed when the stoma has healed, usually within 4-6 weeks. The laryngectomy tube is shorter, but larger in diameter, than a tracheostomy tube. Care of the laryngectomy tube is the same as that for the tracheostomy tube.

(3) Since the patient will not be able to speak initially, some means of communication must be developed for the patient. Commonly used techniques are simple note writing, flash cards, magnetic letter boards, and magic slates. Always have a call bell within the patient's reach. When the stoma has healed, the speech pathologists will work with the patient to help him learn new speaking methods.

d. Special considerations for the laryngectomee include the following:

(1) For the laryngectomee, air passes directly into the trachea without being moistened and warmed by the upper respiratory mucosa. This causes the trachea and bronchi to secrete excessive amounts of mucous, and the patient may experience frequent bouts of coughing. In time, the mucosa of the trachea and bronchi will adapt to this altered physiology. In the meantime, however, the patient will be more comfortable with added humidification in the inspired air. This may be provided by steam or cool mist humidifiers.

(2) Precautions must be taken in the shower to prevent water from entering the stoma. A small plastic bib worn around the neck works well. Swimming is not recommended, as the laryngectomee may drown without ever putting his face in the water.

(3) Care must be taken to prevent hair spray, powder, loose hairs, and any other foreign objects from entering the stoma.

(4) A laryngectomee should carry or wear identification that will alert a first-aid giver to his special resuscitation needs. A laryngectomy stoma may be hidden by a scarf and not noticed by the first-aid giver. A neck breather, whether partial or total, requires artificial ventilation through the stoma. This may be done by mouth-to-stoma artificial respiration or by bag-mask to stoma. If the patient wears a tube in his stoma, do not remove it. Give artificial ventilation through it. The mouth and nose must be sealed closed to prevent the escape of air from the nose and mouth, in the event that the patient is a partial neck breather.
2-37. TRACHEOSTOMY

a. A tracheotomy is the incision of the trachea through the skin and muscles of the neck. When an indwelling tube is inserted into the surgically created opening in the trachea, the term “tracheostomy” is used. A tracheostomy may be permanent or temporary. There are many diseases and conditions that make a tracheostomy necessary. For example, a tracheostomy may be done:

(1) To bypass an upper airway obstruction.

(2) To replace an endotracheal tube with a tracheostomy tube.

(3) To allow for extended mechanical ventilation.

(4) To facilitate removal of tracheobronchial secretions.

(5) To prevent aspiration in the comatose or paralyzed patient.

b. A tracheostomy tube (sometimes referred to as a tracheal cannula set) consists of three parts: the outer cannula, the inner cannula, and the obturator. Refer to Figure 2-3.

(1) The obturator is used by the surgeon as a guide when inserting the outer cannula into the tracheal incision.
(2) After insertion of the outer cannula, the obturator is removed. The inner cannula is inserted into the outer cannula and locked in place.

(3) Tracheostomy tubes may be metal or plastic. Plastic tubes that have an inflatable cuff surrounding the outer cannula are the most commonly used. The cuff helps to hold the tube in place, prevents aspiration of material into the lungs, and prevents leaking of air around the sides of the tube.

(4) The tracheostomy tube is kept in place by means of cotton twill tape inserted through the slotted flanges of the outer cannula and tied around the patient's neck. A sterile dressing is placed around the tube to protect the stoma.

2-38. TRACHEOSTOMY NURSING CARE

a. **Preparatory Nursing Measures.** In addition to routine preparation of the patient unit for postoperative care, the following measures should be planned in advance.

   (1) The patient will require constant attendance for at least the first 48 hours. The nursing personnel must remember two important things: the patient's life depends upon a clear airway, and the patient will have a temporary loss of voice. Therefore, the patient must be observed closely for airway patency and immediate action taken when any adverse signs or symptoms are present. The patient will feel anxious about his inability to communicate with his voice. Always have the call bell available to the patient. Devise a temporary means of communication such as writing notes or using flash cards so that the patient may communicate his needs to the nursing personnel.

   (2) For the first few days postoperatively, the patient should be kept in a room where the temperature and humidity can be maintained at optimum levels. Increased temperature and humidity will help to reduce the tracheal irritation that results when inspired air has bypassed the natural warming and moisturizing of the nasopharyngeal airway.

   (3) The patient's room should be supplied with a variety of equipment necessary to the care of the patient. Such things include suction equipment, a spare tracheostomy tube set, and sterile dressing material.

b. **Postoperative Nursing Measures.** In addition to routine postoperative nursing care, the following nursing actions should be noted.

   (1) Always apply basic principles of aseptic technique when caring for the incision and the airway. When suctioning, use separate set-ups for pharyngeal and tracheostomy suctioning.

   (2) Constantly observe the patient for signs of respiratory obstruction such as restlessness, cyanosis, increased pulse, or gurgling noises during respiration.
(3) Watch closely for bleeding from the incision, and look for blood in the aspirated secretions when suctioning.

(4) Be alert for choking or coughing when the patient swallows. This may indicate damage to the esophagus with leakage of swallowed material into the trachea.

2-39. PERFORMING TRACHEOSTOMY SUCTIONING

a. Assemble the necessary equipment.

   (1) Portable continuous suction machine or in-wall suction.

   (2) Sterile suction kit containing sterile suction catheters (14-18ºFr.), a sterile solution container, and sterile gloves.

   (3) Sterile saline in a pour bottle.

   (4) Sterile gauze sponges.

   (5) Sterile normal saline in 5cc packets for tracheal instillation, if ordered.

   (6) Oxygen source with flow meter and a manual resuscitator (ambu bag).

   (7) Waste receptacle.

b. Explain the suctioning procedure to the patient if he is conscious.

   (1) Hyper oxygenation will be performed. An ambu bag with 100 percent oxygen will be connected to the tracheostomy tube and the patient will be given several breaths prior to suctioning. This is done to prevent shortness of breath or hypoxia.

   (2) Approximately 5cc of normal saline will be instilled into the tracheostomy tube to help liquify secretions. Inform the patient that this may stimulate a cough reflex.

c. Place the patient in semi-Fowler's position if permitted.

d. Wash your hands and set up the sterile suction kit.

   (1) Open the suction kit, using the wrapper to create a sterile field. Place the sterile sponges on the field.

   (2) Pour 50-100cc of sterile saline into the solution container, using a septic technique.

e. Turn on the suction unit and set to low pressure to avoid trauma to the patient.
f. Using aseptic technique, don the sterile gloves.

g. Attach the sterile suction catheter to the connecting tubing by holding the catheter in your dominant hand (sterile hand) and the connecting tube in your non-dominant hand (non-sterile hand). Refer to Figure 2-4.

h. Moisten the catheter tip in the sterile saline.

i. Instruct your assistant to hyper oxygenate the patient.
   
   (1) Disconnect ventilator tubing if patient is receiving mechanical ventilation.

   (2) Give the patient several breaths of 100 percent oxygen with the ambu bag and quickly remove the bag.

j. With the suction diverted, gently insert the sterile suction catheter into the tracheostomy tube until slight resistance is felt, then pull back slightly.

k. Apply suction.

   (1) Place the thumb of your non-dominant (non-sterile) hand over the suction control port of the catheter.

   (2) Rotate the catheter between the thumb and index finger of your sterile hand while withdrawing the catheter. Apply intermittent suction while withdrawing.

   (3) Suction only for 5-10 seconds. Refer to Figure 2-5.
I. Instruct the assistant to hyper oxygenate the patient while you rinse the catheter by suctioning a small amount of the sterile saline.

m. If secretions are thick, instill 5 cc of sterile normal saline into the tracheostomy tube and suction again.

Figure 2-5. Tracheostomy suctioning.

n. Repeat the suction procedure until the airway is clear.

(1) Hyper oxygenate the patient between suctioning.

(2) Rinse the catheter between suctioning.

o. Reconnect the patient to the ventilator if one is in use.

p. Perform oropharyngeal suctioning, if required.

q. Discard used equipment and restock the patient's bedside with new equipment.

r. Record the procedure in the Nursing Notes.
2-40. PERFORMING TRACHEOSTOMY CARE

Changing the tracheostomy dressing, cleansing the skin around the stoma, and cleaning the inner cannula are collectively referred to as tracheostomy care.

a. Assemble necessary equipment and supplies.
   (1) Trach cleaning kit (obtain from CMS).
   (2) Clean scissors.
   (3) Hydrogen peroxide.
   (4) Sterile saline--pour bottle.
   (5) Sterile gloves--2 pairs.
   (6) Exam gloves--2.
   (7) Waste receptacle.

b. Explain the procedure to the patient and establish a method of communication.

c. If suctioning is required, perform that procedure prior to beginning tracheostomy care. It is routine to perform tracheostomy care after suctioning.

d. Position the patient in semi-Fowler's position if permissible.

e. Wash your hands and set up the equipment using aseptic technique.
   (1) Open the cleaning kit, using wrapper as a sterile field.
   (2) Open dressings and other supplies and place on sterile field.
   (3) Pour hydrogen peroxide in one basin and sterile saline in the other (disposable basins/containers are included in the kit).

f. Put on exam gloves and remove soiled tracheostomy dressing. Tracheostomy secretions should be considered contaminated and handled accordingly.

g. Remove and discard exam gloves and put on sterile gloves.

h. Clean inner cannula, if present.
   (1) Unlock the inner cannula and remove.
(2) Place the inner cannula in the hydrogen peroxide, allowing it to soak for a few minutes.

(3) Clean the inner cannula with the test tube brush.

(4) Rinse the inner cannula in the sterile saline.

(5) Remove the inner cannula from the saline and allow it to drain on a sterile 4x4 gauze sponge.
   i. Cleanse the tracheostomy incision and surrounding area with antiseptic swabs.
      (1) If crusting occurs, remove with sterile swabs soaked in hydrogen peroxide.
      (2) Do not allow cleansing solutions to enter the tracheostomy opening.
   j. Reinsert the inner cannula and lock in place.
   k. Apply sterile tracheostomy dressing. Use precut, non-raveling sterile 4x4. Place it with the slit toward the chin, allowing the uncut portion to absorb secretions.
   l. Reapply ties.
      (1) Cut and remove soiled, outer tube ties if necessary. The patient or an assistant should hold the outer tube in place to prevent dislodgement of the tube.

**NOTE:** If an assistant is not available and the ties must be changed, secure new ties in place before cutting and removing soiled ties.

(2) Cut a slit about one inch from the end of each tape.

(3) Insert the slit end of the tape through the flange of the outer cannula, and draw the other end of the tape through the slit (Figure 2-6).
(4) Tie the tapes securely with a knot, never a bow. Position the knot at the side of the patient's neck rather than the back. Trim off excess tape.

m. Remove and discard gloves or return all equipment to the appropriate location.

n. Record procedure in Nursing Notes.

Section VII. DISORDERS INVOLVING THE LOWER RESPIRATORY SYSTEM

2-41. PLEURISY

a. Inflammation of the visceral and parietal pleura is called pleurisy. When the inflamed membranes rub together during respiration, it causes a severe, sharp pain. During the dry stage, a pleural friction rub can be heard on auscultation. Later, fluid develops between the inflamed pleura and the pain lessens.

b. This inflammation may occur after chest trauma or thoracotomy, may be associated with cancer, or may accompany upper respiratory infections, pneumonia, or tuberculosis.
c. The physician must discover the underlying cause of the inflammation and treat it. Along with the treatment of the primary cause, symptomatic treatment should be utilized for the effects of the pleurisy. Applications of heat or cold may ease discomfort. Analgesics should be used to decrease the pain. Anti-inflammatory drugs are also useful in decreasing the painful inflammation of the pleura. Additionally, the patient should be closely observed for signs indicating the development of pleural effusion.

2-42. PLEURAL EFFUSION

a. Pleural effusion is the collection of fluid in the pleural space. Normally, the pleural space contains a small amount of lubricating fluid that allows the surfaces of the visceral and parietal pleura to move without friction. When pleural effusion is present, the patient will experience shortness of breath and rapid pulse. Decreased breath sounds will be noted on auscultation of the affected lung.

(1) Pleural effusion is normally secondary to other disease processes. When factors influencing formation and re-absorption of pleural fluid are altered, a transudate occurs. A transudate is fluid with a relatively low content of protein, cells, and cellular debris. The presence of transudate would indicate an underlying cause such as congestive heart failure, renal failure, or ascites.

(2) Local inflammation within the pleura, in adjacent tissues, or beneath the diaphragm will cause an exudate. An exudate is fluid characterized by a relatively high content of protein, cells, and cellular debris. The presence of exudate is indicative of tuberculosis, pneumonia, pulmonary viruses, or cancer.

b. Again, the physician must identify and treat the underlying cause in order for the effusion to resolve. Large amounts of fluid should be removed in order to relieve the dyspnea and discomfort felt by the patient. This can be done by needle aspiration (thoracentesis) or by the insertion of chest tubes to drainage. Analgesics should be used to reduce discomfort.

2-43. ATELECTASIS

a. Atelectasis is defined as collapse of the lung. This means the collapse of an alveolus or multiple alveoli. There are two different mechanisms that may cause alveolar collapse.

(1) Pressure on the lung that restricts normal lung expansion of the alveoli. Whenever there is an overcrowding of the thoracic contents, the spongy lung tissue will be the first thing to collapse as a result of the compression. Such pressure may be caused by pleural effusion, pneumothorax, tumor growth, or an upwardly displaced diaphragm.

(2) Obstruction of a bronchus may restrict airflow to and from the communicating alveoli. This may be caused by inhalation of a foreign body, but the
most frequent cause is the presence of thick mucous that is not removed by coughing. Postoperative patients and debilitated bedridden patients are susceptible to obstructive atelectasis due to inadequate depth of respiration and the accumulation of bronchial secretions.

b. If a sudden collapse involving sufficient tissue occurs, the following signs and symptoms may be present: dyspnea, tachycardia, anxiety, cyanosis, and pleural pain. The chest wall of the affected side will barely move on respiration.

c. Treatment involves the identification and correction of the underlying cause. If the presence of air or fluid in the pleural space is causing compression, measures should be taken to remove the air or fluid by thoracentesis or chest tube insertion. Bronchial obstruction should be removed by the use of vigorous percussion, coughing, and postural drainage. Secretions may be loosened and liquefied by the use of humidification and increased fluid intake.

d. Postoperative atelectasis can be reduced significantly by the use of early ambulation, incentive spirometry, and a rigorously enforced program of deep breathing and coughing.

2-44. CHRONIC OBSTRUCTIVE PULMONARY DISEASE.

a. Chronic obstructive pulmonary disease (COPD) is a broad term used to classify conditions associated with chronic obstruction of the airflow entering or leaving the lungs. Chronic obstructive pulmonary disease is characterized by increased resistance to airflow due to one of the following basic conditions:

(1) Excessive secretion of mucous within the airways that is not because of a specific cause (such as an underlying infection) will obstruct airflow. This is typical of chronic bronchitis.

(2) An increase in the size of the alveoli with a loss of elasticity will increase airflow resistance. This is the case in emphysema.

(3) Narrowing of the bronchial airways significantly restricts airflow. This type of obstruction is characteristic of asthma.

b. There are other similar conditions that may be classified as COPD. In all these conditions, the underlying problem is the same. Altered physiology of the respiratory structures has caused a chronic airflow problem due to obstruction of part of the air passageways.

c. Physical examination and patient history will usually identify the altered physiology at work. Treatment is based upon symptomatic relief, use of controlled oxygen therapy, and medications to compensate for the altered physiology. Patient education is important, since there is no cure for these conditions. They are the result of years of progressive deterioration of normal physiology.
2-45. PNEUMONIA

a. Pneumonia is inflammation of the lungs accompanied by consolidation (lung becomes firm as air spaces are filled with exudate). This condition is most commonly caused by infectious agents such as viruses, bacteria, or fungi. Inhalation of caustic gases may cause chemical pneumonia.

b. Pneumonia may be referred to as lobar pneumonia if the majority of a lobe is involved. The term bronchopneumonia is used when the inflammation begins in the bronchi and extends to adjacent lung tissue.

c. Signs and symptoms include fever, chills, chest pain, rapid and difficult breathing, and rapid pulse accompanied by a painful cough and purulent sputum. The organisms are spread by droplets or by contact with material contaminated with respiratory secretions.

d. Treatment depends upon the causative agent. Antibiotic therapy is initiated when the agent has been identified. Increased fluid intake and humidification are encouraged to liquefy secretions and aid in their expectoration. Percussion and postural drainage are also used to loosen and mobilize secretions. Pain medications should be used to relieve the pleuritic pain, but care should be taken to avoid suppressing the cough reflex.

2-46. PULMONARY EMBOLISM

a. Pulmonary embolism is the presence of one or more thrombin that has moved from their site of origin, into the pulmonary vascular bed, to obstruct one or more of the pulmonary arteries. These thrombin originate somewhere in the venous system or the right side of the heart. They become dislodged and are carried to the lung, interrupting the blood supply to lung tissue and causing infarction of lung tissue.

b. Signs and symptoms range from nonexistent to pleuritic pain, cough, hemoptysis, tachycardia, dyspnea, and anxiety. The symptoms present will depend upon the size of the thrombus and the location of the occlusion.

c. Treatment for pulmonary embolism involves immediate measures to stabilize the patient. Massive pulmonary embolism is a life threatening medical emergency. Oxygen is administered to relieve respiratory distress. An IV is started to provide a life-line for administration of emergency medications. If the embolism is severe enough, the patient may require an indwelling urinary catheter, endotracheal intubation, mechanical ventilation, and ECG monitoring. The second aspect of treatment involves anticoagulant therapy to prevent recurrence or extension of the embolism. This therapy is potentially dangerous and must be strictly controlled by the physician.
2-47. PULMONARY EDEMA

a. Pulmonary edema is an abnormal accumulation of fluid in the lungs. The most common cause of pulmonary edema is cardiac disease. When the pulmonary blood vessels receive more blood from the right heart than the left heart is able to receive in return, pulmonary congestion occurs. Pulmonary edema is the end result of unrelieved pulmonary congestion. The congested pulmonary capillaries leak fluid into the nearby air spaces. As the pulmonary edema progresses, the escaping fluid mixes with alveolar air and a frothy sputum is produced, churning and gurgling with each respiration. This causes the characteristic "death rattle" associated with severe pulmonary edema. Fluid build-up in the lungs prevents air from entering the alveoli, causing severe hypoxia.

b. Treatment involves measures to improve ventilation and oxygenation and reduce lung congestion. The patient should be positioned in an upright position to decrease venous return to the right heart, thereby decreasing the right ventricular output to the lungs. Oxygen is used to relieve dyspnea and hypoxia. Administration of morphine in small doses will decrease the anxiety and dyspnea. Diuretics are used to decrease the fluid volume if necessary. Since pulmonary edema is a result of an imbalance between the left and right heart, treatment will also include those therapies and medications necessary to stabilize the heart dysfunction.

2-48. PNEUMOTHORAX AND HEMOTHORAX

a. Pneumothorax is defined as the presence of air in the pleural space.

(1) This condition may occur after thoracentesis or pleural biopsy.

(2) It may also occur secondary to mechanical ventilation when use of excessive pressures results in tissue rupture. When there is a rupture of lung tissue (alveoli or visceral pleura), a "spontaneous" pneumothorax is said to have occurred.

(3) Chest trauma, such as a puncture or missile wound, allows air to enter the pleural space, also causing pneumothorax.

b. When air enters the pleural space through a hole in the lungs, the tissue around the edges of the hole acts as a valve, allowing air to enter the pleural space, but not to escape. This condition is called a tension pneumothorax because there is a build up of pressure (tension) within the pleural space. This pressure, if unrelieved, will cause lung compression and eventual collapse. Additionally, the mediastinum may be displaced, causing disrupted circulation.

(1) Tension pneumothorax may occur when there is a wound in the lung that does communicate with the exterior of the body. For example, a fractured rib may be pushed inward, tearing the lung and the surrounding pleura. Air can now escape from the lung, but is trapped in the pleural space.
(2) Tension pneumothorax may also occur when a sucking chest wound has been sealed with an occlusive dressing. The air will escape from the lung into the pleural space with each inspiration, but will be trapped due to the occlusive dressing over the exterior wound.

(3) Tension pneumothorax may also occur as a postoperative complication. The opening at fault may be leakage around the drainage tube, an undiscovered opening in the visceral pleura, or faulty suturing of resected lung tissue.

c. Hemothorax is the accumulation of blood in the pleural cavity. This condition usually accompanies chest trauma. Blood from lacerated lung tissue and torn blood vessels enters the pleural cavity and pools in the dependent area.

d. When air and blood are found in the chest cavity together, the condition is called hemopneumothorax.

e. Treatment for all the above conditions involves the removal of the air or blood from the pleural cavity, thereby allowing the lung to expand once again. This is routinely done by thoracentesis for small amounts of air or blood or by the insertion of chest tubes to drainage when a large amount of air or blood is involved. Other treatment measures involve administration of oxygen and analgesics.

2-49. THORACIC SURGERY

a. Pulmonary resection is removal of a significant portion of a lung. Resection in which a lobe of a lung is removed is referred to as lobectomy. Removal of the entire lung is referred to as pneumonectomy. These procedures are done to treat diseases such as tuberculosis and cancer or to deal with the consequences of trauma to the lungs.

b. These procedures involve opening the pleural cavity containing the affected lung. When the pleural cavity is opened, the affected lung will collapse. After completion of the desired surgical procedure, the surgeon will place a tube into the pleural cavity. The use of either an air-tight underwater seal or suction on the tube will help recreate the naturally existing partial vacuum in the pleural cavity and re-expand the remainder of the affected lung. The tube is withdrawn when the air and fluid has been removed from the pleural cavity.

c. In addition to the routine preoperative care given to any surgical patient, patients scheduled for thoracic surgery require special nursing considerations.

(1) Frequently, much time must be devoted to improving the patient's respiratory status prior to surgery. This will make the preoperative period longer than normal.
(2) The patient will be instructed in special exercises that will strengthen those muscles of the shoulders and chest that support respiratory movement. These exercises are routinely taught by the physical therapist. The nursing personnel, however, must be familiar with these exercises. It is a nursing responsibility to reinforce the teaching, observe, and assist the patient in correct procedure.

(3) Preoperative patient education must include preparing the patient and his family, the postoperative course of events, to include chest tubes, suctioning, and artificial ventilation, as appropriate.

(4) Preoperative education can be used to reduce the potential for complications. (For example, teaching the importance of active range of motion of the arms may prevent the patient from developing a "frozen" shoulder.) Always explain what must be done and why it is important. A patient will naturally be reluctant to perform a movement or exercise that is painful to him.

d. In addition to general postoperative nursing care, the following considerations for chest surgery patients must be noted.

(1) Intake and output must be strictly monitored.

(2) Intravenous fluids are routinely given slowly and in limited amounts (as ordered by the physician) to avoid fluid overload and pulmonary edema.

(3) Vigorous turning, coughing, and deep breathing must be done to expel secretions. If these secretions are not removed, atelectasis may occur. Secretions that cannot be removed by coughing must be removed by suctioning.

(4) Blood pressure, pulse, and respirations should be taken and recorded frequently for the first 24 hours postoperatively. Nursing personnel should note general appearance, skin color and temperature, character of respiration, and appearance of the wound site. Close observation must be made for signs of shock, hemorrhage, pulmonary edema, or respiratory embarrassment.

(5) Early ambulation of chest surgery patients is desired, with exercises as prescribed, to promote lung re-inflation, good body posture, and maintenance of shoulder movement and muscle tone. Increase in ambulation will depend upon physician's orders, nursing assessment, and the patient's desire for independence.

(6) Proper positioning while bed resting is extremely important. The pneumonectomy patient should not be placed directly on his inoperative side. To do so will place additional strain on the already overtaxed remaining lung. Patients undergoing resection should not be placed on the operative side, as this interferes with the desired maximum expansion of the operative lung.
2-50. CONCLUSION

a. This lesson has introduced the basic nursing care techniques and procedures involved in the nursing care related to the respiratory system.

b. Review the lesson objectives once again. If you feel confident that you have achieved the lesson objectives, complete the exercises at the end of this lesson.

c. If you do not feel that you have met the lesson objectives, review the necessary material before you attempt the end of lesson exercises.

Continue with Exercises

Return to Table of Contents
EXERCISES, LESSON 2

INSTRUCTIONS: Answer the following exercises by completing the incomplete statement or by writing the answer in the space provided at the end of the question.

After you have completed all of these exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers. For each exercise answered incorrectly, reread the material referenced with the solution.

1. The upper respiratory system is composed of the ____________________, ____________________, and ____________________.

2. The bronchioles terminate in the ____________________.

3. The organ of respiration is the ____________________.

4. The layer of serous membrane that lines the chest cavity is called the ______________ pleura.

5. The exchange of oxygen and carbon dioxide in the lungs is called ______________.

6. The respiratory center is located in what part of the brain?
______________________________.

7. The exchange of gases between the capillary blood and the body cells is called ______________.

8. Air flows from an area of ______________ to an area of ______________.

9. When observing a patient’s respirations, you should note the __________, __________, and __________.

10. The procedure used to mobilize secretions and aid in lung expansion is called ____________________.
11. Before and after percussion you should ________________________________.

12. An incentive spirometer is a device that stimulates the patient to 
______________________________________________________.

13. A device that delivers precise, controlled concentrations of O₂ by mixing O₂ with room air is a ________________________________.

14. Suctioning the trachea interferes with __________________________.

15. A positive pressure breathing device which maintains respirations is called a(n) ____________________________

16. The purpose of thoracentesis is to ________________________________
__________________________________________.

17. What should always be kept in the immediate area of a patient with a chest tube? _____________ or ________________.

18. When water-seal drainage is used without suction, drainage depends upon _________________ and ____________________.

19. When using suction with water-seal drainage, if the suction is turned off for any reason, you must ____________________.

20. When managing epistaxis, you should position the patient with the head ____________________.

21. Inflammation of the mucous membrane of the nose is called ________________.

22. When giving artificial ventilation through a laryngectomy stoma, you must ______
__________________________ if the patient is a partial neck breather.
23. List the three parts of a tracheostomy cannula set. ________________________,
______________________________, ____________________.

24. Immediately prior to suctioning a tracheostomy, you should ________________
________________________ to prevent shortness of breath.

25. Inflammation of the visceral and parietal pleura is called ________________.

26. Collection of fluid in the pleural space is called ________________________.

27. Collapse of the alveoli is called ________________________.

28. ________________ is the end result of unrelieved pulmonary congestion.

29. ________________ is a substance secreted by some alveolar cells.

30. The most common cause of pulmonary edema is ________________________.

*Check Your Answers on Next Page*
SOLUTIONS TO EXERCISES, LESSON 2

1. Nose, pharynx, larynx, and trachea. (para 2-2b)
2. Alveoli (or final air spaces). (para 2-3e)
3. Lung. (para 2-3f)
4. Parietal. (para 2-3f)
5. External respiration. (para 2-4a)
6. Medulla. (para 2-5a)
7. Internal respiration. (para 2-4b)
8. Higher pressure; lower pressure. (para 2-5b)
9. Rate, rhythm, depth. (para 2-8b)
10. Percussion. (para 2-14)
11. Auscultate the patient's lungs. (paras 2-10d, 2-16)
12. Achieve maximum voluntary lung expansion. (para 2-17)
13. Venturi mask. para 2-18d)
14. Oxygenation. (para 2-20a)
15. Mechanical ventilator. (para 2-22)
16. Withdraw fluid or air from the pleural cavity. (para 2-23a)
17. Hemostats or clamps. (para 2-24e)
18. Gravity; the mechanics of respiration. (para 2-25c(4))
19. Open the system to the atmosphere (create an air vent). (para 2-26a)
20. Forward. (para 2-27b)
21. Rhinitis (para 2-28)
22. Seal both the mouth and nose closed. (para 2-36d(4))
23. Inner cannula, outer cannula, obturator. (para 2-37b)
24. Hyper oxygenate the patient. (para 2-39b)
25. Pleurisy. (para 2-41)
26. Pleural effusion. (para 2-43)
27. Atelectasis. (para 2-43)
28. Pulmonary edema. (para 2-47)
29. Surfactant (para 2-3f)
30. Cardiac disease. (para 2-47)