Chapter 18

Care of the Child with Respiratory Disorders

BRIEF Outline

Anatomy and Physiology
Mechanism of Respiration
Brief Assessment Overview
UPPER RESPIRATORY DISORDERS
Epistaxis
Upper Respiratory Infections

FOREIGN BODY OBLIQUE AIRWAY
LOWER RESPIRATORY DISORDERS
Congenital Respiratory Disorders
Lower Respiratory Infections
Additional Respiratory Disorders
Nursing Care

LEARNING Outcomes

After completing this chapter, you will be able to:

• Discuss the anatomy and physiology of the pediatric respiratory system.
• Describe respiratory disorders to include upper respiratory infections, tracheoesophageal fistula, cystic fibrosis, asthma, and lower respiratory infections.
• Explain appropriate nursing interventions for children with respiratory disorders.
• Discuss clinical manifestations, diagnostic procedures, medical management, and nursing interventions related to respiratory trauma.

HEALTH PROMOTION ISSUE:
Tonsillectomy

NURSING PROCESS CARE PLAN:
Respiratory Syncytial Virus

NURSING PROCESS CARE PLAN:
Client with Asthma

CRITICAL THINKING CARE MAP:
Caring for a Client with Respiratory Infection

Care of the Child with Respiratory Disorders
Disorders of the respiratory system include congenital malformation, infections, and diseases resulting from chromosomal abnormalities or unknown causes.

**Anatomy and Physiology**

The respiratory system is divided into the upper respiratory system and the lower respiratory system. The upper respiratory system contains the nose, nasal sinuses, pharynx, and larynx. The lower respiratory system contains the trachea, bronchial tree, and alveoli inside the lungs. The right lung is divided into three lobes, and the left lung is divided into two lobes. The entire respiratory system is lined with a continuous mucous membrane that produces approximately 125 mL of mucus daily. The underlying epithelial cells of the lower respiratory system contain cilia, which are hair-like structures extending outward from the cell membrane. The cilia continuously move the mucus toward the pharynx. Figures 18-1 and 18-2 show the differences in upper respiratory structures between a child and an adult.

**SINUSES**

Air enters the nares or nostrils and flows through the nasal cavities. Protruding into the nasal cavity from the sides are three shelflike structures called conchae. These structures, covered with mucous membrane, increase the surface area for warming and humidifying the air and trapping foreign particles. The four pairs of nasal sinuses open into the nasal cavity. The frontal, sphenoidal, ethmoidal, and maxillary sinuses lighten the weight of the head, as well as warm and humidify the air. The openings of the sinuses into the nasal cavity are small and easily blocked by swelling of the mucous membrane. The lacrimal (tear) sacs also open into the nasal cavity.

**PHARYNX**

The pharynx or throat is made up of the nasal pharynx at the top, oral pharynx behind the mouth, and laryngopharynx above the larynx. The pharynx is simply a connection between the nasal cavity and the larynx and esophagus. Both air and food pass through this structure. The eustachian (auditory) canals from the middle ear open into the nasal pharynx. In infants, the eustachian tube is practically horizontal (see Figure 16-30B); by age 12, it tilts diagonally down into the nasopharynx and so is less likely to promote middle ear infection.

Masses of lymphatic tissue or tonsils are embedded in the wall of the pharynx. The pharyngeal tonsils (adenoids) are
located in the nasal pharynx. The palatine tonsils are located on each side of the oral pharynx, and the lingual tonsils are located between the back of the tongue and the epiglottis. The tonsils begin to atrophy in midadolescence, so tonsillectomy and adenoidectomy are rarely performed after age 15. The epiglottis is a cartilage “door” that covers the larynx during swallowing in order to prevent food from entering the airway.

Besides a passageway for air to enter the lungs, the larynx contains the vocal cords. The larynx is surrounded by cartilage for protection. Muscles attached to the vocal cords control the pitch of the voice.

The trachea or windpipe extends from the larynx to the bronchi in the chest (Figure 18-3 ▶). The trachea is held open by C-shaped rings of cartilage. The remainder of the respiratory tree is made up of branches of the trachea called bronchi and smaller bronchioles. Each bronchiole ends in an air sac or alveolus. The alveoli are surrounded by capillaries through which gas exchange takes place.

Although the structures of the respiratory system are the same for children as adults, the size of the organs is different. The small diameter of the airways makes obstruction more likely (see Figure 18-2). For example, the size of the child’s trachea closely approximates the diameter of the little finger. Small toys, bits of food such as raisins, and hard candy can block the airway with serious consequences. A child’s trachea is shorter than an adult’s. Therefore, when suctioning the airway, the suction catheter does not need to be advanced as far (see Figure 18-3).

**Mechanism of Respiration**

The mechanism of breathing is a complex process of changing pressure. Inside the aorta and carotid arteries (the major blood vessels leaving the left side of the heart) are specialized cells or chemoreceptors. When the carbon dioxide level in the blood rises, the chemoreceptors sense the elevation and send a message to the brain. The brain responds by stimulating a contraction of the diaphragm (the large muscle dividing the chest and abdominal cavities) and intercostal muscles (the muscles between the ribs). The contraction of these muscles causes the ribs to move outward and the diaphragm to flatten. The result is an increase in the size of the chest cavity, creating a vacuum that sucks air into the body. The pressure of oxygen inside the alveoli is greater than that in the blood, allowing oxygen to move into the capillary. The carbon dioxide level in the blood is greater than that in the alveoli, allowing carbon dioxide to move into the alveoli. The diaphragm and intercostal muscles relax, moving the ribs and diaphragm back to a resting state and pushing air out of the lungs. This cycle repeats 20 to 40 times a minute.

**Brief Assessment Overview**

Assessing the respiratory system of a child is the same as for an adult. However, because the child may not be able to tell you subjective information, observation of respiratory patterns and skin color are critical. The child should be quiet in order to assess breathing depth, regularity, and lung sounds accurately.

To assess respiratory rate and breathing patterns accurately, the child must be in a position with the chest exposed so the nurse can watch the chest rise and fall. Table 18-1 identifies the normal respiratory rate by age. The child’s respiratory rate gradually slows and, by age 6, approximates that of the adult.
standing, it is called orthopnea. If the breathing stops for a brief period, it is called apnea. Alternating hyperventilation and apnea is termed Cheyne-Stokes respiration (CSR). CSR is an ominous sign of declining condition in critical disorders such as congestive heart failure or neurologic disorders. Abnormal breathing patterns may be accompanied by circumoral cyanosis (bluish discoloration of the skin around the mouth). The child could have a productive or nonproductive cough. Whenever a child has a respiratory disorder, the nurse should monitor the oxygen saturation level.

The nurse should listen to all lung fields with the stethoscope. Lung sounds should be clear. Crackles (fine, dry sounds, formerly called rales), rhonchi (coarse, wet sounds), and wheezing are common sounds in the child with respiratory disorders. These sounds result when airways are partially obstructed by mucus or bronchial muscle spasms. Differentiating expiratory wheezes from inspiratory wheezes can be difficult due to the normally rapid respiratory rate. Occasionally, the child develops stridor (a high-pitched inspiratory crowing sound caused by severely narrowed airways).

clinical ALERT

When a child develops stridor, prompt medical attention is needed to prevent total airway obstruction.

### Upper Respiratory Disorders

#### Epistaxis

**Manifestations**

Epistaxis or nosebleed is common in school-age children. The anterior nares, rich in blood vessels, are the usual source of bleeding. Blood vessels can be irritated by trauma, including nose picking, foreign bodies, and low humidity resulting in drying of the mucous membranes. Other causes could be allergies, forceful blowing of the nose, and infection.

**Diagnosis**

Diagnosis is made by obvious blood draining from the nares or down the throat. However, the location of the bleeding may be more difficult to determine. Most nosebleeds coming from the anterior septum stop in 10 minutes with treatment. The posterior septum can also be a source of nosebleeds. Posterior nosebleeds are usually more difficult to stop and may need medical attention. Posterior nosebleeds have a variety of causes that may include systemic conditions such as bleeding disorders, leukemia, and hypertension. If a nosebleed does not stop within 10 minutes or occurs frequently without identifiable cause, the child needs medical attention.

**Treatment**

First aid treatment of nosebleeds includes applying direct firm pressure to the bleeding nares where the nose attaches to the maxillary bone. By pushing the outer side of the nares against the nasal septum, blood supply is slowed and clot formation can begin. The child should hold the head slightly forward to prevent blood from going down the throat and into the stomach, which can cause nausea and vomiting. A cold cloth applied to the forehead and back of the neck can slow circulation to the nose and aid in clot formation. Once the nosebleed stops, the child should not blow the nose for several hours to prevent a second nosebleed.

#### Upper Respiratory Infections

Upper respiratory infections in young children are common. Infections stimulate the immune system to develop
antibodies that will protect the young child in later life. However, if the immune system is immature or is overwhelmed by multiple infections or other disorders, the life of the child may be in danger. Upper respiratory system infections include bacterial and viral infections of the nasal and oral pharynx, tonsils, middle ear, and epiglottis.

**NASOPHARYNGITIS**

**Manifestations**
The most common infection in children, **nasopharyngitis**, also called **rhinitis, coryza**, or the “common cold,” is inflammation of the nasal mucosa often caused by a viral infection (e.g., rhinovirus, coronavirus) or bacteria (especially **group A Streptococcus**). The classic symptoms include redness and swelling of the nasal and pharyngeal mucosa. Clear nasal discharge either through the nares or down the back of the throat is common. Tonsils may be enlarged, and vesicles may appear on the soft palate and the pharynx. Fever and irritability or general discomfort may occur. If the discharge becomes yellow or greenish, a bacterial infection should be suspected. Mouth breathing leads to drying of the mucous membranes, further irritation, and pain.

**Diagnosis**
Diagnosis is based on symptoms, nasal swabs, or throat culture.

**Treatment**
Nasopharyngitis usually resolves within 10 days. Parents may assist the child by providing humidified air when the child is sleeping. Saline nose drops can be administered every 3 to 4 hours and can be helpful to infants when given just prior to feeding. Older children may use drops or sprays. Decongestants or antihistamines may be prescribed. Parents should be taught to use over-the-counter medicines only if approved for use in children and only in the dosage recommended for the child’s age and weight. Aspirin should be avoided because of its association with Reye’s syndrome.

Between episodes, the child should be asymptomatic. If the infection persists or recurs frequently, the child should be evaluated by the primary care provider. Antibiotics, decongestants, and antihistamines may be prescribed. Persistent or recurring respiratory infections could indicate a bacterial infection or a more serious condition, such as leukemia or diabetes mellitus. Herbal remedies are sometimes employed to assist with symptoms (Box 18-1). Teach parents to review home remedies with the care provider to ensure safety.

**TONSILLITIS**

**Manifestations**
Tonsillitis, inflammation of the palatine tonsils, commonly spreads from the nasopharynx through the drainage of lymphatic fluid. Tonsillitis may be caused by a virus or bacteria, and the condition tends to recur. The inflammation causes the tonsils to enlarge, resulting in pain, difficulty swallowing, and a risk for airway obstruction (Figure 18-4). Frequently, the swelling of the mucous membrane narrows or closes the eustachian tubes, trapping fluid in the middle ear. Microorganisms can be trapped in the middle ear as well, resulting in otitis media (see Chapter 16).

**Diagnosis**
When a child presents with a sore throat and swelling and infection of the tonsils, a culture is needed to determine the causative agent. The tympanic membranes are visualized and assessed for redness and fluid in the middle ear.

**BOX 18-1 COMPLEMENTARY THERAPIES**

**Herbal Agents Used for Respiratory Disorders**
Herbal remedies may be used to achieve balance in the body. Common herbs used to prevent or treat respiratory disorders are:
- **Eucalyptus**—Clears stuffy nose and congested sinuses; boil in water and breathe in steam.
- **Garlic**—Treats cough and may have some antibiotic effect when eaten raw.
- **Mullein**—Soothes and relaxes airway and relieves cough; mix with water and take orally.
- **Echinacea**—Boosts the immune system to help prevent infection.

Any child presenting with an upper respiratory infection should be evaluated for otitis media. Any child presenting with otitis media should be evaluated for an upper respiratory infection. These infections often occur simultaneously.

**Figure 18-4.** Infected tonsils can swell and obstruct the airway. (Custom Medical Stock Photo Inc.)
HEALTH PROMOTION ISSUE

TONSILLECTOMY

Parents worry about their children’s tonsils, either because the tonsils are large, making swallowing difficult and causing snoring, or because of frequent episodes of tonsillitis. Ear, nose, and throat specialists are reluctant to surgically remove the tonsils. When should tonsils be removed?

DISCUSSION

The tonsils, lymphatic tissue found in the posterior oral pharynx, function to drain the lymph from the nose and sinuses. The nasal passages are the first line of entry for airborne bacteria and viruses. The lymph from the nose may contain these bacteria or viruses. Once the lymph enters the tonsil tissue, the micro-organisms are destroyed by white blood cells. At times, the number of micro-organisms entering the nose or multiplying within the lymph is greater than the white blood cells can destroy. When this occurs, the tonsils become swollen, red, and painful. If tonsillitis is the result of a virus, the infection will usually resolve spontaneously in 10 days to 2 weeks. If tonsillitis is from a bacterial infection, the child may need antibiotics to help stop the infection. This is especially true when the causative organism is beta-hemolytic *Streptococcus*, which can invade and damage heart tissue.

Two common indications for tonsillectomy are chronic tonsillitis, having continuous symptoms for more than 3 months, or recurrent tonsillitis, having at least five episodes of tonsillitis in a year. However, the American Academy of Otolaryngology recommends that children have a tonsillectomy if they have three or more episodes of tonsillitis in a year. In contrast, a study by Jack L. Paradise, MD (2002), reported that the modest benefit of a tonsillectomy in children who are moderately affected with sore throats (seven per year) does not seem to justify the risks, morbidity, or cost.

Sometimes the tonsils and adenoids become so enlarged that they cause obstructive sleep apnea (OSA). Children with OSA snore, have labored breathing, observed apnea, restlessness, excessive daytime sleepiness, and behavior or learning problems, including attention deficit/hyperactivity disorder. Once the diagnosis of OSA is made, the child usually has both the tonsils and the adenoids removed (Marcus, C. L., Chapman, D., Word, S. D., McColley, S. A., 2002).

Children with large tonsils can also have difficulty swallowing, resulting in feeding problems, failure to thrive, mouth breathing, and speech problems. As the child ages, the tonsils usually get smaller. If it is believed that the child will not outgrow the enlarged tonsils in a reasonable amount of time, or if the child is losing weight, a tonsillectomy may be performed.

The nurse collects data regarding the number of sore throats the child has.

Treatment

When tonsillitis is caused by a virus, treatment is symptomatic until the infection resolves. Acetaminophen eases throat pain and reduces fever. Cold nonacidic liquids or frozen popsicles can soothe the throat and help prevent dehydration. A home humidifier can aid breathing during sleep. Teach parents to make a mild saltwater solution by dissolving 1/4 tsp of common salt in 8 oz warm water. Parents may need to show the child how to gargle with this solution in order to wash and soothe the swollen tissue in the throat.

When tonsillitis is caused by bacteria, antibiotics are generally prescribed. Because some bacteria, such as beta-hemolytic *Streptococcus*, can cause more serious infections (e.g., rheumatic fever), it is important to encourage parents to obtain treatment in a timely manner.

If a child has frequent recurrent episodes of bacterial tonsillitis, consideration may be given to surgical removal of the tonsils (tonsillectomy). The Health Promotion Issue above discusses this topic.
had over time. It is important to obtain a throat culture to document the cause of the illness and to provide the correct medical treatment. Sore throat from postnasal drip does not count as an episode of tonsillitis unless the tonsils have pus on them. It is important for the nurse to question the child and parent regarding a current cold or sinus drainage. The severity of the symptoms should also be determined. If symptoms are so severe that the child misses a week of school with each episode of tonsillitis, a tonsillectomy may be warranted.

When a child presents with behavioral or attention problems, questions regarding sleep habits, snoring, and restlessness should be addressed. If the child is not growing at an acceptable rate or states dysphagia, the nurse should look in the throat to assess the size of the tonsils.

**PLANNING AND IMPLEMENTATION**

Parents need information about the child’s specific disorder. If the child has recurrent or chronic tonsillitis, it is important for the nurse to teach the parents methods of preventing infection. Instruction must include hand washing, diet, adequate sleep, and avoiding infected persons. The nurse should answer questions about possible surgery, preoperative and postoperative care, and administration of antibiotics (including their side effects).

Even though the tonsils offer an important line of defense for the body, there are times when tonsillectomy is a necessary procedure. Continuous or recurrent tonsillitis can lead to more serious heart conditions and must be treated promptly. Sleep apnea is also a serious condition, and the parents should not wait for the child to outgrow the tonsil problems.

**Self-Reflection**

*Think of one time when you were out of breath from running or swimming. You may recall leaning forward over your knees (orthopneic position) and inhaling forcefully as you tried to “catch your breath.” Gradually, your breathing returned to normal and your body relaxed. Knowing that in tonsillitis the child may experience restricted breathing, think of measures you can use to assist the child. Review both pharmacologic and nonpharmacologic measures.*

**Suggested Resources**

**For the Nurse**


**For the Client**

- [www.everydaykidz.com](http://www.everydaykidz.com) This is a website for parents and caregivers of children with asthma-related breathing problems.

**Nursing Considerations**

When a tonsillectomy is planned, the nurse must provide preoperative teaching for the child and parents. The age and development of the child will influence the method of presenting information to the child. (See Chapters 12 and 14 for information about communicating with children.) Generally, routine preoperative care will be needed. This includes NPO for at least 4 hours, assessing the mouth for loose teeth, initiating an IV line, and giving sedation.

Postoperatively, the child’s throat will be sore and the child may not want to swallow. Cold fluids such as popsicles may help relieve discomfort and increase fluids. Milk products are generally not given because they increase mucus production. Red fluids are also avoided so secretions do not appear to be blood. Liquid analgesics may be ordered.

The primary complication of a tonsillectomy is bleeding in the first 24 hours and again when the scab comes off around day 10. Excessive swallowing may indicate
blood is draining down the back of the throat. The nurse must use a flashlight to look into the child's oral pharynx to assess for bleeding. The child may be discharged from the hospital within 24 hours after surgery. Parents should be taught to keep the child quiet for a few days, offer soft foods, and increase fluid intake. Bleeding will continue to be a concern until healing is complete in 7 to 14 days. Any trauma to the back of the throat will increase the risk of bleeding. For this reason, drinking straws should be avoided, and the child should be supervised while brushing the teeth. During the healing process, the dark scab will turn white and eventually slough off. Most commonly, the child will swallow the scab without noticing. Until healing is complete, the child's breath may have a strong foul odor. Gargling with mouthwash or saltwater is not recommended due to the increased risk of bleeding. The odor will subside once healing is complete. Teach parents to contact the doctor immediately if bleeding is noticed.

**EPIGLOTTITIS**

**Manifestations**

Epiglottitis is inflammation of the epiglottis caused by a bacterial infection of the pharynx and soft tissue of the larynx. As the epiglottis swells with inflammation, complete respiratory obstruction is possible. Therefore, epiglottitis is a potentially life-threatening condition. Typically, the child develops a sudden high fever (higher than 102°F or 39°C), a sore throat, muffled or hoarse voice (dysphonia), and difficulty swallowing (dysphagia). As swelling progresses, inspiratory stridor begins. Due to dysphagia, the child does not swallow saliva, resulting in drooling. Orthopnea is common.

**Diagnosis**

Diagnosis is based on symptoms. Visual inspection is contraindicated because of the danger of triggering laryngospasm and airway obstruction in the child. A lateral x-ray view of the neck may be taken. Culture is postponed until an endotracheal tube or tracheostomy is in place.

**clinical ALERT**

Because of the life-threatening nature of epiglottitis, infants and toddlers who cannot ask for help must not be left alone during the acute phase of epiglottitis.

Difficulty swallowing, breathing, and speaking is frightening to the child and parents. The unfamiliar environment of the hospital creates additional stress. The nurse can reassure the child and family by remaining calm, explaining the various pieces of equipment, and providing care in a professional manner. Remaining in the room, or leaving for only a brief time, reassures the child and family that their needs will be met. Keep parents informed, and reassure them that any loss of voice is temporary.

Most children show rapid response to treatment with cool mist, fluids, and antibiotics. The endotracheal tube can usually be removed in 24 to 36 hours. Home care involves completing the antibiotics as ordered. Parents need instruction in medication administration and potential side effects of the specific medication.

**Foreign Body Obstructed Airway**

The airway can become obstructed when the child puts small objects in the mouth or chokes on food. Infants and young children must be watched closely while eating and be taught not to put small objects in the mouth. Even with appropriate care, foreign body obstruction of the

**Treatment**

Medical treatment includes the insertion of an endotracheal tube in order to maintain the airway (see Procedure 13-28 Assisting with Airway Insertion). IV antibiotics are given to treat the infection. Acetaminophen or ibuprofen may be used to reduce the fever and discomfort. The child with epiglottitis is often cared for in the intensive care unit (ICU).

**Nursing Considerations**

Nursing care consists of managing the airway, administering prescribed medications, maintaining hydration, and providing emotional support for the child and family. Crying stimulates the airway, increases oxygen consumption, causes the respiratory system to work harder, and could cause laryngospasm, which would totally occlude the airway. Provide a calm, quiet environment and a confident manner. The calmer the child is, the better. Avoid any painful or frightening procedure until after the airway is secured. At times, sedation may be needed.
airway can occur. In this emergency situation, the care provider must immediately open the airway. To determine if the airway is obstructed, observe the child’s facial expression, ask the child if he or she can talk, and observe for respirations. If the object can be seen in the back of the throat, try to remove it with a finger sweep, taking care not to push it deeper into the airway. If the object cannot be removed, the Heimlich maneuver (Figure 18-5) is the recommended procedure to clear an obstructed airway safely. The size of the child will determine the position and procedure used.

**INFANT**

To perform the Heimlich maneuver on an infant, the prone position is used with the baby’s head lower than the trunk (see Figure 18-5A). Support the head and neck with one hand, with the torso on the forearm. Use the palm of the other hand to give five forceful back blows between the shoulder blades. After the back blows, the free hand is placed over the back of the neck sandwiching the infant between the hands. The infant is turned over maintaining the head-down position. Two fingers are placed on the middle of the sternum between the nipples. Five chest thrusts are given at a rate of one every 3 to 5 seconds. Abdominal thrusts are not used on infants due to the risk of damaging the internal organs. This procedure is repeated until the airway is cleared.

Cardiopulmonary resuscitation (CPR; Figure 18-6) may be needed once the airway is open. (CPR training is not reviewed in detail in this text. Nurses often obtain training for CPR through the American Heart Association, local Red Cross, or their employing agency. Nurses may be expected or required to maintain current certification...
Lower Respiratory Disorders

Congenital Respiratory Disorders

Tracheoesophageal fistula (TEF), a connection between the trachea and the esophagus, is the most common congenital anomaly affecting the respiratory system. TEF is associated with esophageal atresia (EA), the esophagus ending in a blind pouch instead of connecting to the stomach. When the newborn takes breast milk or formula, the food will enter the trachea through the fistula, resulting in aspiration and pneumonia. There is a possibility that the baby could drown. Because the primary problem is with the esophagus, discussion is found in Chapter 22.

Cystic Fibrosis

Cystic fibrosis (CF) is an inherited recessive disorder of the exocrine glands affecting predominantly white children. In CF, there is a defective chloride ion and water transport across the cell membranes of cells that secrete mucus, causing production of thick, tenacious mucus that obstructs all organs with mucous ducts. Electrolytes are lost through sweat saliva, and mucus secretions. The disease affects primarily the respiratory and gastrointestinal systems, but it has some effect on the integumentary, musculoskeletal, and reproductive systems as well (Figure 18-7).

Manifestations

Presenting symptoms are usually meconium ileus (a small bowel obstruction) in the newborn, failure to thrive, or chronic recurrent respiratory infections. The child may be constipated often. The child will have a chronic, productive cough with thick, sticky mucus and...
frequent respiratory infections. Despite a voracious appetite, children will have trouble gaining weight. There may be clubbing of fingers related to a reduction in oxygen reaching the tissues.

Diagnosis
Diagnosis is made by a positive sweat test (Figure 18-8 ■). Table 18-2 ■ describes this test. Diagnosis may be made before 1 year of age, but children with a mild form of the disease may not be diagnosed until adolescence. The disease is not generally terminal until adulthood.

Treatment
Medical treatment is aimed at maintaining maximum respiratory function and nutrition for as long as possible. Postural drainage (chest physiotherapy) is ordered to help the child eliminate respiratory secretions. Procedure 18-1 ■

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<tr>
<th>TABLE 18-2</th>
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<tr>
<td><strong>Sweat Test for Cystic Fibrosis</strong></td>
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<td><strong>TEST</strong></td>
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<td>Sweat test (pilocarpine iontophoresis)</td>
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provides information on performing chest physiotherapy. Aggressive treatment of respiratory infections or allergies is required.

Pancreatic enzymes; vitamins A, D, E, and K; and a diet high in carbohydrates and protein are prescribed to manage the gastrointestinal complications of CF. On hot days, the child may need extra fluids and salt.

**Nursing Considerations**

When assessing a child with CF, pay close attention to respiratory function. Thick mucus can obstruct the bronchi, resulting in hypoxia and infection. The priority for assessment and intervention must be to open and maintain a patent airway (see Respiratory Procedures section in Chapter 13). Children are frequently admitted to the hospital with an acute respiratory infection. Respiratory therapy several times a day and antibiotics will be ordered to help clear the airways. Parents will need to be taught how to provide postural drainage with percussion. Procedure 18-1 provides steps for how to perform percussion.

Children with CF are growth retarded even with a voracious appetite. The thick mucus blocks the production of pancreatic enzymes, resulting in an inability to digest nutrients. The child’s stools are large, bulky, and frothy. They contain a large quantity of fat that causes them to be foul smelling and to float in water. Fat-soluble vitamins are poorly absorbed. Digestive problems can be eased with special medication and diet modification. Pancreatic enzymes should be given with each meal and each large snack. The goal is to achieve near normal stools and maintain adequate weight gain.

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**PROCEDURE 18-1 Postural Drainage with Percussion (Chest Physiotherapy)**

**Purpose**
- To clear the airway of thick mucus

**Equipment**
- Bed or table for the child to lie on
- Pillows
- Hand towel

**Interventions**

1. Position the child on one side, usually with the head lower than the hips. (The various positions for chest physiotherapy are shown in Figure 18-9.) The upper arm should be positioned over the head or across the anterior chest, exposing the lateral chest. Pillows may be used to support the child in position. Positioning with the head down facilitates mucus moving from small bronchioles to larger bronchi by gravity.
2. Place folded towel over the chest. The towel protects the skin from trauma.
3. With cupped hands (Figure 18-10), gently clap on the lateral chest for 3 to 5 minutes. Turn the child to the abdomen to expose the back. Clap on the back over each lobe of the lung for 3 to 5 minutes each. Turn the child to the opposite side and continue clapping over each lung field. Clapping on the chest with cupped hands causes vibration inside the lung, moving mucus to larger airways.
4. Sit the child up and have him or her deep breathe and cough. Coughing helps expel mucus.
5. With the child in a sitting position, clap over the upper chest to clear the right and left upper lobes. The upper lobes are anterior to the main bronchus; therefore, the child must be sitting for gravity to pull the mucus toward the large airway.
6. A mechanical vibrator can be purchased to provide percussion instead of clapping with the hands. The child’s position will be the same. Mechanical vibrators can be used with postural drainage to move mucus out of small airways.
Figure 18-9. ■ Positions for postural drainage of different parts of the lung. The area of the lung to be drained is illustrated directly above the client’s position. (Data from materials provided by Datalizer Slide Charts, Addison, IL)

A Upper lobes

B Lower lobes

C Lower Lobes (continued)  Right Middle Lobe  Left Upper Lobe

Figure 18-10. ■ The cupped-hand position is used to clap against the chest wall over the segment to be drained. This creates a vibration that helps dislodge secretions. Various body positions are used, depending on the location of the obstruction. See Figure 18-9 for positions.

SAMPLE DOCUMENTATION

(date) 0730  Respirations labored, accessory muscles used with inspiration. Lung sounds diminished in right middle and lower lobes. Postural drainage with percussion to all lung fields performed by mother. Productive cough of a moderate amount of thick white mucus. Lung sounds clear bilaterally. Respirations less labored. ___

L. Hines, LPN
CF is a chronic, long-term illness that is ultimately fatal. With adequate treatment and prevention of complications, some children live into adulthood. However, the stress on the child, family members, and community resources is great. The child needs to be encouraged to participate in activities consistent with his or her level of development and physical endurance in order to maintain as "normal" a life as possible. Parents will need emotional support as they work daily to keep their child healthy.

CF takes a financial toll on the family resources as well. The nurse should provide referral to support groups and other resources to assist families.

Lower Respiratory Infections
Infections of the lower respiratory system include viral and bacterial infection of the bronchi and alveoli. The symptoms and nursing care of lower respiratory infections are similar. Medical treatment is specific to the causative organism.

BRONCHIOLITIS
Bronchiolitis is infection and inflammation of the smaller airways or bronchioles. A buildup of mucus and swollen mucous membranes results in wheezing from partial obstruction. The most common causative organism is the respiratory syncytial virus (RSV).

RSV occurs in epidemics from October to March. This virus is easily transmitted, and most children have been infected by age 3. RSV is transmitted through direct or close contact with respiratory secretions of infected individuals. The virus invades the cells of bronchial mucosa, causing the cells to rupture. Cell debris irritates the airway, causing an increase in secretions that obstruct the bronchioles.

Manifestations
When the airways are partially obstructed, wheezing and crackles can be heard on auscultation. As the blockage continues, breath sounds diminish, causing impaired gas exchange and eventually leading to respiratory failure.

Symptoms of RSV begin with nasal stuffiness and fever, but within a few days they progress to frequent, deep cough; rapid, labored breathing; and respiratory distress, including retraction and nasal flaring. Parents report that the child appears sicker, refuses to eat, and is less playful. Labored lung sounds may diminish as airflow to the lungs decreases. The child may be dehydrated.

Diagnosis
Diagnosis is made by history, culturing nasopharyngeal secretions (e.g., with enzyme-linked immunosorbent assay or ELISA), and chest x-ray.

Treatment
The child with RSV will be hospitalized for treatment. The doctor will probably order IV fluids, humidified oxygen, and medication to open the airways, decrease inflammation, thin the secretions, and lower the temperature. The respiratory therapist will be a valuable resource in maintaining a patent airway and administering breathing treatments.

Nursing Considerations
When hospitalized, the child with RSV requires special precautions to prevent transmission of the organism to others. These precautions would include a private room and the use of gowns and gloves (some facilities also require masks) when in the child’s room. (See Procedure 13-26 Administering Oxygen to Children.)

NURSING PROCESS CARE PLAN
Respiratory Syncytial Virus

Omar, a 6-month-old child, has been admitted to the pediatric unit with a diagnosis of possible RSV. Omar is experiencing labored breathing. His mother states, “I am so scared. His breathing is getting worse.” Laboratory reports indicate a high white blood count and respiratory acidosis.

Assessment
- Color pale with slight circumoral cyanosis
- Wheezing lung sounds
- P 150, R 54

Nursing Diagnosis. The following important nursing diagnosis (among others) is established for this condition:
- Ineffective Airway Clearance.

Expected Outcome
- Airway will be clear within 48 hours.

Planning and Implementation
- Monitor vital signs every hour. The child’s condition can change rapidly and therefore must be closely monitored.
- Monitor oxygen saturation continuously. Continuous monitoring of oxygen saturation will alert the nurse if the child’s condition deteriorates.
- Administer oxygen as ordered. Oxygen is administered to maintain oxygen saturation above 95%.
- Anticipate worsening respiratory distress by monitoring breath sounds, respiratory effort, and level of consciousness. Anticipating a worsening of the child’s condition allows the nurse time to prepare for airway maintenance.
- Reposition every ½ hour. Frequent position changes facilitate drainage of respiratory mucus.
- Administer IV fluids via appropriate equipment. IV fluids are administered by infusion pump to prevent accidental fluid overload.
- Administer medications with attention to dosage. Pediatric dosages are individualized based on body weight. If dosages are not calculated carefully, overdose or underdose could occur. To maintain medication blood level in a therapeutic range, medications must be administered on time.
**Evaluation**

- Lung sounds will be clear.
- Oxygen saturation will remain higher than 95%.

**CROUP**

*Croup* is a term used to represent a group of respiratory illnesses that results from inflammation and swelling of the larynx, trachea, and large bronchi (Figure 18-11 ■). The causative agent can be either viral or bacterial. Although laryngotracheobronchitis is the most common, epiglottitis (discussed previously) and bacterial tracheitis are the most serious. In these infections, swelling of the epiglottis occludes the larynx, and tracheal edema against the cricoid cartilage leads to obstruction.  

(Note: infectious diseases such as pertussis—whooping cough—are discussed in Chapter 26.)

**Manifestations**

When a child has croup, inspiratory stridor will be present. A barking “seal-like” cough and hoarseness are also present. The infant or child may have been ill for several days before the airway became partially obstructed and caused symptoms. Others may be healthy and develop severe symptoms in a matter of a few hours. Fever may or may not be present. The child may refuse to swallow saliva due to severe throat pain and swelling, resulting in drooling.

**Diagnosis**

Diagnosis is based on clinical findings. An x-ray may be taken to rule out foreign body obstruction. Pulse oximetry is used to detect hypoxemia.

**Treatment**

The goal of treatment is to reduce the swelling and open the airways. Cool mist administered by mask or tent (see Figure 13-33 and Procedures 13-25 to 13-28) may be ordered. If a bacterial infection is present, appropriate antibiotic therapy will be prescribed. Endotracheal intubation may be needed to keep the airway open. Medications to reduce airway swelling may be ordered.

**Nursing Considerations**

As with other respiratory conditions, the child should be observed closely for airway patency, oxygen saturation, and retractions. It is important to deliver cool mist to the child in a quiet environment. The child should not be left alone because very young children may not be able to summon help. They should not cry because this can induce laryngospasm. Avoid probing the throat, including obtaining throat cultures, to prevent laryngospasm and complete obstruction.

Most children show rapid improvement once cool mist, oxygen, antibiotics, and fluids are started. The endotracheal tube, if used, can usually be removed in 24 to 36 hours. Discharge teaching includes the continued use of cool mist and administration of prescribed antibiotics, including side effects.

**PNEUMONIA**

*Pneumonia* is inflammation or infection of the bronchioles and alveoli in the lung (Figure 18-12 ■). Most common in
infants and young children, the causative organism is usually viral. In premature infants and older children, the causative agent is more commonly bacterial (Pneumococcus). Whether viral or bacterial in origin, the pathophysiology of pneumonia is the same. The infecting organism causes inflammation and swelling of the mucous membranes. Macrophages move to the area and engulf the organisms by phagocytosis. Thick mucus, dead cells, and other debris accumulate in the alveoli and small air passages where they block gas exchange. If the mucus remains in the small airways, it will consolidate and become more difficult to remove.

**Manifestations**
The child with lower respiratory infection will develop a fever, malaise, and a cough. Breath sounds may be wheezy, diminished, or absent in consolidated areas. Respirations will be fast (tachypnea) and labored. The child will be tired and want to sleep, but may be unable to rest due to dyspnea.

**Diagnosis**
Sputum cultures and chest x-rays are used to diagnose pneumonia.

**Treatment**
Medical treatment includes antibiotics (depending on the causative organism), fluids, cough suppressants, and antipyretics. If diagnosed early, the child may be treated at home. The hospitalized child will require oxygen (see Procedures 13-25 to 13-28), chest physiotherapy, and IV fluids. Most children recover in a short period of time.

The culture of the sick child can influence the way the family chooses to treat respiratory and other diseases. Box 18-2 describes one cultural view of pneumonia.

**Nursing Considerations**
Like other respiratory disorders, the priority of care is to maintain the airway and provide symptom relief for pain and fever. The child requires constant attention. Parents need support because seeing their child in respiratory distress is frightening. The nurse provides teaching as appropriate for the situation and age of the child.

**BOX 18-2 CULTURAL PULSE POINTS**

**Pneumonia as a “Cold” Disease**
Various cultures, especially Asian cultures, believe that physical disorders result from a hot or cold imbalance in the body fluids. Pneumonia is a disorder that is considered a “cold” disease that should be treated with “hot” fluids (e.g., hot tea). Other respiratory disorders are considered “cold” in nature.

**BOX 18-3 CULTURAL PULSE POINTS**

**Unusual Response to TB (Mantoux) Test**
A false-positive tuberculin or Mantoux test can be expected from a child of Filipino heritage. This is due to the type of vaccine, bacille Calmette-Guérin, given to children of this country. To diagnose tuberculosis in these children, chest x-rays and sputum cultures are necessary.
Treatment
Medical treatment includes the administration of isoniazid, rifampin, and pyrazinamide for 2 months, followed by 6 months of isoniazid or rifampin. Table 18-3 describes drugs used in the treatment of TB. The PPD test will be permanently positive. Chest x-ray will be required to determine the elimination or recurrence of the disease.

Nursing Considerations
Nursing care is centered on family education. Drug resistance to TB has increased dramatically in recent years, so parents must be taught the importance of adhering closely to the medical regimen and completing treatment. Teaching should include preventing the spread of the infection to others and stressing the necessity of taking the prescribed medication. All people who have come in contact with the infected child should be screened and treated as necessary.

Additional Respiratory Disorders
NEONATAL RESPIRATORY DISTRESS SYNDROME
Neonatal respiratory distress syndrome (RDS) is a condition commonly seen in premature infants. RDS is defined as an inadequate production of surfactant. Surfactant is a mixture of phospholipids and apoproteins that attach to the internal surface of the alveoli, reducing the surface tension and improving the lungs’ ability to remain inflated during exhalation. Without adequate amounts of surfactant, the alveoli collapse (Figure 18-14), and the infant must work hard to reinflate the alveoli with each breath.

Manifestations
The infant will exhibit signs of respiratory distress, including respirations greater than 60, retractions (see Figures 9-18 and 18-3), nasal flaring, and audible grunting. Lung sounds will be greatly decreased. Within a few minutes, symptoms can worsen.

Diagnosis and Treatment
Diagnosis, based on clinical symptoms, must be made rapidly in order to save the infant’s life. Treatment includes oxygen and assisted mechanical ventilation (see Procedures 13-25 to 13-28). Synthetic surfactant, given within 24 hours, may be helpful in treating atelectasis (an airless state of the lungs), but it does not prevent chronic inflammation.

Nursing Considerations
Children with RDS will be cared for in the ICU and will be monitored closely for oxygen and fluid levels. Infants will be placed in a warmer to maintain body temperature and reduce metabolic demands. Use of oxygen in premature infants can lead to bronchopulmonary dysplasia (discussed later) or blindness (called retinopathy of prematurity). Excess fluids can lead to pulmonary edema. The child may develop chronic lung disease.

Besides providing emergency treatment, the nurse must support the parents. The nurse may need to call clergy or family to be with the parents. Teaching about treatment can help alleviate the parents’ fear of losing their child. Parents will need to learn CPR and oxygen administration. They may also need to learn how to use an apnea monitor or other equipment at home. Referral to a support group may be useful.

BRONCHOPULMONARY DYSPHASIA
Bronchopulmonary dysplasia (BPD) is a chronic lung disease that affects infants with RDS, congenital heart defects, meconium aspiration, or other conditions that result in assisted mechanical ventilation. Most infants with BPD have been on a mechanical ventilator for at least 3 days. The
taught to administer feedings, oxygen, and medication. They must also learn to manage the required equipment. (See Figure 14-16 and respiratory Procedures 13-25 through 13-28 in Chapter 13.) At home, the infant may continue mechanical ventilation, oxygen, and medication. Parents who are fearful of assuming responsibility for their baby may require home nursing assistance. Referrals for respiratory supplies, medications, financial support, and follow-up care should be planned and coordinated before discharge.

SUDDEN INFANT DEATH SYNDROME

Sudden infant death syndrome (SIDS) is the sudden unexplained death of an infant younger than 1 year. SIDS most often strikes infants between 2 and 4 months of age and is more common in males. Other factors common in SIDS include Native American or African American descent, low birth weight, and multiple births (twins or triplets). SIDS is the leading cause of death of infants between 1 month and 1 year of age. Box 18-4 identifies risk factors associated with SIDS.

Manifestations

When SIDS strikes, the infant is typically found not breathing, and emergency medical help is summoned. The infant is usually in a normal state of nutrition and hydration. In more than 50% of infants, blood-tinged frothy fluids are present in and around the mouth and nose. The diapers are filled with urine and stool. The infant may be clutching a blanket. There

immature lung becomes damaged from the high ventilator pressure and oxygen toxicity, resulting in pulmonary inflammation, cellular damage, and death of tissue.

Manifestations

The infant with BPD has persistent signs of respiratory failure due to bronchial edema and fibrosis of the lung tissue. There may be wheezing, crackles, retractions, nasal flaring, and grunting. Normal activities, such as feeding, place additional work on the respiratory system and may result in failure to thrive. Diagnosis is based on chest x-rays.

Treatment

Medical management involves supporting ventilation for weeks or months with progressive weaning from mechanical assistance, oxygen administration, nutrition, and anti-inflammatory medication. A tracheostomy is indicated for long-term mechanical ventilation. Long-term complications include asthma and recurrent pulmonary infections. Some infants require a gastrostomy tube for feeding in order to obtain adequate caloric intake to support growth.

Nursing Considerations

Nursing care focuses on promoting respiratory function and preparing the family for home care. The infant with BPD can become acutely ill with respiratory complications at any time, and parents must be alert for early symptoms. Parents must be taught to administer feedings, oxygen, and medication. They must also learn to manage the required equipment. (See Figure 14-16 and respiratory Procedures 13-25 through 13-28 in Chapter 13.) At home, the infant may continue mechanical ventilation, oxygen, and medication. Parents who are fearful of assuming responsibility for their baby may require home nursing assistance. Referrals for respiratory supplies, medications, financial support, and follow-up care should be planned and coordinated before discharge.

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is no audible outcry at the time of death. Skin is a white ashen color, not the expected cyanotic blue found with respiratory distress. An autopsy will need to be performed to identify the cause of death.

Prevention and Treatment
Although infants who are at risk can be identified, SIDS remains unpredictable. The main preventive measure is to place infants on their back to sleep. If a child is found in respiratory arrest, CPR must be initiated immediately and emergency medical services called.

Nursing Considerations
The impact of SIDS on the family is one of extreme shock followed by extreme outrage. Family members commonly experience guilt, either self-blaming or projecting blame onto other family members or caregivers (e.g., a babysitter). Older children may fear SIDS will happen to them as well. Siblings may also believe that the infant died because of bad thoughts or desires they had toward their brother or sister.

The nurse has an important role in both supporting the family and educating the public. Recall that by 2 months infants are able to reposition their head to breathe. Ordinary bedding is incapable of causing hypoxia to the point of suffocation. This knowledge can be used to help family members understand that the death was not their fault.

Although the need for support of parents and siblings is obvious, grandparents will need additional support. Grandparents will be experiencing grief at the loss of their grandchild, as well as extreme hurt at watching their own children suffer. Family members should be allowed to hold the infant, and receive handprints, footprints, and a lock of hair. Provide the family with information about local support groups.

ASTHMA
Asthma is a chronic inflammatory disorder of the tracheobronchial tree. Asthma attacks are influenced by a variety of triggers, including allergens, medication, fumes, exercise, or stress (Figure 18-15). The stimulus that initiates the inflammatory process is specific to each individual. Before puberty, more boys have asthma, but by adulthood the disease is equally distributed between the genders.

Manifestations
As the lining of the tracheobronchial tree becomes irritated by an allergen, fumes, or dust, the cells release histamine.
Diagnosis
Diagnosis of asthma is based on medical history, physical assessment, and pulmonary function tests. Peak expiratory flow rates (PEFRs) are used to determine the extent of damage. (See Chapter 13 for description and illustration of PEFR.) PEFR is the fastest speed at which air is exhaled. With asthma, airways collapse, trapping air in the alveoli and lowering the PEFR. Allergens can be identified by skin tests.

Treatment
Asthma management involves avoiding triggers, regulating medications, family teaching, and ongoing follow-up. Drug management depends on the severity and frequency of the child’s symptoms. Short-acting bronchodilators, inhaled corticosteroids, and long-acting oral anti-asthmatics can be used alone or in combination. The newest class of drugs used to treat asthma is the leukotriene modifiers. These drugs prevent the bronchoconstrictive and anti-inflammatory action of leukotriene by blocking the receptor. Table 18-4 lists common medications used in children with asthma.

Secondhand Smoke
Research has confirmed that secondhand cigarette smoke contributes significantly to asthma and other chronic respiratory problems in children of all ages. This fact should be stressed with parents. If a parent is not ready to quit smoking, he or she may be willing to smoke outside, at least keeping the inside of the home free of smoke.

Nursing Considerations
The child, with the help of the parents, may be able to avoid the specific allergens that trigger an asthma attack. Because exercise can bring on an acute asthma attack, the child should warm up well before exercising, avoid outdoor exercising in cold or dry air, and take prescribed medication 15 to 30 minutes before exercising.
Parents need to be taught to administer medication by metered-dose inhaler and by continuous nebulizer (see Procedure 13-32). Older children can be taught to perform their own respiratory treatments. PEFR monitoring devices can be used in the home or at school to monitor the child’s condition and response to treatment, as well as to detect deteriorating lung function. Parents, children, and school personnel should receive instruction on the proper use of the PEFR equipment. The use of the PEFR allows the family greater control over the management of asthma and decreases the need for hospitalization by alerting parents to the need for adjustments to prescribed therapy.

PNEUMOTHORAX

Pneumothorax, air in the chest cavity, can result from chest trauma or spontaneous rupturing of alveoli. When air enters the chest cavity, the normal negative pressure is lost and the lung cannot inflate (Figure 18-17 ■). Pressure from the intact lung can cause a shift of organs (mediastinal shift; see Figure 18-17B) that compresses the great vessels, leading to shock. If bloody fluid is in the chest cavity, the disorder is called a hemothorax.

Manifestations

Because air is unable to enter the bronchi, lung sounds will be absent. The child may complain of being unable to breathe. Oxygen saturation will decrease.

Diagnosis

Clinical findings, coupled with history of chest injury or chronic lung disease, will usually result in further investigation with a chest x-ray.

### Table 18-4

<table>
<thead>
<tr>
<th>Drug (Generic and Common Brand Name)</th>
<th>Usual Route/Dose</th>
<th>Classification</th>
<th>Selected Side Effects</th>
<th>Don’t Give If</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albuterol (Proventil, Vantolin)</td>
<td>PO: 2–6 years 0.1–0.2 mg/kg t.i.d. PO: 6–12 years 2 mg 3–4 times/day Inhaled: 6–12 years 1–2 inhalations every 4–6 hours</td>
<td>Beta-adrenergic agonist</td>
<td>Hypersensitivity, tremors, anxiety, blurred vision; call doctor if no relief</td>
<td>Epinephrine is being administered (possible additive effect)</td>
</tr>
<tr>
<td>Fluvoxamine (Flonase)</td>
<td>Inhaled: 1–2 inhalations bid</td>
<td>Anti-inflammatory</td>
<td>Candidal infection of oral-pharynx</td>
<td>Oral inhaler and nasal inhaler are not interchangeable</td>
</tr>
<tr>
<td>Prednisone, (Solumedrol, etc.)</td>
<td>Acute asthma: PO: 1–2 mg/kg in divided doses Asthma: PO: 10–40 mg every other day, depending on age</td>
<td>Glucocorticoid</td>
<td>Edema, muscle weakness, hyperglycemia, growth suppression</td>
<td>Do not stop or alter dose without consulting primary care provider</td>
</tr>
<tr>
<td>Montelukast (Singulair)</td>
<td>PO: 4–5 mg daily in evening</td>
<td>Bronchodilator (respiratory smooth muscle relaxant), leukotriene receptor</td>
<td>Fever, headache, nasal congestion</td>
<td>Monitor periodic live tests</td>
</tr>
<tr>
<td>Theophylline (Theo-dur)</td>
<td>PO/IV 0.4–0.8mg/kg/hour</td>
<td>Xanthine bronchodilator</td>
<td>Irritability, headache, tachycardia</td>
<td>Wait 4–6 hour after IV dose before starting PO; check IV incompatibility</td>
</tr>
<tr>
<td>Levalbuterol (Xopenex)</td>
<td>Inhaled 0.31 mg tid</td>
<td>Autonomic nervous system agent, bronchodilator (respiratory smooth muscle relaxant)</td>
<td>Allergic reactions, anxiety, headache, dizziness, increased blood glucose, tachycardia</td>
<td>Past allergic reaction; not recommended for children younger than 6 years</td>
</tr>
</tbody>
</table>

Parents need to be taught to administer medication by metered-dose inhaler and by continuous nebulizer (see Procedure 13-32). Older children can be taught to perform their own respiratory treatments.
should ease, and breath sounds should return in all lung fields. The chest tube can usually be removed in a few days. Parents may be frightened to touch the child because of the chest tube. They should be reassured that the child can be touched, held, and played with as long as the chest tube is not pulled. Should an air leak occur, the chest tube should be clamped with large hemostats as close to the client as possible. The charge nurse and doctor should be notified immediately.

NURSING CARE

PRIORITIES IN NURSING CARE

The priorities of nursing care for children with respiratory disorders are to:

- Maintain patent airway
- Prevent infection
- Promote healing
- Prevent further respiratory damage.

ASSESSING

The infant or child with a respiratory disorder should be assessed for lung sounds bilaterally, oxygen saturation (see Figure 13-34 in Procedure 13-27), elevated temperature, and stridor. If the throat is infected, the ears should be assessed for infection.
checked for signs of infection. Likewise, if the ears are infected, the throat should be assessed because of the communication between each through the eustachian tubes. Careful observation for signs of respiratory distress is critical. The airway of the infant is small and obstructs easily. The oxygen saturation should be monitored and reported to the supervising RN or physician if it falls below 90%. Many respiratory disorders affecting older children began in the younger years and continue into adolescence and adulthood. The older child should be assessed to determine if he or she is ready to assume some responsibility for the daily management of his or her respiratory condition.

DIAGNOSING, PLANNING, AND IMPLEMENTING

The following nursing diagnoses are common among pediatric clients with respiratory disorders and their families:
- Ineffective Airway Clearance
- Risk for Infection
- Deficient Fluid Volume
- Fear/Anxiety
- Deficient Knowledge.

The following outcomes may be used when caring for pediatric clients with respiratory disorders:
- Open airway
- No evidence of respiratory infections
- No evidence of fluid imbalance
- Client and family appear calm and relaxed
- Client and family verbalize understanding of respiratory disorder, medical treatment, and medication administration.

When planning and implementing care for the infant with severe respiratory disorders, the first priority is to establish and maintain an open airway. The nurse should ensure that artificial airways and suction equipment are available in case of airway obstruction.

- Take vital signs, including oxygen saturation measurements, at least every 2 hours in children with severe respiratory disorders. The pediatric client condition may change rapidly, and the child may not be able to communicate this to the nurse.
- Record intake and output if risk for deficient fluid volume exists. IV fluids may be administered. The nurse must be alert for signs of dehydration, which can be life threatening.
- Once the child is able to swallow, provide cool liquids. Cool liquids can help decrease throat swelling, relieve discomfort, and maintain fluid balance.
- Observe the child and the parents for signs of fear and anxiety. Remain with the child and family, and explain the need for the various pieces of equipment (Figure 18-19). Parents are fearful when the child is having difficulty breathing and has...
loss of voice. The hospital environment is frightening to the child and parents. The nurse’s presence can be reassuring. Knowing about the equipment can reduce fear.

- Explain all procedures to the parents and encourage their participation in care of the child to the extent possible. Infants and young children experience separation anxiety if the parents are not nearby. (See developmental stages in Chapter 11 and effects of hospitalization on children in Chapter 14.)
- Promote age-appropriate activities to the extent possible. Children with chronic respiratory conditions still need to progress developmentally. Encouraging children to do all they can will promote self-esteem.

EVALUATING

Children with respiratory disorders are evaluated frequently for airway patency and oxygen saturation. An increase in urinary output indicates adequate fluid intake. Failure to complete ordered antibiotics can result in recurrence of the infection, so the importance of giving antibiotics as ordered must be emphasized with family members.

NURSING PROCESS CARE PLAN

Client with Asthma

Jimmy, a 7-year-old, is admitted to the pediatric unit with a diagnosis of acute asthma. His vital signs are T 98.4, P 112, R 36. He has high-pitched wheezing on expiration. The physician has ordered IV Solu-Medrol and breathing treatments.

Assessment

- Wheezing respirations
- Labored breathing
- Clings to mother

Nursing Diagnosis. The following important nursing diagnosis (among others) is established for this client:

- Ineffective Airway Clearance related to allergic response, inflamed bronchial tree.

Expected Outcomes. Expected outcomes for Jimmy are that:

- Wheezing will resolve after administration of medication.
- Respirations will return to within normal range.
- Client will state that breathing is easier.
- Parent and child will return demonstration of metered-dose inhaler for medication.

Planning and Implementation

- Administer medication as ordered. Medications relieve bronchial inflammation, decrease swelling, and open airways.
- Teach Jimmy and his parents how and when to use the handheld nebulizer. Parent and child need instruction in technique and in proper use of the medication.
- Teach appropriate “play” techniques to extend expiratory time. Increasing expiratory pressure and extending expiratory time improves breathing by keeping airways open, allowing air to leave the lungs.
- Supervise use of breathing equipment (e.g., inhalers, nebulizers, oxygen cannula/mask). This ensures proper use of breathing equipment.

Evaluation. Lung sounds will be clear, and breathing pattern will be within normal limits of 15 to 25 for a 7-year-old. Parents and child can verbalize and demonstrate use of breathing equipment.

Critical Thinking in the Nursing Process

1. What play activities could lengthen the exhalation time?
2. What questions should Jimmy and his parents be asked to help identify causative agents for the asthma attack?
3. What can the nurse do to help Jimmy express his feelings?

Note: Discussion of Critical Thinking questions appears in Appendix I.

Note: The references and resources for this and all chapters have been compiled at the back of the book.
Chapter Review

**KEY TERMS by Topic**

**Anatomy and Physiology**
- conchae

**Mechanism of Respiration**
- diaphragm, intercostal muscles

**Assessing the Respiratory System**
- eupnea, hypoventilation, hyperventilation, dyspnea, orthopnea, apnea, Cheyne–Stokes respirations (CSR), circumoral cyanosis, crackles, rhonchi, stridor

**Epistaxis**
- epistaxis

**Upper Respiratory Infections**
- nasopharyngitis, rhinitis, coryza, tonsillitis, tonsillectomy, epiglottitis, dysphonia, dysphagia

**Congenital Respiratory Disorders**
- tracheoesophageal fistula (TEF), esophageal atresia (EA)

**Lower Respiratory Disorders**
- bronchiolitis, respiratory syncytial virus (RSV), croup, pneumonia, tuberculosis (TB), Mantoux test

**Additional Respiratory Disorders**
- neonatal respiratory distress syndrome (RDS), surfactant, atelectasis, bronchopulmonary dysplasia (BPD), asthma, pneumothorax, hemothorax

**KEY Points**

- Respiratory disorders are potentially life threatening and should not be taken lightly.
- Upper respiratory infections can spread to the lower organs.
- Viral infections should be treated with supportive care. Antibiotics should only be used for bacterial infections.
- Frequent swallowing after a tonsillectomy is the first sign of bleeding.
- Many respiratory disorders begin in early childhood and become chronic lifelong disorders.
- Pediatric clients can be taught to manage their chronic respiratory disorder.
- Management of asthma is focused on identifying and avoiding triggers, family education, medication administration, and follow-up care.
- Cystic fibrosis, an autosomal recessive trait, affects the child’s respiratory and gastrointestinal systems. The life expectancy is 30 years.
- Health promotion activities, including immunizations, removing pollutants from the environment, and infection control measures, can help prevent or control pediatric respiratory disorders.

**Animations**
- Foreign body airway obstruction
- Pulse oximeter
- Lung sounds
- Pneumonia
- Asthma
- Cystic fibrosis
- Epiglottitis

**FOR FURTHER Study**

Newborn resuscitation was discussed in Chapter 9.
Review Chapter 11 for developmental levels of children as they relate to nursing care.
See Chapter 12 for information about communicating with children.
Review Chapter 14 for effects of hospitalization by age and development.
For additional information on otitis media, see Chapter 16.
Gastrointestinal disorders are discussed in Chapter 22.
Infectious diseases such as pertussis (whooping cough) are discussed in Chapter 26.

**EXPLORE MediaLink**

Additional interactive resources for this chapter can be found on the Companion Website at www.prenhall.com/towle. Click on Chapter 18 and “Begin” to select the activities for this chapter.
For chapter-related NCLEX-style questions and an audio glossary, access the accompanying CD-ROM in this book.
Caring for a Client with Respiratory Infection
NCLEX-PN® Focus Area: Physiologic Integrity

Case Study: Joseph, a 9-month-old infant, is admitted to the pediatric unit with a diagnosis of respiratory infection. He has a history of three episodes of bronchitis in the past 6 months. He has gained 1/2 lb since his last hospitalization 2 months ago. His mother states, “I don’t know why he gets infections so easily.”

Nursing Diagnosis: Ineffective Airway Clearance

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<th>COLLECT DATA</th>
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</table>

Would you report this? Yes/No
If yes, to: ____________________________

How would you document this?______________________
____________________________________________________________
____________________________________________________________
____________________________________________________________
____________________________________________________________
____________________________________________________________

Data Collected
(use those that apply)
- Lung sounds wheezy
- Crying
- T 103.2, P 148, R 40
- Mother reports not knowing cause of infection
- Nonproductive cough
- No eye contact
- Weight gain
- Labored breathing
- Withdrawn
- Circumoral cyanosis
- Jaundice
- Sleepy

Nursing Interventions
(use those that apply; list in priority order)
- Note mother-infant interaction.
- Offer 1,000 mL clear liquids.
- Offer milk four times a day.
- Administer IV medication as ordered.
- Provide mist tent.
- Administer expectorant cough syrup.
- Provide droplet precautions.
- Provide contact precautions.
- Suction airway every 2 hours.

Compare your documentation to the sample provided in Appendix I.
1. An infant is in isolation for RSV. Which action by the nurse is most appropriate?
   1. Wear sterile gloves when caring for the infant.
   2. Double-bag soiled diapers.
   3. Have the baby wear a mask when in the playroom.
   4. Wear gown, mask, and gloves when feeding the infant.

2. A 6-month-old child is receiving oxygen in a mist tent. Which of the following is an important consideration in caring for this young child?
   1. Change bedding and clothing frequently.
   2. Remove child from the tent if restlessness occurs.
   3. Keep all objects outside the tent to prevent fire hazard.
   4. Open the mist tent every hour to decrease the temperature inside the tent.

3. The day an 8-year-old is discharged after an acute asthma attack, her mother asks the nurse to recommend a pet for her child. The most appropriate pet for the child would be a:
   1. cat.
   2. fish.
   3. dog.
   4. parakeet.

4. A 7-year-old with cystic fibrosis is admitted with bronchial pneumonia. The physician orders postural drainage, primarily to:
   1. clear the lungs of mucus.
   2. dilate the bronchi.
   3. provide more room for lung expansion.
   4. remove bacteria from the lungs.

5. A toddler is being admitted to the pediatric unit with a diagnosis of epiglottitis. In planning care for this child, the nurse should:
   1. notify the respiratory therapist of the admission.
   2. have tracheostomy equipment available.
   3. make the child NPO.
   4. have antibiotics prepared when the child is admitted.

6. A 5-year-old had a tonsillectomy yesterday. The nurse would be least concerned by:
   1. halitosis.
   2. increased pulse.
   3. restlessness.
   4. crying.

7. The second day after a tonsillectomy, a child is receiving a full liquid diet. Which should be avoided?
   1. popsicles
   2. jello
   3. vanilla pudding
   4. orange juice

8. A 10-year-old is admitted with an acute episode of asthma after playing soccer. All of the following interventions are needed prior to discharge. Place them in priority order.
   1. Teach how to use prescribed inhalers.
   2. Schedule follow-up appointment with primary care provider.
   3. Stay with child to keep him calm.
   4. Ask parents to identify triggers in the home environment.
   5. Teach child the importance of warming up before playing soccer.

9. The nurse is teaching a mother how to administer 1 tsp of cough medicine to her 6-month-old child. The nurse should recommend which of the following?
   1. household measuring spoon
   2. silverware teaspoon
   3. plastic medicine cup
   4. plastic syringe (without needle) calibrated in milliliters

10. The doctor has ordered Albuterol liquid 0.2 mg/kg for a 43-lb child. Albuterol is supplied in 2 mg/5 mL. How many milliliters will be administered to this child?

Answers for Review Questions, as well as discussion of Care Plan and Critical Thinking Care Map questions, appear in Appendix I.