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Patient education: Bronchiolitis (and RSV) in infants and children (Beyond the Basics)

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INTRODUCTION

Bronchiolitis is a lower respiratory tract infection that occurs in children younger than two years old. It is usually caused by a virus. The virus causes inflammation of the small airways (bronchioles) ([figure 1](#)). The inflammation partially or completely blocks the airways, which causes wheezing (a whistling sound heard as the child breathes out). This means that less oxygen enters the lungs, potentially causing a decrease in the blood level of oxygen.

Bronchiolitis is a common cause of illness and is the leading cause of hospitalization in infants and young children. Treatment includes measures to ensure that the child consumes adequate fluids and is able to breathe without significant difficulty. Most children begin to improve two to five days after first developing breathing difficulties, but wheezing can last for a week or longer. Bronchiolitis can cause serious illness in some children. Infants who are very young, born early, have lung or heart disease, or have difficulty fighting infections or handling oral secretions are more likely to have severe disease with bronchiolitis. It is important to be aware of the signs and symptoms that require evaluation and treatment.

This topic review discusses the causes, signs and symptoms, and usual treatment of bronchiolitis in infants and children. More detailed information about bronchiolitis is available by subscription. (See "[Bronchiolitis in infants and children: Clinical features and diagnosis](#)" and "[Bronchiolitis in infants and children: Treatment, outcome, and prevention](#)".)

BRONCHIOLITIS CAUSE

Bronchiolitis is typically caused by a virus. Respiratory syncytial virus (RSV) is the most common cause. In the northern hemisphere, RSV outbreaks usually occur from November to April with a peak in January or February. In the southern hemisphere, wintertime epidemics occur from May to September, with a peak in May, June, or July. In tropical and semitropical climates, the seasonal outbreaks usually are associated with the rainy season.

Virtually everyone will have been infected with RSV by the age of three years. It is common to be infected more than once, even in the same RSV season; however, subsequent infections are usually milder. (See "[Respiratory syncytial virus infection: Clinical features and diagnosis](#)".)

Children who are older than two years typically do not develop bronchiolitis but can be infected with RSV. RSV infection is common in children older than two years. It usually causes symptoms similar to those of the common cold or mild wheezing, and at times, the illness is significant enough to require evaluation by a health care provider. (See "[Patient education: The common cold in children \(Beyond the Basics\)](#)".)

BRONCHIOLITIS SYMPTOMS

Bronchiolitis usually develops following one to three days of common cold symptoms, including the following:

- Nasal congestion and discharge.
- A mild cough.
- Fever (temperature higher than 100.4°F or 38°C). The table describes how to take a child's temperature ([table 1](#)). (See "[Patient education: Fever in children \(Beyond the Basics\)](#)".)
- Decreased appetite.

As the infection progresses and the lower airways are affected, other symptoms may develop, including the following:

- Breathing rapidly (60 to 80 times per minute) or with mild to severe difficulty
- Wheezing, which usually lasts approximately seven days
- Persistent coughing, which may last for 14 or more days (persistent cough also may be caused by other serious illnesses that require medical attention)
- Difficulty feeding related to nasal congestion and rapid breathing, which can result in dehydration

Apnea (a pause in breathing for more than 15 or 20 seconds) can be the first sign of bronchiolitis in an infant. This occurs more commonly in infants born prematurely and infants who are younger than two months.

Signs of severe bronchiolitis include retractions (sucking in of the skin around the ribs and the base of the throat) ([figure 2](#)), nasal flaring (when the nostrils enlarge during breathing), and grunting. The effort required to breathe faster and harder is tiring. In severe cases, a child may not be able to continue to breathe on his or her own.

Low oxygen levels (called hypoxia) and blue-tinged skin (called cyanosis) can develop as the illness progresses. Cyanosis may first be noticed in the finger and toenails; ear lobes; tip of the nose, lips, or tongue; and inside of the cheek. Any of these signs or symptoms requires immediate medical evaluation.

A child who is grunting, appears to be tiring, stops breathing, or has cyanosis needs urgent medical attention. (See ['Emergency care'](#) below.)

Contagiousness — The most common causes of bronchiolitis, respiratory syncytial virus (RSV) and rhinovirus (RV), are transmitted through droplets that contain viral particles; these are exhaled into the air by breathing, coughing, or sneezing. These droplets can be carried on the hands, where they survive and can spread infection for several hours. If someone with RSV or RV on his or her hands touches a child's eye, nose, or mouth, the virus can infect the child. Adults infected with RSV or RV can easily transmit the virus to the child or other adults.

Individuals should wash their hands or use an alcohol-based hand sanitizer before handling an infant.

A child with bronchiolitis should be kept away from other infants and individuals susceptible to severe respiratory infection (eg, those with chronic heart or lung diseases, those with a weakened immune system) until the wheezing and fever are gone.

BRONCHIOLITIS DIAGNOSIS

The diagnosis of bronchiolitis is based upon a history and physical examination. Blood tests and x-rays are not usually necessary. Tests that can identify the virus or viruses in children with bronchiolitis are available if it is important to determine the underlying cause.

Determining severity — The health care provider must determine if the child's illness is severe or if there is a risk of complications. In these cases, hospitalization is generally recommended to closely monitor the child and provide intravenous fluids or supplemental oxygen. (See '[Hospital care](#)' below.)

BRONCHIOLITIS TREATMENT

Emergency care — Parents should seek medical attention if the child seems to be worsening. A child who is grunting, appears to be tiring, stops breathing, or has blue-colored skin (cyanosis) needs urgent medical attention. Emergency medical services should be called, available in most areas of the United States by dialing 911. (See '[When to seek help](#)' below.)

Severe bronchiolitis should be evaluated in an emergency department or clinic capable of handling urgent respiratory illnesses. This is a life-threatening illness, and treatment should not be delayed for any reason.

Symptomatic care — There is no cure for bronchiolitis, so treatment is aimed at the symptoms (eg, difficulty breathing, fever). Treatment at home usually includes making sure the child drinks enough and [saline](#) nose drops (with bulb suctioning for infants).

Monitoring — Monitoring at home involves observing the child periodically for signs or symptoms of worsening. Specifically, this includes monitoring for an increased rate of breathing, worsening chest retractions, nasal flaring, cyanosis, a decreased ability to feed, or decreased urine output. Parents should contact their child's health care provider to determine if and when an office visit is needed or if there are any other questions or concerns. (See '[When to seek help](#)' below.)

Fever control — Parents may give [acetaminophen](#) (sample brand names: Tempra, Tylenol) to treat fever if the child is uncomfortable. [Ibuprofen](#) (sample brand names: Advil, Motrin) can be given to children greater than six months of age. [Aspirin](#) should not be given to any child under age 18 years. Parents should speak with their child's health care provider about when and how to treat fever.

Nose drops or spray — [Saline](#) nose drops or spray might help with congestion and runny nose. For infants, parents can try saline nose drops to thin the mucus, followed by bulb suction to temporarily remove nasal secretions ([table 2](#)). An older child may try using a saline nose spray before blowing the nose.

Encourage fluids — Parents should encourage their child to drink an adequate amount of fluids; it is not necessary to drink extra fluids. Children often have a reduced appetite and may eat less than usual. If an infant or child completely refuses to eat or drink for a prolonged period, urinates less often, or has vomiting episodes with cough, the parent should contact their child's health care provider.

Other therapies — Other therapies, such as antibiotics, cough medicines, decongestants, and sedatives, are not recommended. Cough medicines and decongestants have not been proven to be helpful, and sedatives can mask symptoms of low blood oxygen and difficulty breathing.

Coughing is one way for the body to clear the lungs and normally does not need to be treated. As the lungs heal, the coughing caused by the virus resolves. Smoking in the home or around the child should be avoided because it can worsen a child's cough.

Antibiotics are not effective in treating bronchiolitis because it is usually caused by a virus. However, antibiotics may be necessary if the bronchiolitis is complicated by a bacterial infection, like an ear infection (common) or bacterial pneumonia (very uncommon).

Sometimes, keeping the child's head elevated can reduce the work of breathing. A child may be propped up in bed with an extra pillow. Pillows should not be used with infants younger than 12 months of age.

Hospital care — Approximately 3 percent of children with bronchiolitis will require monitoring and treatment in a hospital. Most children receive monitoring of vital signs and supportive care, including supplemental oxygen and intravenous fluids, if necessary. Other treatments are individualized, based upon the child's needs and response to therapy.

Isolation precautions — Because the viruses that cause bronchiolitis are contagious, precautions must be taken to prevent spreading the virus to other patients and/or children. Parents may visit (and stay with the child), but siblings and friends should not. Toys, books, games, and other activities can be brought to the child's room. All visitors (nurses, doctors, parents) must wash their hands before and after leaving the room.

Feeding — Most infants and children can continue to eat, breastfeed, or drink normally while in the hospital. If the child is unable or unwilling to eat or drink adequately, the respiratory rate is too fast, or the child is having significant difficulty breathing or stops breathing, fluids and nutrition may be given into a vein (intravenously).

Treatments — Supplemental oxygen may be needed for children who are unable to get enough oxygen from room air; this is usually given by placing a tube (called a nasal cannula) under a child's nose or by placing a face mask over the nose and mouth. For infants, an oxygen head box (a clear plastic box) may be used. The child is tested periodically to determine the blood oxygen level when oxygen is turned off. The goal is to slowly reduce and then discontinue supplemental oxygen when the child is ready.

If a child is severely ill and unable to breathe adequately on his or her own, or if the child stops breathing, a breathing tube (endotracheal tube) may be inserted into the mouth and throat. This is connected to a machine (called a ventilator) that breathes for the child at a regular rate. The use of an endotracheal tube and ventilator is a temporary measure that is discontinued when the child improves.

Discharge to home — Most children who require hospitalization are well enough to return home within three to four days. Children who require a machine to help them breathe usually need to stay in the hospital for four to eight days or longer before they are ready to go home.

Recovery — Most children with bronchiolitis who are otherwise healthy begin to improve within two to five days. However, wheezing persists in some infants for a week or longer, and it may take as long as four weeks for the child to return to his or her "normal" self. Recovery may take longer in younger infants and those with underlying medical problems (eg, prematurity, other lung diseases). The child should be kept out of daycare and/or school until the fever and runny nose have resolved (ie, the time during which they are most contagious).

BRONCHIOLITIS PREVENTION

There are several ways to prevent severe bronchiolitis:

- Avoid smoking in the child's home because this increases the risk of respiratory illness.
- Wash hands frequently with soap and water, especially before touching an infant. Hands should ideally be wet with water and plain or antimicrobial soap, and rubbed together for 15 to 30 seconds. Hands should be rinsed thoroughly and dried with a single-use towel.

- Use alcohol-based hand rubs. These are a good alternative for disinfecting hands if a sink is not available. Hand rubs should be spread over the entire surface of hands, fingers, and wrists until dry. Hand rubs are available as a liquid or wipe in small, portable sizes that are easy to carry in a pocket or handbag. When a sink is available, visibly soiled hands should be washed with soap and water.
- Avoid other adults and children with upper respiratory infection. It may be difficult or impossible to completely avoid persons who are ill, although parents can try to limit direct contact. In addition, infants or children who are sick should not be sent to day care or school because this can potentially cause others to become ill.
- A yearly vaccination for influenza virus is recommended for everyone older than six months, especially for household contacts of children younger than five years, and out-of-home caregivers of children younger than five years. (See ["Patient education: Influenza symptoms and treatment \(Beyond the Basics\)".](#))
- Infants who are younger than 24 months with specific types of chronic lung disease and infants who are younger than 12 months who were born before 29 weeks, have specific types of heart disease, or have other risk factors for severe respiratory syncytial virus (RSV) infection may be given a special medication ([palivizumab](#)) to prevent severe RSV infection requiring hospitalization. Palivizumab (brand name: Synagis) is a monoclonal antibody that protects the lungs from severe infection from RSV. It is given as an injection into the muscle once per month for five months starting before RSV season. There is a low risk of serious side effects with palivizumab. More detailed information about this is available separately. (See ["Respiratory syncytial virus infection: Prevention in infants and children".](#))

BRONCHIOLITIS AND ASTHMA

There is interest in the relationship between bronchiolitis in early childhood and later development of asthma. Infants hospitalized with bronchiolitis caused by respiratory syncytial virus and rhinovirus have an increased risk of recurrent wheezing during the first 10 years of life. Some studies have also noted an increased risk of asthma following an episode of bronchiolitis, although it is unclear if the risk of asthma is increased due to bronchiolitis or other risk factors (eg, genetic predisposition to asthma, environmental irritants such as cigarette smoke).

The first time a child develops wheezing, it can be difficult to know if it is caused by bronchiolitis or asthma. Most cases of first time wheezing are caused by a virus. A history of recurrent

wheezing episodes and a family or personal history of asthma, nasal allergies, or eczema help to support a diagnosis of asthma. Viruses frequently trigger asthma attacks in children with asthma.

After developing bronchiolitis, some infants will have recurrent episodes of wheezing during childhood. These wheezing episodes are triggered by viruses and may respond to the same treatments used in children with asthma.

WHEN TO SEEK HELP

If, at any time, a child develops features of worsening or severe bronchiolitis, the parent should seek **immediate** medical attention. This includes:

- Difficulty breathing or appearing overwhelmed by the work of breathing
- Pale or blue-tinged (cyanotic) skin
- Severe coughing spells
- Severe sucking in of the skin around the ribs and base of the throat (retractions) with breathing ([figure 2](#))
- If the child stops breathing

Parents should not attempt to drive their child to the hospital if the child is severely agitated, cyanotic, struggling to breathe, stops breathing, or is excessively drowsy (lethargic); emergency medical services should be called, available in most areas of the United States by dialing 911.

A parent should call the child's doctor or nurse if:

- The child has a fever (temperature higher than 100.4°F or 38°C), particularly for infants who are younger than 90 days ([table 1](#))
- The child has signs or symptoms of bronchiolitis
- The child has difficulty feeding or has fewer wet diapers than usual
- There are questions or concerns about the child's condition

WHERE TO GET MORE INFORMATION

Your child's health care provider is the best source of information for questions and concerns related to your child's medical problem.

This article will be updated as needed on our website (www.uptodate.com/patients). Related topics for patients, as well as selected articles written for health care professionals, are also

available. Some of the most relevant are listed below.

Patient level information — UpToDate offers two types of patient education materials.

The Basics — The Basics patient education pieces answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials.

[Patient education: Bronchiolitis \(and RSV\) \(The Basics\)](#)

[Patient education: Cough in children \(The Basics\)](#)

[Patient education: Pneumonia in children \(The Basics\)](#)

[Patient education: Transient tachypnea of the newborn \(The Basics\)](#)

[Patient education: Mycoplasma pneumonia in children \(The Basics\)](#)

Beyond the Basics — Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are best for patients who want in-depth information and are comfortable with some medical jargon.

[Patient education: The common cold in children \(Beyond the Basics\)](#)

[Patient education: Fever in children \(Beyond the Basics\)](#)

[Patient education: Influenza symptoms and treatment \(Beyond the Basics\)](#)

Professional level information — Professional level articles are designed to keep doctors and other health professionals up-to-date on the latest medical findings. These articles are thorough, long, and complex, and they contain multiple references to the research on which they are based. Professional level articles are best for people who are comfortable with a lot of medical terminology and who want to read the same materials their doctors are reading.

[Approach to chronic cough in children](#)

[Bronchiolitis in infants and children: Clinical features and diagnosis](#)

[Bronchiolitis in infants and children: Treatment, outcome, and prevention](#)

[Causes of chronic cough in children](#)

[Respiratory syncytial virus infection: Clinical features and diagnosis](#)

[Respiratory syncytial virus infection: Treatment](#)

The following organizations also provide reliable health information.

- National Library of Medicine

<http://www.nlm.nih.gov/medlineplus/healthtopics.html>

- American Academy of Pediatrics

(www.healthychildren.org/English/health-issues)

[1-4]

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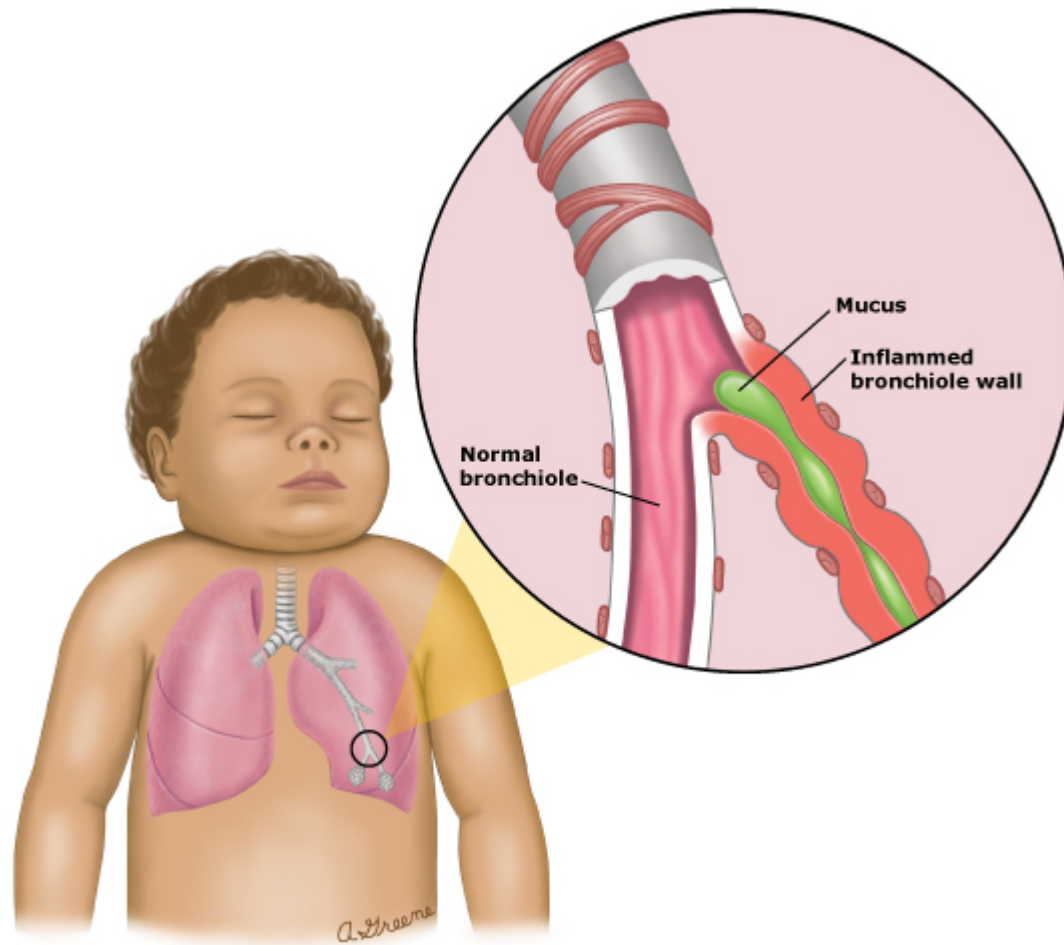
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3. Bronchiolitis Guideline Team, Cincinnati Children's Hospital Medical Center. Bronchiolitis pediatric evidence-based care guidelines, 2010. www.cincinnatichildrens.org/service/j/anderson-center/evidence-based-care/recommendations/topic/ (Accessed on February 24, 2015).
4. [Gern JE. Viral respiratory infection and the link to asthma. Pediatr Infect Dis J 2004; 23:S78.](#)

Topic 1213 Version 18.0

GRAPHICS

Bronchiolitis



Bronchiolitis is an infection that affects the small tubes that carry air in and out of the lungs. When infected, these tubes (called bronchioles) get swollen and inflamed. That makes it harder to breathe.

Graphic 52758 Version 4.0

Frequently asked questions about fever in children

<p>What is a fever?</p> <p>In general, a fever means a temperature above 100.4°F (38°C). You might get slightly different numbers depending on how you take your child's temperature (oral [mouth], armpit, ear, forehead, or rectal).</p>
<p>How do I measure my child's temperature?</p> <p>The best method to measure temperature depends upon several factors. In all cases, rectal temperatures are the most accurate. However, measurements of temperature in the mouth (for children older than 4 or 5 years) is accurate when done properly. Temperatures measured in the armpit, in the ear, and on the forehead are the least accurate but may be useful as a first test.</p> <p>Glass thermometers are not recommended, due to the potential risks of exposure to mercury, which is toxic. If another (digital) thermometer is not available, be sure to carefully "shake down" the glass thermometer before use. Instructions for disposing of glass thermometers are available online (www.epa.gov/mercury/spills/index.htm).</p>
<p>Measuring a rectal temperature</p> <p>The child or infant should lie down on his or her stomach across an adult's lap.</p> <p>Apply a small amount of petroleum jelly (sample brand name Vaseline) to the end of the thermometer.</p> <p>Gently insert the thermometer into the child's anus. The silver tip of the thermometer should be 1/4 to 1/2 inch inside the rectum.</p> <p>Hold the thermometer in place. A glass thermometer requires 2 minutes, while most digital thermometers need less than 1 minute.</p>
<p>Measuring an oral temperature</p> <p>Clean the thermometer with cool water and soap. Rinse with water.</p> <p>Do not measure the temperature in a child's mouth if he or she has consumed a hot or cold food or drink in the last 30 minutes.</p> <p>Place the tip of the thermometer under the child's tongue toward the back. Ask the child to hold the thermometer with his or her lips.</p> <p>Keep the lips sealed around the thermometer. A glass thermometer requires approximately 3 minutes, while most digital thermometers need less than 1 minute.</p>
<p>Measuring an armpit temperature</p> <p>Place the tip of the thermometer in the child's dry armpit.</p> <p>Hold the thermometer in place by holding the child's elbow against the chest for 4 to 5 minutes.</p>
<p>Measuring an ear temperature</p> <p>To measure temperature in the ear, the parent must pull the child's outer ear backward before inserting the thermometer.</p> <p>The ear probe is held in the child's ear for approximately 2 seconds.</p> <p>If the child has been outside on a cold day, wait 15 minutes before measuring the ear temperature.</p> <p>Ear tubes and ear infections do not affect the accuracy of an ear temperature.</p>

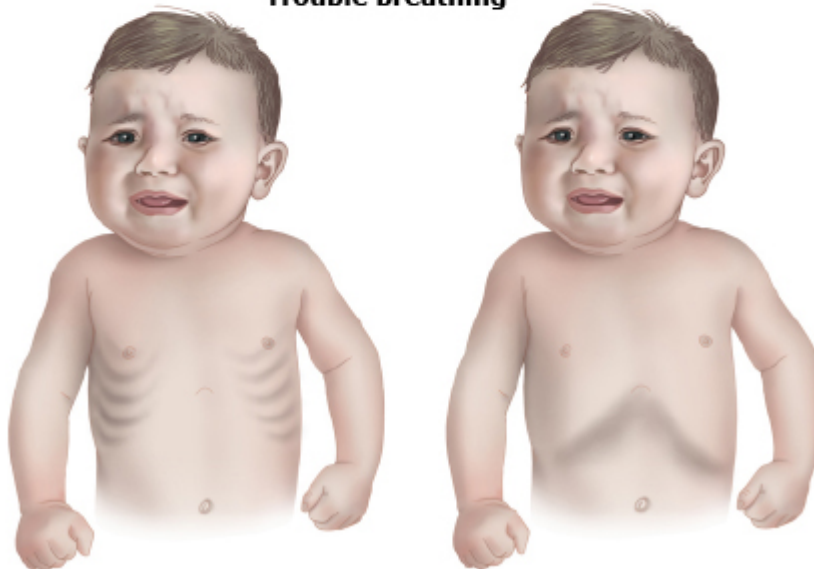
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Retractions

Normal



Trouble breathing



When a child is having trouble breathing, the skin and muscles between the child's ribs or below the child's ribcage look like they are caving in. The medical term for this is "retractions."

Graphic 59786 Version 3.0

Instructions on using a bulb syringe^[1]

Nasal congestion from a cold can make it difficult for a young infant to breathe while eating. Mucus can be removed from the infant's nose with a bulb syringe.

Before using a bulb syringe, saline nose drops can be used to thin the mucus. Saline nose drops can be purchased in most pharmacies or can be made at home by adding 1/4 teaspoon salt to 8 ounces (1 cup) of warm (not hot) water. Stir to dissolve the salt, and store the solution for up to one week in a clean container with a cover.

Place the infant on his or her back. Using a clean nose dropper, place one to two drops of saline solution in each nostril. Wait a short period.

Squeeze and hold the bulb syringe to remove the air. Gently insert the tip of the bulb syringe into one nostril, and release the bulb. The suction will draw mucus out of the nostril into the bulb.

Squeeze the mucus out of the bulb into a tissue.

Repeat suction process several times in each nostril until most mucus is removed.

Wash the dropper and bulb syringe in warm, soapy water. Rinse well, and squeeze to remove any water.

The bulb syringe can be used two to three times per day as needed to remove mucus. It is best to do this before feeding; the saline and suction process can cause vomiting after feeding.

Reference:

1. *Suctioning the Nose with a Bulb Syringe*. Cincinnati Children's Hospital Medical Center. Available at: www.cincinnatichildrens.org/health/info/newborn/home/suction.htm.

Graphic 67982 Version 3.0

Contributor Disclosures

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