

# Wheezing/Asthma

Asthma is a chronic (long-term) lung disease that inflames and narrows the airways. Asthma causes recurring periods of wheezing (a whistling sound when you breathe), chest tightness, shortness of breath, and coughing. The coughing often occurs at night or early in the morning.

## Overview

Asthma affects the smaller end airways in the lungs called bronchioles. People who have asthma tend to react strongly to certain substances that are breathed in, causing inflammation in these airways.

When the airways react, the muscles around them tighten. This causes the airways to narrow, and less air flows to your lungs. In addition, the inside of the airways develop swelling and excessive mucus, making the airways even narrower.

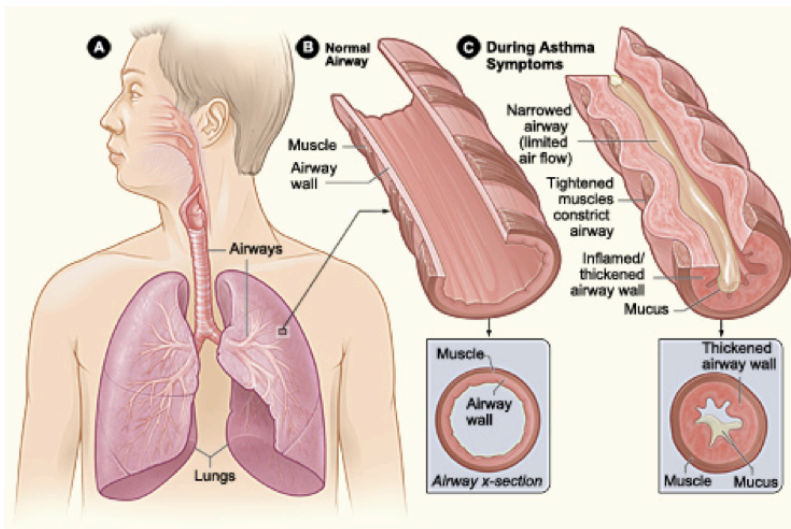


Figure A shows the location of the lungs and airways in the body. Figure B shows a cross-section of a normal airway. Figure C shows a cross-section of an airway during asthma symptoms.

Sometimes symptoms are mild and go away on their own or after minimal treatment with an asthma medicine. At other times, symptoms continue to get worse. It's important to treat symptoms when you first notice them. This will help prevent the symptoms from worsening and causing a severe asthma attack. Severe asthma attacks may require emergency care, and they can cause death.

## What Causes Asthma?

The exact cause of asthma isn't known. Researchers think a combination of factors (family genes and certain environmental exposures) interact to cause asthma to develop, most often early in life. These factors include:

- An inherited tendency to develop allergies, called atopy
- Parents who have asthma
- Certain respiratory infections during childhood
- Contact with some airborne allergens or exposure to some viral infections in infancy or in early childhood when the immune system is developing

# The "Hygiene Hypothesis"

One theory researchers have for what causes asthma is the "hygiene hypothesis." They believe that our Western lifestyle - with its emphasis on hygiene and sanitation - has resulted in changes in our living conditions and an overall decline in infections in early childhood.

Many young children no longer experience the same types of environmental exposures and infections as children did in the past. This affects the way that the immune systems in today's young children develop during very early childhood, and it may increase their risk for atopy and asthma. This is especially true for children who have close family members with one or both of these conditions.

Recent studies suggest that certain exposures in early childhood can influence the development of asthma. Children from large families, who live with pets, or attend childcare in the first year of life are actually less likely to develop asthma.

## What Are the Signs and Symptoms of Asthma?

Common asthma symptoms include:

- **Coughing.** Coughing from asthma is often worse at night or early in the morning, making it hard to sleep.
- **Wheezing.** Wheezing is a whistling or squeaky sound that occurs when you breathe.
- **Chest tightness.** This may feel like something is squeezing or sitting on your chest.
- **Shortness of breath.** Some people who have asthma say they can't catch their breath or they feel out of breath. You may feel like you can't get air out of your lungs.

Not all people who have asthma have these symptoms. Likewise, having these symptoms doesn't always mean that you have asthma. A [pulmonary \(lung\) function test](#), done along with a medical history (including type and frequency of your symptoms) and physical exam, is the best way to diagnose asthma for certain.

The types of asthma symptoms you have, how often they occur, and how severe they are may vary over time.

**It's vital to treat symptoms when you first notice them so they don't become severe.**

## What Causes Asthma Symptoms to Occur?

A number of things can bring about or worsen asthma symptoms. Triggers may include:

- Allergens found in dust, animal fur, cockroaches, mold, and pollens from trees, grasses, and flowers
- Irritants such as cigarette smoke, air pollution, chemicals or dust in the workplace, odors or fragrances, cleaning products.
- Unventilated space heaters and fireplaces
- Odors and gases released from new carpets furniture, or materials in new buildings.
- Certain medicines such as aspirin or other nonsteroidal anti-inflammatory drugs (Ibuprofen or Naprosyn)
- Sulfites in foods and drinks
- Viral upper respiratory infections such as colds
- Exercise (physical activity)
- Gastrointestinal reflux

# How Is Asthma Diagnosed?

Your pediatrician can diagnose asthma based on your child's medical history and a physical exam. He or she also will figure out what your level of asthma severity is - that is, whether it's **intermittent, mild, moderate, or severe**. Your severity level will determine what treatment you will start on.

You may need to see an asthma specialist (pulmonologist) if:

- Your child needs special tests to be sure you have asthma (pulmonary function testing)
- Your child had a life-threatening asthma attack
- Your child needs more than one kind of medicine or higher doses of medicine to control your asthma, or they have overall difficulty getting their asthma well controlled
- Your child may need allergy treatments

## Diagnostic Tests

### Pulmonary Function Test

A pulmonologist can use a test called [spirometry](#) (pulmonary function test) to check how a patient's lungs are working; it is painless and can be done starting around age 4-5. During the test your child takes a deep breath and blows out air as fast as possible. The results show whether air flow in the small and large airways is normal, as well as the total lung volume.

The doctor also may administer an inhaled medication (albuterol) and then test again after 15 minutes to see whether the results have improved. If the starting results are lower than normal and improve with the medicine, and if your child's medical history shows a pattern of asthma symptoms, the diagnosis will likely be asthma.

### Other Tests

- Allergy testing
- A test to show whether you have another disease with the same symptoms as asthma, such as reflux disease, vocal cord dysfunction, or sleep apnea.
- A chest xray to look for a foreign object or other disease.

## Diagnosing Asthma in Young Children

Most children who have asthma develop their first symptoms before 5 years of age. However, asthma in young children (aged 0 to 5 years) can be hard to diagnose. **Many young children who have wheezing episodes when they get colds or respiratory infections don't go on to have asthma after they're 6 years old. These symptoms may be due to the fact that infants have smaller airways that can narrow even further when they get a cold or respiratory infection.** The airways grow as a child grows older, so wheezing no longer occurs when the child gets a cold.

A young child who has frequent wheezing with colds or respiratory infections is more likely to have asthma if:

- One or both parents have asthma
- The child has signs of allergies, including the allergic skin condition eczema
- The child has allergic reactions to pollens or other airborne allergens, or to foods

- The child wheezes even when he or she doesn't have a cold or other infection

A lung function test along with a medical history and physical exam is the most certain way to diagnose asthma. However, this test is harder to do in children younger than 5 years. Thus, **doctors may rely on children's medical histories, signs and symptoms, and physical exams to make a diagnosis. Doctors also may use a 4 to 6 week trial of asthma medicines to see how well a child responds.**

## How Is Asthma Treated and Controlled?

***Asthma is a long-term disease that can't be cured. The goal of asthma treatment is to control the disease.***

Good asthma control will:

- Prevent chronic and troublesome symptoms such as coughing and shortness of breath
- Reduce need for quick-relief medicines (see below)
- Help maintain good lung function
- Allow normal activity levels and sleep through the night
- Prevent asthma attacks that could result in ER visits or hospital admissions.

An **asthma action plan** gives guidance on taking medicines properly, avoiding factors that worsens asthma, tracking level of asthma control, responding to worsening asthma, and seeking emergency care when needed.

## Avoid Things That Can Worsen Asthma

A number of common things (sometimes called asthma triggers) can set off or worsen your asthma symptoms. Once you know what these factors are, you can take steps to control many of them.

- **Don't smoke**, or allow anyone else to smoke in your home or car
- **Reduce exposure to dust mites.** If your child has a dust mite allergy, cover your child's mattress and pillows with special allergy-proof covers, wash his bedding every 1-2 weeks in hot water, remove stuffed toys from the bedroom, and vacuum and wet dust often. If possible, use a dehumidifier or remove carpeting in the bedroom. Bedrooms in basements should not be carpeted.
- **Reduce exposure to pet allergens.** If your child is allergic to furry pets, remove them from the home if at all possible. If not, keep the pet out of your child's bedroom, and consider a high-efficiency particulate air (HEPA) filter in the bedroom and remove carpeting.
- **Control cockroaches.** Repair any holes in walls or other entry points, set roach traps, and avoid leaving out exposed food or garbage. Avoid bug sprays as these can trigger an asthma attack.
- **Prevent mold.** Mold in homes is often caused by excessive moisture indoors. This can result from water damage from flooding, leaky roofs or pipes, or excessive humidity. Control indoor humidity by using exhaust fans in bathrooms and kitchens and adding a dehumidifier in areas of high humidity. Clean existing mold with dilute bleach. Some materials such as wallboards with mold must be replaced.

- **Reduce pollen exposure.** If your child is allergic to pollen, use an air conditioner in their bedroom, with the fresh air vent closed, and leave doors and windows closed during high pollen times. The internet can provide local pollen counts.
- **Reduce indoor irritants.** Avoid scented cleaning products, room deodorizers, mothballs, and scented candles.

The NHLBI offers many useful tips for [controlling things that make your asthma worse](#). (See page 2 of NHLBI's Asthma Action Plan.)

If your child's asthma symptoms are clearly linked to allergies, and you can't avoid exposure to those allergens, then your doctor may recommend allergy shots. These shots may lessen or prevent asthma symptoms, but they can't cure asthma.

## Medicines

Asthma is different in every child, and symptoms can change over time. Your child's asthma medication will be chosen based on the severity and frequency of symptoms and your child's age.

Sometimes it is necessary to take several medicines at the same time to control and prevent symptoms. We may start with several medicines to get symptoms under control, and then decrease the medications as needed. We may also use a peak flow meter or pulmonary function tests (PFTs) to monitor your child's progress.

Asthma medicines come in a variety of forms, including:

- Metered-dose inhalers (MDIs)
- Dry powder inhalers (DPIs)
- Liquids that can be used in nebulizers
- Pills

Asthma is treated with two types of medicines: **long-term control** and **quick-relief medicines**.

## Long-Term Control Medicines

**Inhaled Controller** medicines are used on a daily basis to control asthma and reduce the number of days or nights that your child has symptoms, these are usually inhaled steroids. Children with symptoms more than twice per week or who wake up more than twice per month should be on controller medicines.

But, like many other medicines, inhaled corticosteroids can have side effects. Most doctors agree that the benefits of taking inhaled corticosteroids and preventing asthma attacks far outweigh the risks of side effects.

One common side effect from inhaled corticosteroids is a mouth yeast infection called thrush. Using a spacer or holding chamber will help avoid thrush. Rinsing your child's mouth out with water or a tooth brushing after taking inhaled corticosteroids also helps.

***If your doctor prescribes a long-term control medicine, it should be taken every day to control asthma.***

## Controller medicines include the following:

- **corticosteroids:** Inhaled corticosteroids are the preferred medicines for long-term control of asthma. These medicines relieve the airway inflammation and swelling that makes the airways sensitive to certain substances that are breathed in. Inhaled corticosteroids are generally safe when taken as prescribed. They're very different from the illegal anabolic steroids taken by some athletes. Inhaled corticosteroids also aren't habit-forming, even if taken every day for many years.
- **Combination medications** with both inhaled steroids and inhaled long-acting beta<sub>2</sub>agonists that help open the airways like albuterol but over a 12 hour period (Symbicort, Advair, Dulera.) These are preferred to using beta-agonists on their own long term.
- **Leukotriene modifiers** (Singulair/Montelukast) These medicines are taken by mouth. They help block the chain reaction that increases inflammation in your airways.

## Quick-Relief Medicines

All people who have asthma need a quick-relief medicine to help relieve asthma symptoms that may flare up. Inhaled short-acting beta<sub>2</sub>-agonists (proventil, albuterol, xopenex) are the first choice for quick relief.

These medicines act quickly to relax tight muscles around affected airways. This allows the airways to open up so air can flow through them.

You should take your quick-relief medicine when you first notice your asthma symptoms. If you use this medicine more than 2 days a week, talk with your doctor about how well controlled your asthma is. You may need to make changes in your asthma action plan.

You shouldn't use quick-relief medicines in place of prescribed long-term control medicines. Quick-relief medicines don't reduce inflammation.

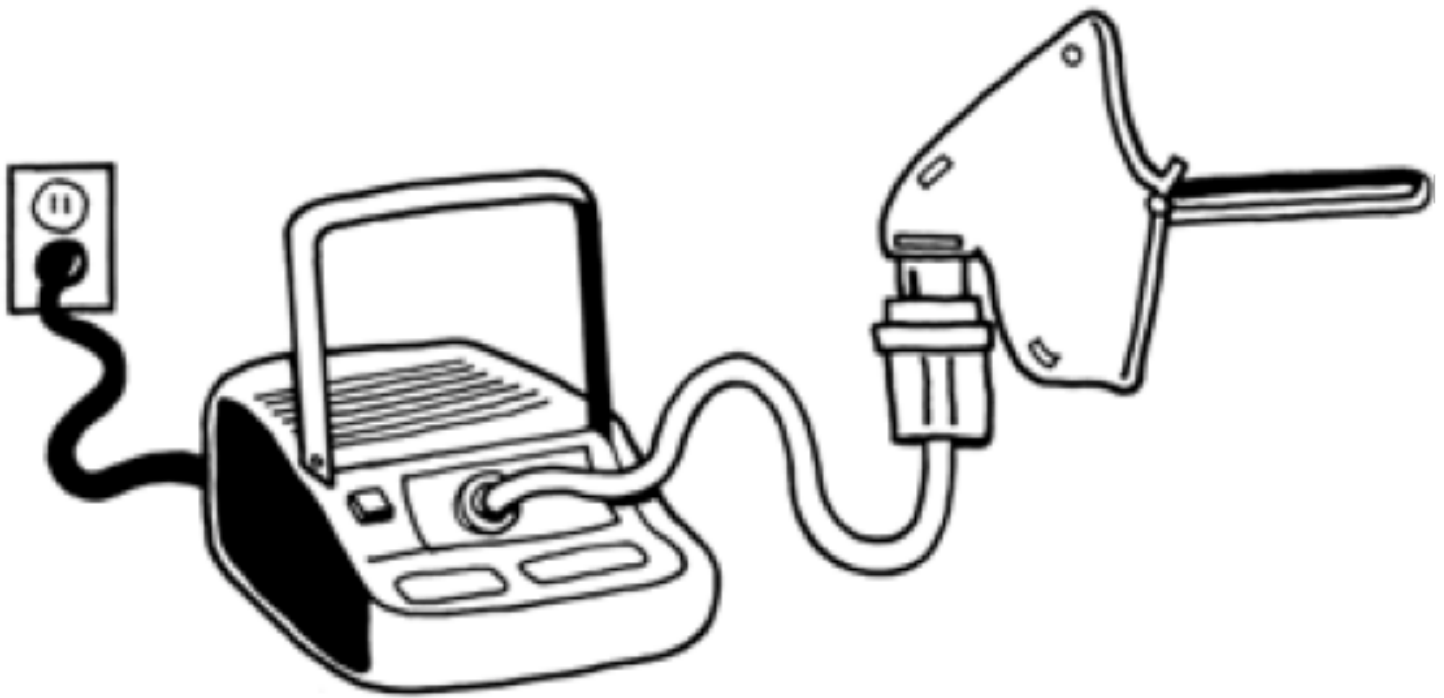
If your child's asthma is well controlled for several months, their doctor may be able to decrease the medicine. Our goal is to maintain the best control possible with the least amount of medicine necessary.

See the National Heart, Lung, and Blood Institute's (NHLBI's) [Asthma Action Plan](#) for a sample plan.

## Devices to help deliver asthma medicines

Medicines for asthma can be given to your child using a variety of devices including the following:

- **Nebulizer.** This may be used with very young children. This device uses an air compressor and cup to change liquid medicine into a mist that can be inhaled through a mouthpiece or mask. Controller medicines and quick-relief medicines can be given this way.



- **Metered-dose inhaler.** This is the most commonly used device for asthma medicines. Spacers, with an attached mask or mouthpiece, should be used to help make it easier to use MDIs.

- **Dry powder inhaler.** This device is available for some medicines. You don't need to coordinate pressing with breathing with a DPI, but its use still requires some training. It may have less taste and often has a built-in counter to help keep track of doses taken and doses left.

How to use a discus <https://www.childrenscolorado.org/doctors-and-departments/departments/breathing-institute/programs/asthma/diskus-inhaler/>

<https://www.lung.org/lung-health-diseases/lung-disease-lookup/asthma/treatment/devices/diskus-inhaler>

How to use a Flexhaler <https://www.childrenscolorado.org/doctors-and-departments/departments/breathing-institute/programs/asthma/flexhaler/>

<https://www.lung.org/lung-health-diseases/lung-disease-lookup/asthma/treatment/devices/diskus-inhaler>

How to use a metered dose inhaler (MDI) <https://www.childrenscolorado.org/doctors-and-departments/departments/breathing-institute/programs/asthma/metered-dose-inhaler/>

How to use a twisthaler <https://www.childrenscolorado.org/doctors-and-departments/departments/breathing-institute/programs/asthma/twisthaler/>

How to use a nebulizer <https://www.childrenscolorado.org/doctors-and-departments/departments/breathing-institute/programs/asthma/nebulizer/>

How to use a peak flow meter <https://www.childrenscolorado.org/doctors-and-departments/departments/breathing-institute/programs/asthma/peak-flow-meter/>

How to use a spacer with mask <https://www.youtube.com/watch?v=f-O8etEE6kQ>

<https://www.lung.org/lung-health-diseases/lung-disease-lookup/asthma/treatment/devices/metered-dose-inhaler-chamber-spacer-mask>

How to use a spacer with mouthpiece (no mask) <https://www.lung.org/lung-health-diseases/lung-disease-lookup/asthma/treatment/devices/metered-dose-inhaler-chamber-spacer>

## Record Your Symptoms

You can record your asthma symptoms in a diary to see how well your treatments are controlling your asthma.

Asthma is "well controlled" if:

- You have symptoms no more than 2 days a week and they don't wake you from sleep more than 1 or 2 nights a month.
- You can carry out all your normal activities.
- You take quick-relief medicines no more than 2 days a week.
- You have no more than one asthma attack a year that requires you to take corticosteroids by mouth.
- Your peak flow doesn't drop below 80 percent of your personal best number.



If your asthma isn't well controlled, contact your doctor. He or she may need to change your asthma action plan.

## Use a Peak Flow Meter

To help monitor asthma, your child may need to use a *peak flow meter*. This is a handheld device that measures how fast a person can blow air out of the lungs. Asthma treatment plans using peak flow meters use 3 zones - green, yellow, and red, like traffic lights - to help you decide if your child's asthma is doing well or getting worse. Peak flow rates *decrease* (the numbers on the scale go down) when your child's asthma is getting worse or out of control. Peak flow rates *increase* (the numbers on the scale go up) when the asthma treatment is working and the airways are opening up.

### When to use the peak flow meter (if your pediatrician has recommended one)

Check your child's asthma using the peak flow meter at the following times:

- Every morning before he takes any medicines.
- If your child's symptoms worsen or he has an asthma attack. Check the peak flow rate before and after using medicines for the attack. This will help you to see if the medicines are working.

Keep in mind, there are differences in peak flow rate measurements at different times of the day. These differences are minimal when asthma is well controlled. Increasing differences may be an early sign of worsening asthma. Also, children of different sizes and ages have different peak flow rate measurements.

Keep a record of your child's peak flow numbers each day. This will help you and your pediatrician see how your child's asthma is doing. Bring this record with you when you visit your pediatrician.

## Emergency Care

Most people who have asthma, including many children, can safely manage their symptoms by following the steps for worsening asthma provided in the asthma action plan. However, call your doctor for advice if:

- Your medicines don't relieve an asthma attack.
- Your peak flow is less than half of your personal best peak flow number.

Call 9-1-1 for an ambulance for your child if:

- They have trouble walking and talking because they are out of breath.
- They are breathing heavily (their abdomen or chest is pulling in and out with each breath)
- They have blue lips or fingernails.

## People Whose Asthma Symptoms Occur With Physical Activity

Physical activity is important for your child's physical and mental health. Children with asthma should be able and encouraged to participate completely in physical education, sports, and other activities in school.

Exercise can often trigger symptoms in children with asthma. It can almost always be prevented with the use of quick-relief medicines taken 10 to 15 minutes before exercise. If it occurs often, however, it may mean your child's asthma isn't under control. Proper asthma control can make a great difference in your child's ability to exercise normally.

The following medicines may help to prevent asthma symptoms due to physical activity:

- Short-acting beta<sub>2</sub>-agonists (quick-relief medicine) taken shortly before physical activity can last 2 to 3 hours and prevent exercise-related symptoms in most people who take them.
- Long-acting beta<sub>2</sub>-agonists can be protective up to 12 hours. However, with daily use, they will no longer give up to 12 hours of protection. Also, frequent use for physical activity may be a sign that asthma is poorly controlled.
- Singulair/Montelukast- a pill taken several hours before physical activity.
- Long-term control medicines. Frequent or severe symptoms due to physical activity may indicate poorly controlled asthma and the need to either start or increase long-term control medicines that reduce inflammation. This will help prevent exercise-related symptoms.

Easing into physical activity with a warmup period also may be helpful. You also may want to wear a mask or scarf over your mouth when exercising in cold weather.

If your child uses their asthma medicines as directed, they should be able to take part in any physical activity or sport.

## Watch for Signs That Your Child's Asthma Is Getting Worse

- Symptoms start to occur more often, are more severe, and/or bother your child at night and cause them to lose sleep.
- Your child is limiting normal activities and missing school or work because of asthma.
- Your child's peak flow number is low compared to your personal best or varies a lot from day to day.
- Your child's asthma medicines don't seem to work well anymore.
- Your child has to use their quick-relief inhaler more often. If you're using quick-relief medicine more than 2 days a week, your asthma isn't well controlled.
- Your child has to go to the emergency room or doctor because of an asthma attack.

If you have any of these signs, see your child's doctor. He or she may need to change your child's medicines or take other steps to control your child's asthma.

## Valuable resources for more information on asthma:

[Exercised Induced Asthma](#) - What is it? Do I have it? How do I treat it?

[American Lung Association](#)- Asthma education, find a local asthma online support community

[www.nhlbi.nih.gov](http://www.nhlbi.nih.gov) - National Institute's of Health informational web site.

[www.webmd.com/asthma/children](http://www.webmd.com/asthma/children) - links to informational articles.

[www.cdc.gov/asthma](http://www.cdc.gov/asthma) - Centers For Disease Control informational web site.

[www.lungusa.org](http://www.lungusa.org) - American Lung Association information web site.

[www.singulair.com](http://www.singulair.com) - Find out if your child's asthma is under control.

[www.noattacks.org](http://www.noattacks.org) - hosted by the EPA, Spanish translation is also available.

[www.aaaai.org](http://www.aaaai.org) - American Academy of Allergy, Asthma and Immunology Information about allergic diseases. Includes a Patient/Public Resource Center and a Just For Kids section of resources and puzzles.

[www.aanma.org](http://www.aanma.org) - Allergy & Asthma Network Mothers of Asthmatics (AANMA)

[www.breatherville.org](http://www.breatherville.org) - fun website helps children understand asthma and allergy.

[www.iggyandtheinhalers.com](http://www.iggyandtheinhalers.com) - kid friendly Web site that helps explain asthma in child-friendly terms and graphics, free downloadable information and worksheets for children.