Resource:

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This information should not be used as a substitute for the medical care and advice of your pediatrician. There may be variations in treatment that your pediatrician may recommend based on individual facts and circumstances.

What is Asthma?

Asthma is a chronic disease of the tubes that carry air to the lungs. These airways become narrow and their linings become swollen, irritated, and inflamed. In patients with asthma, the airways are always irritated and inflamed, even though symptoms are not always present. The degree and severity of airway inflammation varies over time.

Children with asthma can have symptoms start or worsen when they are exposed to many indoor substances such as

- Dust and dust mites
- Cockroaches
- Animals such as cats and dogs
- Molds
- Secondhand cigarette smoke

Children with asthma may also be sensitive to colds and other viral infections, cold air, and particles or chemicals in the air. Ongoing exposures to these substances will not only worsen asthma symptoms, but also continue to aggravate airway inflammation.

Inflammation of the airways causes them to be oversensitive and "twitchy," often called "hyperreactive." When the airways are hyperreactive, they can go into spasms, causing blockage and symptoms of wheezing, chest tightness, and shortness of breath.

Who Gets Asthma?

Asthma is a common condition in childhood. In the United States, 10% to 15% of children in grade school have or have had asthma. It can cause a lot of sickness and result in hospital stays and even death. The number of children with asthma is increasing, and the amount of illness due to asthma may also be increasing in some parts of the country. The reasons for these increases are not exactly known; however, outdoor air pollution and increased exposure to allergens are not likely causes.

Recent studies suggest that how often and how early a child is exposed to certain infections and animals can influence the development of asthma. For example, children who come from large families, live with pets, or spend a considerable amount of time in child care in the first year of life are less likely to develop asthma. This early exposure to common allergens may actually protect against the development of asthma.

Studies have also shown that a child's exposure to infections early in life can determine whether he develops allergies or asthma. Some infections seem to decrease the risk of developing asthma, whereas one infection, respiratory syncytial virus, increases the risk.

How Is Asthma Treated?

Any child who has asthma symptoms more than twice per week should be treated. One of the most important treatments of asthma is to control the underlying inflammation of the airways. This can be done with medications or by avoiding environmental factors that cause or aggravate airway inflammation.

Knowing the causes and triggers for asthma can allow families to reduce or avoid these triggers and reduce ongoing airway inflammation and hyperreactivity. This can reduce the severity and frequency of asthma symptoms and, hopefully, the need for as much asthma medication.

Allergies & Asthma

Allergies and asthma, which typically start in childhood, are by far the most common chronic diseases among children in the United States. Consider the following statistics:

- Some 50 million Americans have allergies (about 1 in 5 people in this country).
- The most common type of allergy is hay fever (allergic rhinitis); the medical cost of treating it, when direct and indirect costs are added up, now exceeds $7 billion a year.
- More than 17 million Americans have asthma, and about one-fourth of these are younger than 18 years. Asthma accounts for about 4,000 deaths a year.
- Seventy to 80% of school-aged children with asthma also have allergies, which are among the most common triggers for asthma, closely tied with viral respiratory infections.
- If one parent has allergies, there's a 25% chance that a child will also be allergic. The risk is more than doubled to 60% to 70% if both parents have allergies.

Many aspects of allergies, eczema, and asthma still are not fully understood. But advances in the diagnosis and treatment of these disorders are helping millions of sufferers.

What Are Allergies?

Many people mistakenly use the word *allergy* to refer to a disease or almost any unpleasant or adverse reaction. We often hear someone say, "I have allergies," "He's allergic to hard work," or "She's allergic to anything that's green." In reality, allergies are reactions that are usually caused by an overactive immune system. These reactions can occur in a variety of organs in the body, resulting in diseases such as asthma, hay fever, and eczema.

Your immune system is made up of a number of different cells that come from organs throughout the body—principally bone marrow, the thymus gland, and a network of lymph nodes and lymph tissue scattered throughout the body, including the spleen, gastrointestinal tract, tonsils, and the adenoid (an olive-shaped structure that is located at the top of the throat behind the nose).

Normally, it's the immune system that protects the body against disease by searching out and destroying foreign invaders, such as viruses and bacteria. In an allergic reaction, the immune system overreacts and goes into action against a normally harmless substance, such as pollen or animal dander. These allergy-provoking substances are called a*llergens*.

Who Is at Risk?

Although allergies can develop at any age, they most commonly show up during childhood or early adulthood. A search of family medical histories of a child with allergies will usually turn up a close relative who also has allergies. If one parent, brother, or sister has allergies, there is a 25% chance that a child will also have allergies. The risk is much higher if both parents are allergic. But the child will not necessarily be allergic to the same substances as the parents or always show the same type of allergic disease (eg, hay fever, asthma, eczema).

Symptoms Associated With Allergies

Eyes, Ears, Nose, Mouth

- Red, teary, or itchy eyes
- Puffiness around the eyes
- Sneezing
- Runny nose
- Itchy nose, nose rubbing

- Postnasal drip
- Nasal swelling and congestion
- Itchy ear canals
- Itching of the mouth and throat

Lungs

- Hacking dry cough or cough that produces clear mucus
- Wheezing (noisy breathing)
- Feeling of tightness in the chest
- Low exercise tolerance
- Rapid breathing; shortness of breath

Skin

- Eczema (patches of itchy, red skin rash)
- Hives (welts)

Intestines

- Cramps and intestinal discomfort
- Diarrhea
- Nausea or vomiting

Miscellaneous

- Headache
- Feelings of restlessness, irritability
- Excessive fatigue

When to Suspect an Allergy

Allergies can result in various types of conditions. Some are easy to identify by the pattern of symptoms that invariably follows exposure to a particular substance; others are more subtle and may masquerade as other conditions. Here are some common clues that should lead you to suspect your child may have an allergy.

- Patches of bumps or itchy, red skin that won't go away
- Development of *hives*—intensely itchy skin eruptions that usually last for a few hours and move from one part of the body to another
- Repeated or chronic cold-like symptoms, such as a runny nose, nasal stuffiness, sneezing, and throat clearing, that last more than a week or two, or develop at about the same time every year
- Nose rubbing, sniffling, snorting, sneezing, or drippy nose
- Itchy, runny eyes
- Itching or tingling sensations in the mouth and throat
- Coughing, wheezing, difficulty breathing, and other respiratory symptoms
- Unexplained bouts of diarrhea, abdominal cramps, and other intestinal symptoms.

Where Does Asthma Fit In?

Although allergies can trigger asthma and asthma is often associated with allergies, they are actually 2 different things. In simple terms, asthma is a chronic condition originating in the lungs, whereas allergies describe reactions that originate in the immune system and can affect many organs, including the lungs. Many different substances and circumstances can trigger an asthma attack—exercise, exposure to cold air, a viral infection, air pollution, noxious fumes, tobacco smoke, and for many asthma sufferers, a host of allergens. In fact, about 80% of children with asthma also have allergies. Although allergies are important in triggering asthma, severe asthma exacerbations are often set off by the good old common cold virus, totally unrelated to allergy

Asthma Fables and Facts

Although our knowledge of asthma is expanding year by year, many people still cling to outdated beliefs about the disease. Following are some that are often repeated:

Fable: Asthma comes and goes.

Fact*:* Asthma is often an inflammatory condition that is always in the airways, even when the person is not having trouble breathing. Exposure to an asthma trigger can worsen symptoms, but the underlying condition never goes away, although it can be controlled with medications and environmental control measures.

Fable: Asthma is an emotional disorder; it's "all in the mind."

Fact: Asthma is a lung disease; it affects the airways, not the brain. It's true that symptoms may get worse when a person is under emotional stress, but this is probably more marked in adults and less so in children. Changes in the airways in asthma occur through physiological mechanisms, not emotional ones.

Fable: People with asthma should use medications only when they have attacks; otherwise, the medications lose their effect.

Fact*:* Regularly using medications is the only way to calm the underlying airway inflammation and prevent asthma flare-ups. Used at the correct dosage, daily medications do not lose their effect or cause uncomfortable side effects. Effective antiasthma medications include inhaled beta-agonists such as albuterol to stop attacks, and inhaled steroids, long-acting beta-agonists, and leukotriene modifiers to prevent attacks from occurring at all.

Fable: Asthma is just an annoying condition, not a real disease.

Fact*:* Asthma can kill when people do not get treatment to control the underlying condition and stop severe attacks. If everybody who needed medications used the proper ones to control symptoms and prevent flare-ups, hospitalizations and deaths from asthma would be greatly reduced.

Fable: Children grow out of asthma.

Fact*:* Most people who have asthma are born with a tendency to the condition and keep it for life. It is true many children get much better with age, and their asthma appears to go away completely. However, many have it return in adulthood. Other children who still have asthma are less likely to lose their asthma as they go in to their adult years.

Fable: Asthma clears up when you move to a warm, dry climate.

Fact*:* If the proper environmental measures are taken and medications are regularly used, people with asthma can live comfortably in any climate they prefer. Very rarely do people ever have to move out of a city or other area because of their asthma.

Asthma Management at School

Children spend a significant part of their day at school. That is why it is so important that asthma symptoms are well managed while they are there. It is also important that you are aware of your child's symptoms and any problems with how your child's asthma is managed in school.

Effective Communication

Good communication is essential to asthma care and management in school. The school needs to know about your child's asthma, how severe it is, what medications your child takes, and what to do in an emergency. This communication can be helped by having your health care provider complete an asthma action plan for the school, as well as a medication permission form that includes whether your child should be allowed to carry and use her own inhaler. You should also sign a release at school and at your health care provider's office to allow the exchange of medical information between you, the school, and your health care provider.

Your child's school needs to communicate to you its policies on how your child will get access to her medications and how they deal with emergencies, field trips, and after-school activities. The school should also inform you about any changes or problems with your child's symptoms while she is at school.

Peak Flow Meter

Peak flow meters can be helpful for school staff in determining the severity of an asthma attack. If your child's health care provider has recommended a peak flow meter, determine your child's best peak flow (your health care provider should tell you how to do this). Then keep a peak flow meter at school.

School Environment

The environment at school is as important as the environment at home.

Coping With Asthma at School

Students with asthma face a number of problems related to school. Talk to your child about how well his asthma is being managed in school. Also talk to your child's teachers, school nurse, coaches, and other school personnel to get their opinions on how well your child is coping with asthma in school and to see if asthma symptoms are causing any of the following problems:

- Missing school due to asthma symptoms or doctor visits.
- Avoiding school or school activities. Work with your health care provider and school personnel to encourage your child to participate in school activities.
- Not taking medication before exercise. Your child may avoid going to the school office or nurse's office to use his inhaler before exercise. Schools that allow children to carry their inhalers with them can help avoid this problem.
- Side effects from medication. Some asthma medications may alter your child's ability to perform in school. Teachers need to know if and when your child takes asthma medication so that you can be notified if there are any problems.

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. All students should have some knowledge of asthma basics and management. Encourage your school to offer asthma awareness education as part of the health education curriculum.

Know Your Rights

Learn about the federal laws that can help you with asthma management concerns at school. These include the following:

- Section 504 of the Civil Rights Act of 1973
- Americans with Disabilities Act (ADA)
- Individuals with Disabilities Education Act (IDEA)

Asthma Medicines: Quick Relief

Short-Acting Beta2-Agonists

These are used for the rapid relief of acute asthma symptoms and to prevent exercise-induced asthma in children. They are first-line treatment of acute asthma symptoms—all patients with asthma need to have available a short-acting beta$_2$-agonist. Children may use them by MDI or nebulizer; either form is effective if used properly. The medication should be available at home, in school, and at the site of sports participation. This class of medication used to be called "rescue" medicine, but this term is no longer used because it implies that a patient must be in terrible shape to use it, which should not be the case. The new preferred term is quick relief. It turns out that almost all patients use albuterol (or a close cous-in called levalbuterol, which acts very similar to albuterol) for their quick-relief medication. Albuterol should be used for any asthma symptom, including wheeze, chest tightness, and cough, and not just reserved for asthma attacks.

Anticholinergics

Ipratropium bromide, a rapid-acting bronchodilator, may be used as an alternative to dilate the airways when inhaled beta$_2$-agonists cannot be used, or given together with an inhaled beta$_2$-agonist in severe asthma.

Systemic Corticosteroids

These are given by mouth or injection to reduce inflammation inside the airways and speed recovery when a youngster is having an asthma flare-up.

Asthma Medicines: Long-term Control

Corticosteroids

Synthetic versions of hormones produced in the adrenal glands, corticosteroids are the most powerful anti-inflammatory medications now available for treating asthma. In inhaled form, they are used exclusively for long-term control; they are not very effective for acute symptoms. Systemic corticosteroids taken by mouth as pills or liquid, or injected, are sometimes of value to get asthma quickly under control when a child is beginning long-term asthma therapy. Inhaled corticosteroids are the agents preferred and recommended as first-line treatment of chronic asthma by various asthma expert panels that publish guidelines on the proper treatment of asthma. They are available in various forms and different dosage forms, which make them convenient for patients to take, such as an aerosol in a metered-dose inhaler (MDI), a dry powder inhaler (DPI), and a liquid form that can be used in a nebulizer for small children.

Leukotriene Modifiers

These compounds act by decreasing the effects of an inflammatory chemical made by the body known as *leukotrienes*. The 2 leukotriene modifiers currently in use, montelukast and zafirlukast, are used as control medications. They have only mild to moderate beneficial effects at best but are very safe. They are taken in pill form; chewable and sprinkle forms are available for young children.

Long-Acting Beta2-Agonists

Medications in the $beta_2$-agonist class work by relaxing the muscles that wrap around the bronchi of the lungs and tend to squeeze down and narrow the airways in those who have asthma. The short-acting forms of $beta_2$-agonists, such as albuterol, are used as first-line agents for relief of asthma in all patients with asthma. Long-acting versions of $beta_2$-agonists were made by making some chemical changes in the short-acting $beta_2$-agonists. These long-acting $beta_2$-agonists are almost always prescribed together with anti-inflammatory medications for long-term control, rarely if ever by themselves. They are usually added when a conventional dose of an inhaled steroid is not adequate for control of daily symptoms.

There is evidence that rare patients experience loss of effect from their rapid-acting bronchodilator (eg, albuterol, levalbuterol) with taking long-acting bronchodilators. While this is quite uncommon, patients should be advised of this potential and instructed to notify their physician if the addition of a long-acting bronchodilator is associated with increased symptoms instead of the usual increased benefit.

Theophylline

Theophylline, usually taken by mouth as a timed-release pill, opens up the airways for an extended period. It can be used alone or together with inhaled corticosteroids. It can be particularly helpful in preventing nighttime symptoms in mild to moderate asthma. Although once used extensively, theophylline is currently infrequently prescribed for asthma, mainly because it requires careful monitoring of blood levels to avoid side effects and because other asthma medications often work as well or better.

Cromolyn Sodium and Nedocromil

These are very mildly effective anti-inflammatory medications rarely used anymore in long- term therapy of mild to moderate asthma in children.

Breathe Easy!

For many children, allergies and asthma stand to get in the way of having a fun, productive school year. But if properly controlled, asthma and allergies should not interfere with your child's activities, school, or life.

Sniffing Out the Problem

Allergic rhinitis (also called "hay fever") is caused by an aggressive immune system response to everyday substances that are normally harmless. It affects 40 million Americans, causing symptoms such as a stuffy, runny, or itchy nose; sneezing; coughing; and itchy or watery eyes.

Asthma is a breathing problem affecting nearly 5 million children in the United States. It is caused by a swelling of the airways, which leads to coughing, wheezing, shortness of breath, and chest pain or tightness.

If uncontrolled, these conditions can limit the activities a child can participate in, as well as her ability to feel well and be alert in school. They can even cause a life-threatening reaction that requires emergency treatment. Allergies and asthma are often triggered by the same allergens and irritants, including:

- Dust (contains dust mites and particles of other allergens)
- Pollen (trees, grasses, weeds)

- Fungi (including molds too small to be seen with the naked eye)
- Dander (from furry animals such as cats, dogs and other pets)
- Latex (rubber gloves, toys, balloons)
- Food (cow's milk, eggs, peanuts, tree nuts, soy, wheat, and fish)
- Cockroaches
- Smoke (wood fires, tobacco)
- Colds and sinus infections
- Odors

Limiting your child's exposure to these allergens can help reduce and may even prevent allergic reactions and asthma attacks.

Clear the Air

While you can't make your child's world 100 percent allergen-free, you can help her identify and avoid the triggers that cause her to feel sick. The following tips may help:

1. Do not smoke or let anyone else smoke in your home or car.
2. Reduce exposure to dust mites through frequent laundering of bedding, frequent vacuuming and dusting of carpets and upholstered furniture, and the use of special allergy-proof casings for mattresses and pillows.
3. Remove carpeting from bedrooms. Damp-mop floors instead of sweeping with a broom, which can send allergens flying into the air.
4. Avoid keeping animals in the house. If you must, then wash pets often and keep them out of your child's bedroom.
5. Use a high-efficiency particulate air (HEPA) filter to clean the air in your child's bedroom.
6. Control indoor humidity and mold by using exhaust fans in the bathrooms and kitchen and adding a dehumidifier in areas with naturally high humidity, such as basements.
7. Reduce pollen exposure by using an air conditioner, vent closed, in your child's bedroom. Leave windows and doors closed during high pollen season.
8. Reduce indoor irritants by using unscented cleaning products and avoiding mothballs, room deodorizers and scented candles.

For more information on allergies and asthma, visit the section on Allergy and Immunology at the AAP's Web site at www.aap.org/sections/allergy.

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