

Understanding Your Child and Asthma



An educational health series from



**National Jewish
Health**[®]

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What Is Asthma?

This booklet, prepared by National Jewish Health® in Denver, is intended to provide information to the families of children with asthma. Asthma is a chronic respiratory disease — sometimes worrisome and inconvenient — but a manageable condition. With proper understanding, good medical care and monitoring, you and your child can keep asthma well controlled. That's our treatment goal at National Jewish Health: to teach patients and families how to manage asthma, so that they can lead full and productive lives.

What Is Asthma?

If your child has asthma, he or she is not alone. In the United States, asthma affects 25 million people. It is the most common chronic disease of childhood. Today, over 6 million children have asthma.

Asthma, also known as reactive airway disease, is defined as a chronic lung condition with:

- Inflammation (swelling) of the airways
- Increased sensitivity of the airways to a variety of things that make asthma worse
- Obstruction of airflow

If your child has asthma, he or she is not alone.
In the United States, asthma affects 25 million people.

Typical changes in the airways include:

INFLAMMATION

Research has shown that inflammation of the lining of the airways is the most common feature of asthma. When they are stimulated, certain cells lining the airways release chemical substances (mediators) which lead to inflammation. This causes the airway lining to swell and narrow. The inflammation may last for weeks following an episode. Most people with asthma have some degree of inflammation all of the time. Some long-term control medications can help prevent and reduce inflammation.

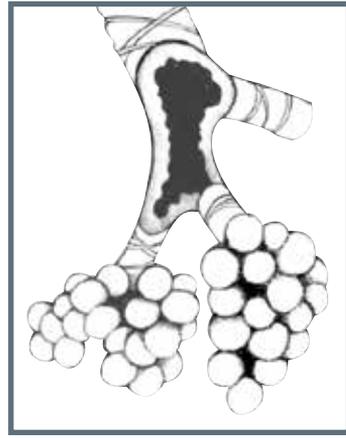
INCREASED SENSITIVITY

Another characteristic of asthma is increased sensitivity of the airways. When inflammation occurs in the airways, the airways become more sensitive. When the airways are more sensitive, your child is more likely to have asthma symptoms when exposed to things that make asthma worse. When there is less inflammation, the airways are less sensitive and your child is less likely to have asthma symptoms when exposed to things that make asthma worse.

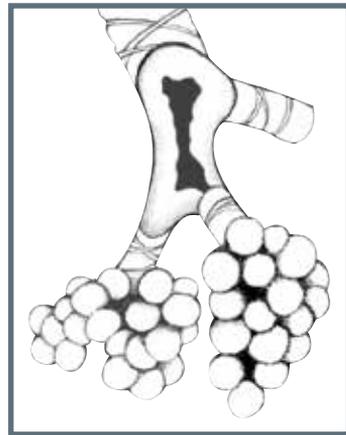
AIRWAY OBSTRUCTION

In addition to inflammation, further airway obstruction sometimes occurs with asthma. Obstruction is caused by tightening of muscles that surround the airways. This is also called bronchospasm. Bronchospasm causes further narrowing of the inflamed airways. Inhaled quick relief medications are generally very effective in reversing the bronchospasm.

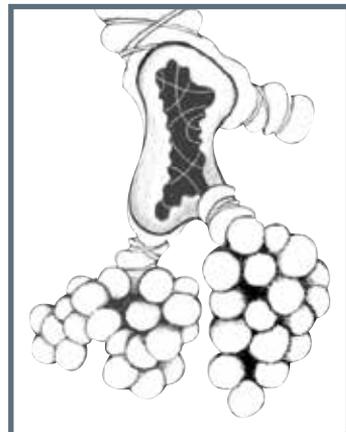
In some children with asthma, the mucus glands in the airways produce excessive, thick mucus, further obstructing the airways.



Normal Airway



Airway with inflammation



Airway with inflammation, bronchospasm, and mucus production



How Does Asthma Develop?

The cause of asthma is unknown. However, we know that children are more likely to develop asthma if they have allergies or if one or both of their parents have asthma or allergies. Asthma symptoms can develop at any age. The amount of difficulty a child has with asthma often changes with age. The airways of an infant/toddler can become obstructed more easily because of their smaller size. This age group can be prone to more noticeable symptoms. As the child's airways grow larger, these symptoms may decrease.

Most children do not experience long-term physical effects of asthma. However, chronic and poorly-controlled asthma may have a slowing effect on growth and may result in reduced lung function as an adult. As with any chronic illness there may be an emotional impact on children with asthma. Emotions such as anger, fear, inferiority, depression and guilt may be experienced.

The first step in diagnosing asthma is a good evaluation.



How Is Asthma Diagnosed?

The first step in diagnosing asthma is a good evaluation. In many cases, a diagnosis of asthma is made based upon your child's history and symptoms at the time of evaluation. With a younger child, recurrent episodes may be experienced before an actual diagnosis of asthma is made. The family history should also be considered, as this increases the child's chances of developing asthma.

Kinds of Tests

Your child's doctor may have your child do a number of tests to evaluate breathing. These may include:

- Detailed medical history and physical exam
- Spirometry (breathing tests)
- Chest and sinus X-rays
- Skin tests

Your child's doctor may order other tests based on the history and physical exam.

When to Test

Many children see their family doctor or pediatrician for asthma care. You and your child's doctor may choose to have your child seen by a specialist, such as a pediatric allergist or pediatric pulmonologist (lung specialist).

We recommend this if any one of the following occurs:

- Severe asthma episode
- Several visits to the hospital or emergency room in the last year
- Conditions that complicate asthma such as chronic sinusitis, nasal polyps or vocal cord dysfunction
- Frequent treatment with steroid tablets or syrup
- Confusion with the diagnosis
- Allergies are being considered
- Asthma seems to be getting worse
- Poor response to medicines

No matter what type of doctor you establish a partnership with to provide your child's asthma care, it is important to ask the following:

- What is the doctor's overall philosophy about asthma and treatment?
- Does the doctor or office staff take time to explain what is happening with your child, provide education and answer your questions?
- Will the doctor work with you to develop an Asthma Action Plan to treat an asthma episode?

In evaluating your child's progress, remember that asthma is a chronic condition which will change in course from time to time. If you feel that your child is not making progress with his or her current treatment, let your child's doctor know your concerns. If things are not going well, ask your child's doctor about seeing a specialist. You should not feel embarrassed about asking for another opinion.

Be willing to ask questions of your child's doctor, and don't be embarrassed to ask for another opinion.



What Are the Goals of Treatment?

Your child should be able to:

- Participate in activities, including physical activity without asthma symptoms
- Sleep through the night without asthma symptoms
- Have normal or near normal lung function
- Limit missed school or work days due to asthma
- Have few, if any, emergency room visits and hospitalizations
- Have few, if any, side effects from the medications taken
- Feel good about his or her asthma care

How Is Asthma Managed?

Asthma management includes:

- Learning more about your child's asthma
- Identifying and controlling and/or treating things that make asthma worse
- Identifying and managing other diseases that may make asthma worse
- Medication therapy
- Monitoring asthma
- An Asthma Action Plan

There is no cure for asthma, but you can learn to manage it so that your child has a normal life. With well controlled asthma, you can often change asthma from a major disrupting factor to a relatively minor annoyance.



What Things Make Asthma Worse and How Can You Control Them?

Children with asthma may have airways that are chronically inflamed. Therefore, the airways are sensitive to things that make asthma worse. These, either singly or together, cause symptoms in children with asthma. Identifying and controlling or treating things that make asthma worse, are essential to good asthma management.

Things that can make asthma worse include: irritants, allergies, exercise, infections, sinusitis, weather, emotions and gastroesophageal reflux. These vary from child to child. Controlling and/or treating multiple things that make asthma worse is often needed. Avoidance of just one is often not enough.

Irritants

Many substances can irritate the nose, throat or airways. Common irritants include smoke such as tobacco smoke, smoke from wood-burning or kerosene stoves and fireplaces, aerosol sprays, strong odors, dust and air pollution. Cigarette smoke is one of the most common irritants and is a strong cause of asthma symptoms.

Actions You Can Take

- It is important that no one smokes in the home or car with a child who has asthma.
- If you smoke, try to give up smoking. Ask the doctor about techniques that are helpful.
- Avoid smoke exposure in the child's school or day care setting.
- Always look for non-smoking sections in public areas.
- Avoid aerosol sprays, perfumes, strong cleaning products and other odor sources in the home. Clean when your child is not home when possible.

Allergies

Allergies can make asthma worse, although not all children with asthma have allergies, and not all children with allergies have asthma. In children with allergies, the immune system becomes sensitive to normally harmless substances known as allergens.

Common allergens include pollens, mold spores, animal dander from feathered or furry animals, dust mites (a major component of house dust in humid climates) and cockroaches. On contact with the allergen, the allergic person's body produces chemicals that irritate the inflamed airways and lead to symptoms. Allergy symptoms may include itchy eyes, runny nose, asthma symptoms, skin problems (eczema) and/or a rash.

Depending upon your child's medical and family history, age and environment, allergy testing may be necessary. We recommend that testing be done under the supervision of a board certified allergist. In most cases, skin testing for allergens is preferable to blood tests. Knowing if your child is allergic, and to what, can help you take appropriate measures in your home to decrease exposure to these allergens.



Many substances can irritate the nose, throat or airways. Cigarette smoke is one of the most common irritants and is a strong cause of asthma symptoms.

What Things Make Asthma Worse and How Can You Control Them?

Although many of the measures are for the entire home, the bedroom is the most important, because the bedroom is where children usually spend 1/3 to 1/2 of their time.

POLLENS

Pollens from trees, shrubs, grasses and weeds can cause allergy symptoms. Pollen may travel many miles. Therefore trees, grasses and weeds in your general area can cause allergy symptoms.

Actions You Can Take

- If possible, keep windows and outside doors shut during pollen season, especially during the daytime.
- Pollen count is highest during the midday and afternoon. Consider this when planning outdoor activities.

MOLD SPORES

Mold can grow in damp areas of your home, such as the kitchen and bathroom. If your child is allergic to mold, take measures to decrease mold growth.

Actions You Can Take

- In the bathroom, use an exhaust fan or open a window to remove moisture after showering. Wipe down surfaces after showering. Wash bathrooms with a mold-preventing or mold-killing solution.
- In the kitchen, use an exhaust fan to remove water vapor when cooking. Discard spoiled foods immediately. Empty the garbage daily.
- Keep indoor moisture low. The ideal humidity is 30-40 percent.
- Use a dehumidifier in the basement if the humidity is high.
- Air conditioning can help decrease the humidity.

ANIMAL DANDER

Animal dander (dead skin that is continually shed), urine, feces and saliva from feathered or furry animals can cause allergy symptoms. Cats, dogs, birds, rodents (hamsters, gerbils) and horses are common examples of feathered or furry animals. If you do not own a feathered or furry pet, do not get one because your child can develop allergies with repeated exposure.



Allergies can make asthma worse, although not all children with asthma have allergies, and not all children with allergies have asthma.

What Things Make Asthma Worse and How Can You Control Them?

Actions You Can Take

- Remove the animal from your home.
- If you must have a pet, keep it out of the allergic person's bedroom at all times. Keep your child's bedroom door closed and put a filter over air vents in the bedroom.
- Keep the pet away from upholstered furniture and carpet as much as possible.
- Avoid visits to friends and relatives with pets when possible. Ask your doctor about using an inhaled medication before you visit a home with a pet.
- Choose a pet without fur or feathers. Snakes and fish can be good pets.

HOUSE DUST MITES

Dust mites are insects, not visible with the naked eye, that live in bedding, carpets, stuffed furniture, old clothing and stuffed toys. They feed on human dander. Dust mites are common in humid climates.

Actions You Can Take

- Enclose the mattress and box springs in a zippered dust-proof encasing. Dust-proof encasings have a layer of material that keeps the dust mites inside the encasing.
- Wash all bedding in hot (130° F) water weekly.
- Put the pillows in zippered dust proof encasings and/or wash the pillows weekly with the bedding.
- Do not use a humidifier or evaporative (swamp) cooler. Keep the indoor humidity below 50 percent.
- Keep stuffed toys out of the bedroom or wash them weekly in hot water.

COCKROACHES

Cockroach allergies are common in inner cities and humid areas.

Actions You Can Take

- Keep food out of the bedroom.
- Keep food and garbage in closed containers.
- Discard spoiled foods immediately. Empty the garbage daily.
- Use poison baits, boric acid or traps to control cockroaches. Keep these out of children's reach.



Knowing if your child is allergic, and to what, can help you take appropriate measures in your home to decrease exposure to these allergens.

What Things Make Asthma Worse and How Can You Control Them?

- If chemical sprays are used, the home should be well ventilated and the child with asthma should stay away from home until the smell dissipates.

DEVICES FOR ALLERGY CONTROL

Air Filtration Systems

The actions described previously are first line measures to control allergy exposure. Once the first line actions are taken, air filtration systems can aid some children by decreasing exposure to allergens. The air filtration system must be carefully selected and properly maintained. Purchase such equipment only if your doctor advises that the benefits will be worth the expense.

Air Conditioning

Central or room air conditioning may reduce the number of airborne allergens by making it easier to keep windows and doors closed in hot weather. This may be helpful for children with pollen and outdoor mold allergies. Central air conditioning also has the benefit of lowering the humidity within the home. This is helpful in controlling mold and house dust mites.

Humidifiers, Vaporizers and Evaporative (Swamp) Coolers

The use of humidifiers, vaporizers and evaporative coolers is not recommended in the homes of children with asthma. All three increase the humidity level in the home creating an ideal environment for house dust mites and mold growth. If you must use any of these devices, clean them regularly.

ALLERGY SHOTS (IMMUNOTHERAPY)

If your child is allergic, actions to avoid exposure are recommended whenever possible. This can be difficult if your child is allergic to pollens, molds and dust mites. Allergy medications, including prescription nasal sprays and antihistamines, can help control symptoms.

If actions to avoid exposure and medications are not effective, your doctor might consider allergy shots. Allergy shots have been shown to reduce symptoms associated with pollens, certain molds, dust mites and animal dander.



The cause of asthma is unknown. However, we know children are more likely to develop asthma if their parents have asthma or allergies.

What Things Make Asthma Worse and How Can You Control Them?

Allergy shots should be given in the doctor's office, where staff is able to treat life threatening reactions. Allergy shots consist of a series of shots with solutions containing the allergens. The objective is to reduce your child's sensitivity, which decreases symptoms. Treatment usually begins with shots of a weak solution given once or twice a week, with the strength gradually increasing. When the strongest dosage is reached, the shots are usually given on a monthly basis.

Allergy shots do not produce immediate results. A period of six months to one year may be required before improvement is seen. A normal course of treatment for the shots is three to five years, although some children with asthma may benefit from a longer course. Not everyone responds well to this treatment.

SUBLINGUAL IMMUNOTHERAPY

Sublingual immunotherapy is an alternative treatment method to treat allergies without injections. Small doses of allergens are introduced under the tongue to reduce allergic symptoms. Currently, the U.S. Food and Drug Administration (FDA) has approved several sublingual products. These include several kinds of grass pollen, and another for short ragweed.

FOOD ALLERGIES

Food allergies rarely make asthma worse. Common food allergies include nuts, eggs, milk, seafood and peanuts. Food allergies are more common in children ages five and under. If you suspect that certain foods are causing problems, they can be removed from your child's diet. However, it is very important that diet changes be made only when there is strong evidence that these foods are causing problems. If food allergies are a concern, you should consider an evaluation by a board certified allergist. This specialist can correlate the information from a detailed diet history, allergy (skin) testing and food challenges, if needed. Because it is possible for a child to have a positive skin test to food even though it is not playing a role in causing symptoms, radical changes in diet should not be based on skin testing alone.

Exercise

Exercise can make asthma worse. Symptoms may include coughing, wheezing, shortness of breath or a feeling of chest tightness during or after exercise. Some children are not aware of these symptoms, but know that they tire easily and cannot do as much as their friends.



Research shows that children with asthma can benefit from exercise.

In most children, prolonged exercise (at least five minutes) is necessary to cause asthma symptoms. Despite this, children with asthma should be encouraged to exercise. Research shows that they can benefit greatly from exercise — physically and in terms of self-esteem and confidence. Participation in swimming, soccer, bowling, basketball, rollerblading and bike riding are only some of the activities children with asthma can enjoy. It is encouraging to know that even some Olympic athletes have asthma.

Actions You Can Take

- If exercise makes your child's asthma worse, your doctor may prescribe inhaled medication, which blocks exercise-induced asthma. When taken 10-15 minutes before exercise, this "pre-treatment" is effective in preventing asthma symptoms. Older children may be responsible for using a pre-treatment before exercise as prescribed.
- A child with exercise-induced asthma needs to learn to determine when they are having asthma symptoms during or after exercise. If coughing or wheezing begins, the child should take a short rest and follow the Asthma Action Plan.
- A child can warm-up before exercise.
- It is very important that children learn to pace themselves.

Obesity

Population studies have shown relationships between obesity and asthma. This includes the development and perhaps even asthma control and severity. It also is difficult to determine if a child's trouble breathing is a result of obesity itself and/or asthma. Therefore, a treatment plan to reduce weight in obese children is encouraged to improve asthma control.

Infections

The cold and flu season can be hard for children with asthma. An upper respiratory infection, even a common cold, can make asthma worse. Viruses are the most common causes of upper respiratory infections. Antibiotics do not affect the virus or the associated inflammation. They are not usually indicated unless a bacterial infection develops.

Actions You Can Take

- Hand washing has been shown to be the most effective way to prevent the spread of common cold viruses. This can help even with close contacts in the home, school and day care center. Alcohol based gels are also effective. Influenza and other flu-like illnesses increase and prolong asthma symptoms. Your child's doctor may recommend a yearly influenza "flu" vaccination.

Sinusitis

Sinuses are part of the upper respiratory system. Very young children have sinus passages rather than fully formed sinuses. Older children have four groups of sinus cavities located within the bone of the skull.

Many children with asthma also have chronic sinusitis. Sinusitis is an inflammation of the mucus membranes that line the sinus cavities. This can interfere with normal sinus drainage and cause increased mucus production. The drainage from the nose and sinuses is known as postnasal drip. Sinusitis can make asthma worse, especially at night. A sinus infection can also significantly worsen your child's asthma. This is one type of upper respiratory infection that may need treatment with an antibiotic.

Actions You Can Take

Sinus care is an important part of an overall management plan for many children with asthma. Treating the inflammation and decreasing the post-nasal drip can reduce cough and throat irritation, decreasing asthma symptoms.



There is no one type of weather which is good or bad for all children with asthma.

Sinus Care Often Includes

- Nasal wash — A salt water or nasal saline wash helps remove mucus and bacteria from the nose and sinuses. When done routinely, this can also decrease post-nasal drip. The nasal wash should be done before using a steroid nasal spray.
- Steroid nasal spray — This helps to decrease irritation and inflammation in the nasal and sinus passages, so mucus production and swelling decrease.
- Antibiotics — An antibiotic may be recommended if a bacterial infection is present.

Emotions

Emotions do not cause asthma, but if a child has asthma, emotions can make asthma worse. Strong emotional feelings can lead to changes in breathing patterns. When a child with asthma who has sensitive airways experiences this, it can make asthma worse. Simple reactions such as laughing or crying can cause asthma symptoms. Strong emotions such as anger, fear and feelings of stress can also cause asthma symptoms. However, it is important to express emotions and good asthma management can minimize the effect of emotions. If your child is experiencing chronic distress or has emotional problems, it may be especially important to talk with your doctor because of their additional effect on your child's asthma.

Weather

Many times, asthma symptoms occur with changes in the weather. However, there is no one type of climate which is good or bad for all children with asthma. Some children develop asthma symptoms on rainy days, while others have difficulty in hot, dry weather. Cold winter days may be difficult for children who are sensitive to cold air, but the winter is a time of welcome relief for those with pollen allergies.

SHOULD WE MOVE?

We do not generally recommend moving to a different part of the country to improve asthma. There is no “best” location for children with asthma to live. Sometimes relocation may seem to produce an improvement in asthma. Whether this is due to a different climate, avoidance of certain allergens

What Things Make Asthma Worse and How Can You Control Them?

or other factors is unknown. Most commonly, moving provides only temporary or no improvement, and it is very difficult to predict.

Our best advice is this: work with your doctor on understanding things that make asthma worse and on developing a management plan to keep your child's asthma well controlled. Then, if you still want to move, discuss this option with your doctor. Remember, there is no guarantee that your child's asthma will improve or stay improved if it does get better.

Gastroesophageal Reflux (GER)

In some children, the muscle between the esophagus and stomach may not work well. This can allow some back flow of stomach fluid into the esophagus that may cause heartburn and/or asthma symptoms. Asthma symptoms and/or heartburn, especially at night can indicate GER.

Actions You Can Take

- Elevate the head of the bed 6-8 inches, by placing blocks under the legs of the bed.
- Avoid food or liquids 2-3 hours before bedtime.
- Medications may be prescribed to help prevent GER.



Nocturnal Asthma

Worsening of asthma at night is very common. Many factors may contribute to the increased symptoms, including:

- Exposure to allergens in the bedroom, particularly dust mites
- Delayed allergic response, which may occur three to eight hours after exposure
- Chronic sinus problems and/or post-nasal drip
- Gastroesophageal reflux
- Airway cooling from a drop in body temperature at night
- Decreased effect of medications during early morning hours
- Sleep apnea — brief, repetitive cessation of breathing during sleep caused by an upper airway obstruction

Actions You Can Take

Many children experience a worsening of their asthma symptoms at night. Treatment of any underlying causes is important. Controlling allergen exposure in the bedroom, treating sinusitis and/or post-nasal drip and gastroesophageal reflux are important for managing nighttime symptoms. Your child's doctor may need to adjust medications to give extra protection during the night. Remember, your child should be able to sleep through the night without asthma symptoms.

Many children experience a worsening of their asthma symptoms at night. Treatment of any underlying causes is important.



Medication Therapy

Asthma management has advanced significantly over the past few years. Research has allowed doctors to gain a better understanding of the role of inflammation in the airways and the cellular mechanisms involved. This has resulted in new approaches to management and new medications.

Depending on the severity of your child's asthma, medications can be taken on an as-needed basis or regularly to prevent or decrease breathing difficulty. Most children with asthma benefit from preventive treatment because this reduces the inflammation in the airways and the possibility of chronic obstruction. This gives ongoing protection even if there are no apparent symptoms. For many children, a combination of medications is prescribed.

Helpful Hints for Remembering Medications

Use a daily routine for remembering your child's medications. Pick something your child does every day such as waking up, brushing teeth, eating meals and going to bed. Plan to give the medications around that activity.

Use a medication checklist or worksheet to record when your child takes medications. Place the checklist someplace visible to use as a reminder.

Pack your child's medications in pill boxes to help you remember to give them.

Many of the current medications available are inhaled. When your child uses the correct technique, medication is deposited directly into the airways. This generally produces fewer side effects than tablets or syrups. With some children however, routine shots, tablets or syrups may also be prescribed.

The important thing to remember is that there is no one "best" drug regimen for everyone. The medication program must be individualized to your child's needs. Monitoring your child's asthma and working with your child's doctor on an on-going basis is the best way to ensure that the medication program is appropriate for your child.

On the following pages is a discussion of the medications generally prescribed for children with asthma. Most of the medications fall into two major groups:

1. Long-Term Control Medications
2. Quick-Relief Medications

Long-Term Control Medications

Long-term control medications are used daily to maintain control of asthma and prevent asthma symptoms.

Quick-Relief Medications

Quick-relief medications are used to treat asthma symptoms or an asthma episode.

Long-Term Control Medications

Long-term control medications are used daily to maintain control of asthma and prevent asthma symptoms. Your child needs to take these medications to prevent asthma symptoms even when the asthma seems better.

INHALED STEROIDS

Common inhaled steroids include:

- Alvesco® (ciclesonide)
- Arnuity® (fluticasone)
- Asmanex® (mometasone)
- Flovent® (fluticasone)
- Pulmicort® (budesonide)
- QVAR® (beclomethasone)

Inhaled steroids are long-term control medications. In addition to preventing swelling, they also reduce swelling inside the airways and may decrease mucus production. Inhaled steroids are the most effective long-term control medicine currently available. They improve asthma symptoms and lung function. They have also been shown to decrease the need for oral steroids and hospitalization. There have been concerns regarding the possibility of growth suppression in children. Recent studies have not shown growth suppression over several years of treatment.

Inhaled steroids are taken on a regular basis and cause few, if any, side effects in usual doses. Using a spacer with inhaled steroids (metered-dose-inhaler) and rinsing your mouth after inhaling the medication reduce the risk of thrush. Thrush, a possible side effect, is a yeast infection causing a white discoloration of the tongue.

LEUKOTRIENE MODIFIERS

Common leukotriene modifiers are:

- Accolate® (zafirlukast)
- Singulair® (montelukast)
- Zyflo® (zileuton/not indicated for children under 12 years)

Leukotriene modifiers are also long-term control medications. They reduce swelling inside the airways and relax smooth muscles around the airways. Leukotriene modifiers are available as tablets. They are less effective than inhaled steroids.



Depending on the severity of your child's asthma, medications can be taken on an as-needed basis or regularly to prevent or decrease breathing difficulty.

Accolate® and Singulair® are available for use in children with few, if any side effects. They are effective at improving asthma symptoms and lung function, but not to the same extent as inhaled steroids.

INHALED STEROID AND LONG-ACTING BETA-AGONIST

Common combinations of an inhaled steroid and long acting beta-agonist include:

- Advair® (fluticasone and salmeterol)
- Breo® (fluticasone and vilanterol)
- Dulera® (mometasone and formoterol)
- Symbicort® (budesonide and formoterol)

This combination is effective at improving asthma symptoms and lung function in people with moderate to severe persistent asthma.

The inhaled steroid prevents and reduces swelling inside the airways. The long acting beta-agonist opens the airways in the lungs by relaxing smooth muscle around the airways. They last up to 12 hours. Breo lasts up to 24 hours. They are often used in combination with inhaled steroids as a long-term control medication to open the airways in people with moderate to severe asthma. Talk with your child's doctor about side effects.

LONG-ACTING BRONCHODILATORS (LAMAS)

A common long-acting bronchodilator (LAMA) is:

- Spiriva® (tiotropium)

This lasts 12 hours and may be used in combination with an inhaled steroid or a combination inhaled steroid and long-acting beta-agonist.

IMMUNOMODULATOR

Common immunomodulators include:

- Cinqair® (resliqumab)
- Fasenra® (benralizumab)
- Nucala® (mepolizumab)
- Xolair® (omalizumab)

Immunomodulators are biologic medications. They are being

Medication Therapy

used in addition to standard long-term control medication in people with severe specific types of asthma. Biologic medications work to decrease specific types of inflammation. Currently, they are given as routine shots or infusions. Not all people with asthma are candidates for this treatment. Evaluations by asthma specialists are required before these agents can be started.

THEOPHYLLINE

Common theophyllines include:

- Uni-phyl®
- Theo-24 and others (theophylline)

Theophylline is available as a tablet, capsule, or syrup. Theophylline relaxes the smooth muscles around the airways. Theophylline is another long-term control medication. A theophylline blood level between 5-15 mcg/ml usually gives relief of symptoms while avoiding side effects. Theophylline is not one of the first medications used for long-term control of asthma. There are safer and more effective medicines available, such as inhaled steroids and leukotriene modifiers. Talk with your child's doctor about side effects and special precautions to take when using this medication.

Quick-Relief Medications

Quick-relief medications are used to treat asthma symptoms or an asthma episode. Quick-relief medications are not a substitute for long-term control medications.

SHORT-ACTING BETA-AGONISTS

Common inhaled beta-agonists include:

- ProAir RespiClick®, ProAir®, Proventil HFA®, Ventolin HFA® (albuterol)
- Xopenex® (levalbuterol)

Short-acting beta-agonists work quickly to relieve asthma symptoms. Beta-agonists relax the smooth muscles around the airways. Your child's doctor may prescribe a beta-agonist to use as needed to relieve asthma symptoms. If your child uses this medicine for asthma symptoms more than twice a week talk with your child's doctor. Also talk with your child's doctor if your child uses more than one metered-dose inhaler a month. This is a sign that your child's asthma is poorly controlled and

When is the metered-dose inhaler empty?

The canister of your child's metered-dose inhaler is marked with the number of puffs in the canister.

Some metered-dose inhalers have a counter. If your metered-dose inhaler does not have a counter, date the canister of the metered-dose inhaler when your child starts using it. You can determine how long the medication will last.

Plan ahead to get the amount of medication your child needs from the pharmacy.

your child's long-term control medication may need to be adjusted.

ANTICHOLINERGICS

Atrovent® (ipratropium) is a quick-relief medication. Atrovent® opens the airways by blocking reflexes through nerves that control the smooth muscle around the airways. It is slower-acting than the short-acting beta-agonists and can take 15-20 minutes to show a significant effect. Atrovent® may be useful following an inhaled beta-agonist to achieve a longer-lasting effect, especially during an asthma episode. Atrovent® is available in inhaled forms.



Albuterol and ipratropium can be combined in one medication. Combivent® is a combination soft-mist inhaler. DuoNeb® is a combination solution for the nebulizer.

STEROID PILLS

Common steroid pills and liquids include:

- Deltasone® (prednisone)
- Medrol® (methylprednisolone)
- Orapred®, Prelone®, Pediapred® (prednisolone)

Steroid pills and syrups are very effective at reducing swelling and mucus production in the airways. They also help other quick-relief medication work better. They are often necessary for treating more severe episodes of asthma.

It is important to note that the steroids used in asthma treatment are not the same as the anabolic steroids used illegally by some athletes for body building. Corticosteroids do not affect the liver or cause sterility.

Steroid pills and syrups can be used occasionally in short-term bursts, or as part of the routine treatment for children with severe asthma.

Steroid Burst

Many children with asthma periodically require a short-term burst of steroid pills or syrups to decrease the severity of asthma symptoms and prevent an emergency room visit or hospitalization. A burst may last two to seven days and may not require a gradually decreasing dosage. For others, a burst may need to continue for several weeks with a gradually decreasing dosage. Your child may experience a few mild side effects such as increased appetite, fluid retention, moodiness and stomach upset. These side effects are temporary and typically disappear after the medicine is stopped.

Routine Steroids

A small percentage of children with severe asthma require steroid pills or liquid as part of their ongoing treatment. It is important that your doctor prescribe a combination of long-term control medications before recommending routine steroid pills or liquid. Steroid pills or syrups alone should not be used to treat asthma!

The use of long-term oral steroids can be associated with significant side effects. These may include: growth suppression, weight gain, fluid retention, osteoporosis, high blood pressure, cataracts, thin skin, easy bruising, muscle weakness, diabetes, or weakened immune system. Not everyone experiences these side effects, but because of the possible risk, long-term steroid pills or syrups should be continued only when absolutely necessary. We recommend that any child requiring long-term steroid pills or syrups be under the care of a specialist (allergist or pulmonologist).

Steroid pills and syrups can be taken in ways that decrease the risk of side effects. The lowest possible dosage should be used, and it is usually taken in the morning. Your child's doctor may prescribe long-term steroid pills or syrups every other day (every 48 hours) to decrease some side effects. Talk with your child's doctor about side effects and steps to prevent side effects.





Using a metered-dose inhaler can be difficult for your child. Ask his or her doctor about using a spacer, which helps deliver the medication from the mouth into the airways of the lungs.



Examples of Common Spacers.

Inhaled Medications

For many years, inhaled medications have been an important part of asthma treatment. Inhaled methods deliver medication directly to the airways, which is useful for lung diseases.

Aerosol devices for inhaled medications may include:

- Metered-dose inhaler
- Metered-dose inhaler with spacer
- Dry powder inhaler
- Soft-mist inhaler
- Nebulizer

Your doctor will prescribe the method that is most helpful for your child.

METERED-DOSE INHALER WITH SPACER

It is crucial that your child use the metered-dose inhaler correctly to get the full dosage and benefit from the medication. It is often hard to use a metered-dose inhaler correctly. At National Jewish Health, we often recommend using a spacer. A spacer is a device which can be attached to the metered-dose inhaler. A spacer helps deliver the medication to the airways of the lungs, instead of the mouth. This helps the medication work better.

Common Spacers include:

- AeroChamber®
- Vortex®

These are available with a mask for younger children.

Ask your child's doctor about using a spacer, which helps deliver the medication from the mouth into the airways of the lungs.

DRY POWDER INHALER

Dry powder inhalers are breath activated. When your child inhales fast enough the medication is released, and inhaled.

Common dry powder inhalers include:

- Flexhaler®
- Diskus®
- Ellipta®
- Flexhaler®
- HandiHaler®
- Neohaler®
- Pressair®
- RespiClick®
- Twisthaler®

SOFT-MIST INHALER

A soft-mist inhaler consists of a plastic device containing medication. The medication is released as a slow-moving mist.

NEBULIZER

A nebulizer or “breathing machine” is another way to inhale medications. A nebulizer treatment is given with an air compressor machine. Pressurized room air is used to create a mist of the medicine solution which your child inhales for approximately 5-10 minutes.

When the metered-dose inhaler is used correctly with a spacer, it is as effective as the nebulizer, but you may find a nebulizer more beneficial when your child has episodes of extreme breathing difficulty. Your doctor may prescribe an air compressor to give your child breathing treatments at home. Battery operated portable compressors are also available.

If your child uses Pulmicort® in a nebulizer, use a jet nebulizer device, not an ultrasonic nebulizer. At National Jewish Health we prefer to use a mask for younger children, rather than the mouthpiece, as this allows for more medication to be inhaled into the airways.

Whichever device your child uses, a metered-dose inhaler with or without a spacer, a dry powder inhaler, a soft-mist inhaler or a nebulizer, you must use it correctly to get the most benefit from the medication. Your doctor may have you demonstrate inhaler technique each visit to make sure it's done correctly.



Monitoring Your Child's Asthma

Because asthma is a chronic condition, both you and your child's doctor benefit from objective monitoring of your child's lung condition and symptoms. This section discusses two tools — watching for asthma symptoms and peak flow monitoring. When you learn to use these tools you and your child's doctor can manage your child's asthma better.

Watching for Asthma Symptoms

Asthma symptoms can range from very mild to severe. Some children with asthma have only occasional or seasonal symptoms. Others have a more chronic form of the disease and experience symptoms weekly or daily. Some children have “asthma attacks,” in which symptoms seem to develop suddenly. In most cases, you and your child can learn to recognize signs and symptoms, and take precautions to decrease the severity of an asthma episode. It's important to recognize and treat even mild symptoms. This can help decrease the amount of inflammation and reduce the risk of a more serious episode.

EARLY WARNING SIGNS

Many times you receive clues that an asthma episode may be developing — before breathing difficulty begins. These clues are called early warning signs. Listed below are some common early warning signs. These early warning signs are often unique for each person. Keep track of these signs for a few weeks. It is also helpful to look back on past episodes and see if your child had any of these early warning signs.

Common early warning signs include:

- Breathing changes
- Sneezing
- Moodiness
- Headache
- Runny/stuffy nose
- Coughing
- Chin or throat itchiness
- Feeling tired
- Dark circles under eyes
- Trouble sleeping
- Poor tolerance for exercise
- Downward trend in peak flow numbers

ASTHMA SYMPTOMS

Asthma symptoms indicate that an asthma episode is occurring. Changes have taken place in the airways and airflow is obstructed. Individuals with asthma experience some or all of these during an asthma episode. Action should be taken to treat these symptoms before they become worse.

Asthma symptoms include:

- Coughing
- Shortness of breath
- Tightness in the chest
- Wheezing

SEVERE ASTHMA SYMPTOMS

Severe asthma symptoms can be a life threatening emergency.

Severe asthma symptoms include:

- Severe coughing, shortness of breath, tightness in the chest and/or wheezing
- Difficulty talking or concentrating
- Walking causes shortness of breath
- Breathing may be shallow and faster or slower than usual
- Hunched shoulders (posturing)
- Neck area and between or below the ribs moves inward with breathing (retractions)
- Gray or bluish tint to skin, beginning around the mouth (cyanosis)



It is very important to understand that you should seek medical attention (doctor's office or emergency room) when your child is not responding to treatment at home.

If any of these symptoms occur, seek emergency treatment immediately. Have an action plan for getting emergency care quickly in the event of severe asthma symptoms.

Peak Flow Monitoring

In addition to watching for asthma symptoms, a peak flow meter can help you monitor your child's asthma. A peak flow meter can be especially useful if a child has moderate to severe asthma or has difficulty identifying asthma symptoms. A peak flow meter is a small, easy-to-use instrument that measures the peak expiratory flow — how fast you blow out air after a maximum inhalation. It reveals how well your child's lungs are working. Young children, often by age 5 or 6, can learn to use a peak flow meter and produce reliable, consistent results. It is important to know that peak flow numbers are effort dependent. This means your child needs to put forth a good effort to have reliable, consistent results. Your doctor may have your child demonstrate peak flow meter technique each visit to make sure it is done correctly.

Monitoring Your Child's Asthma

A daily (or regular) record of peak flow numbers can provide you with a valuable early warning sign. Sometimes peak flow numbers will decrease hours, or even a day or two, before other asthma symptoms become evident. When you monitor peak flow numbers on a daily (or regular) basis, you can identify this drop and take steps to prevent an asthma episode. The peak flow numbers, along with watching for asthma symptoms can be used to make decisions about asthma treatment.

The highest number your child can blow regularly is the “personal best.” This is determined by recording peak flow numbers daily for two to three weeks when the asthma is under good control. Talk with your child’s doctor about determining your child’s “personal best.”

Once you know your child’s personal best, it may be helpful for you and your doctor to establish zones. Zones will cue you about how well your child is breathing and actions you should take. The zone system can be compared to the colors of a traffic light.

GREEN ZONE SIGNALS ALL CLEAR

This indicates good lung function. Follow the routine treatment plan for maintaining asthma control.

YELLOW ZONE SIGNALS CAUTION

Your child may need more aggressive medical management for asthma. This may include a temporary increase in quick-relief medication and inhaled steroid medications, an oral steroid burst or other medications as prescribed by your child’s doctor.

RED ZONE SIGNALS A MEDICAL ALERT

Your child needs immediate treatment with quick-relief medication. Notify your child’s doctor or go to the emergency room if peak flow numbers don’t return and stay in the yellow or green zone.

Your doctor can help determine what your child’s “personal best” is and what steps you should take when the peak flow numbers are in the green, yellow or red zones.



Young children, often by age 5 or 6, can learn to use a peak flow meter and produce reliable, consistent results.



Using an Asthma Action Plan

An Asthma Action Plan is a written, customized plan to help you manage asthma episodes. The action plan is based on changes in asthma symptoms and peak flow numbers. Your child's action plan is based on changes in asthma symptoms and peak flow numbers. It will give you information about when and how to use long-term control medications and quick-relief medications. If you know what to watch for and what steps to take, you will be able to make timely and appropriate decisions about managing your child's asthma.

It will also help you decide when to call your doctor and when to seek emergency medical care. It is very important to understand that you should seek medical attention (doctor's office or emergency room) when your child is not responding to treatment at home. Your child's care in the doctor's office or emergency room may seem similar to what you were

doing at home. The difference is that the child is receiving close medical supervision. Oxygen by nasal tubing or mask may be needed. There may be repeated nebulizer treatments and simple breathing tests (spirometry or peak flows) to check response to the treatments. If breathing tests are not significantly improved, medical personnel may start an intravenous solution of medications. Steroid therapy is necessary in these episodes. Hospitalization (overnight or longer) may be required for some episodes.

A severe episode of asthma that requires such intensive treatment does not clear up right away. Your child will likely need to continue extra medications for a period of time. It is very important that your child take medications on schedule and use the peak flow meter as instructed by your doctor.



Living with Asthma

Asthma, like all chronic conditions of childhood, affects not only the child but the entire family. For children with mild asthma, the impact on the family may be minimal — but with more severe disease, parents may have issues in several areas.

Age Appropriate Self-Management

As children get older, they are able to take more responsibility for their daily activities, including management of their disease. As your child takes on more responsibility, it should be appropriate for the age and abilities. It may be difficult to find the right balance of support and responsibility at times. A preschooler's tasks often include learning to cooperate with inhaled medications and the adult takes the leading role in asthma management. A school age child is learning to take more responsibility with the adult still taking the leading role. The adolescent can gradually assume more responsibility and the adult will move into more of a guidance role. It is important for the adult to routinely monitor medication technique and supplies. Family meetings can help identify how the daily medications and activities and the asthma action plan are going.



A written school Asthma Action Plan can help manage asthma episodes at school.

School

A variety of issues may arise in connection with school. Fortunately, there are steps you can take to address these issues.

ARRANGE A SCHOOL CONFERENCE BEFORE THE SCHOOL YEAR BEGINS.

This conference should include your child's teachers, physical education teachers, school nurse and teacher aides. It is important for them to have an understanding of your child's asthma. You can give a brief asthma education lesson — discussing what can make asthma worse in the school environment, your child's daily treatment including exercise pre-treatment if needed, techniques to inhale medication, asthma symptoms, peak flow zones and the school Asthma Action Plan.

PROVIDE A WRITTEN ASTHMA ACTION PLAN.

This school Asthma Action Plan should include what makes your child's asthma worse, long-term control medication, especially those taken at school, asthma symptoms, peak flow zones, quick-relief medications to be taken for peak flows in the yellow and red zone or asthma symptoms, and emergency telephone numbers. Immediate access to quick-relief medication is important. When approved by the doctor,

parent and school personnel, it is helpful if the child with asthma can carry the quick-relief medication for immediate access. Ask your child's doctor to work with you and the school if further arrangements are needed. A written asthma action plan is always useful.

COMMUNICATE REGULARLY WITH SCHOOL STAFF

Talk with your child and the school staff regularly to assure your child's asthma action plan is working.

Some children have difficulty keeping up with their school work because of missed school days. When asthma is severe enough to require hospitalization, school days may be missed. However, it is usually not necessary to miss school because of mild asthma symptoms, which can be handled at school. Monitoring your child's asthma symptoms and peak flows at home and at school can be very helpful.

These steps will help address school issues related to your child and asthma so your child can have a positive and enjoyable school experience.

Discipline

Parents are sometimes hesitant to punish children with asthma for fear punishment will cause an attack. While it is true that children who are upset by restrictions (or any frustrating situation) may develop asthma symptoms, the harm done by letting a child always have his or her own way because of asthma is much greater, even if some asthma symptoms occur with discipline. Follow your child's action plan if asthma symptoms occur. Also, if there are other children in the family, they may resent what they see as special treatment.

Counseling

Asthma is not a psychosomatic illness. However, as a result of prolonged asthma, behavior problems can arise. When a child has self-destructive behavior — such as using asthma to avoid school or manipulate the family, or deliberately missing medication to cause an episode — a referral to a psychologist or psychiatrist may be helpful.

Asthma, like any chronic illness, may sometimes magnify other family problems. Family stresses which may be tolerable when the child is healthy may become major problems when the child is ill. Sometimes a cycle is set up in which asthma and other family problems aggravate each other. Individual counseling for your child may not be sufficient, and family counseling may be recommended.

Diet

Children with asthma have the same nutritional requirements as other children. Aside from avoiding specific foods that you know cause symptoms, no special kind of diet has been shown to be beneficial for asthma. Extra vitamins, over and above normal daily requirements, typically are not needed. Some children need extra calcium and vitamin D because of long-term steroid (pills or syrups) therapy.

Remember, your child should be able to:

- Participate in activities, including physical activity without asthma symptoms
- Sleep through the night without asthma symptoms
- Have normal or near normal lung function
- Limit missed school or work days due to asthma
- Have few, if any, emergency room visits and hospitalizations
- Have few, if any, side effects from the medications taken
- Feel good about his or her asthma care



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