Introduction to Asthma

If you or your child has recently been diagnosed with asthma, you are not alone. Some 12 million to 15 million Americans, including 5 million children, have asthma, according to the National Institutes of Health. The number of asthma sufferers has more than doubled since 1980. Researchers have theories for the rise, but no one knows exactly why it is happening. Asthma is an increasingly costly problem for our society. At least 25 percent of missed school days are directly attributable to asthma, according to the NIH. Billions of dollars are spent on asthma treatment for adults and children, yet the number of cases continues to rise.

Asthma can be terrifying, particularly during an acute attack. Few things are as scary as not being able to breathe. Difficulty breathing is one of asthma's most common symptoms, but there are others. Wheezing and coughing are also common. Attacks can be set off by exposure to such "triggers" as pollen, cold air, smoke, chemicals, respiratory infections and exercise. Unfortunately for those who have asthma, many triggers are part of everyday life -- and sometimes cannot be avoided.

But there is good news. There are a variety of medications that can help control asthma symptoms. There are also things you can do to reduce the likelihood of having an asthma attack, such as taking precautions when exercising in cold weather and avoiding or eliminating triggers, such as tobacco smoke. Think of asthma as a lifetime disease but one that can be controlled through proper management. Even if attacks cannot be prevented completely, for many patients it is possible to reduce the number of attacks and their severity.

Fifty years ago, a diagnosis of asthma meant that life would probably be curtailed in many important ways. Exercise, for example, would have been against the doctor's orders. But today, even people with severe asthma can lead normal lives so long as they:

- Learn about the disease and identify the triggers likely to provoke an attack.
- Avoid those triggers or situations.
- Take medications regularly as prescribed.

What Is Asthma?

To understand asthma, you need to know a little bit about the lungs. The lungs deliver oxygen to and remove carbon dioxide from the blood stream. The lungs consist of a series of tubes, known as bronchi, which connect with the air sacs, or alveoli. The bronchi are the passage ways through which air travels, and the alveoli are where oxygen enters the blood stream and carbon dioxide leaves it. If you think of the lungs as a tree, the bronchi are the branches and the alveoli are the leaves.

Asthma is a disease in which the bronchi become inflamed or irritated. Several things happen as a result. The bronchi become swollen, narrowing the passageways, and they produce increased amounts of mucus. The muscles around the bronchi constrict and make the bronchi narrower, making it more

difficult to breathe. The bronchi also become abnormally sensitive to things like smoke, dust and cold air, and they constrict more than normal when exposed to these irritants. In this way, the bronchi are similar to sunburned skin, which tends to be overly sensitive to things such as a woolen sweater, which would not bother skin that was not inflamed.

What's the Difference Between Asthma and Allergies?

Many people are confused by the relationship between asthma and allergies, and understandably so. Although sometimes related, asthma and allergies are not the same. Allergies refer to the body's exaggerated response to certain substances, such as pollen or bee venom. Substances that evoke an allergic response are known as allergens, and they can cause itchy, watery eyes; a runny nose; sneezing; or skin rash. Some people who have asthma have an allergic response to inhaled allergens. The allergic response contributes to inflammation in the bronchi and makes the asthma worse.

Who Gets Asthma?

Asthma occurs in people of all ages, races, cultures and socioeconomic backgrounds, and in all parts of the world. Although asthma is most common in children, a significant number of people first develop the disease as adults, sometimes not until quite late in life. Genetic makeup, or heredity, plays a role in the development of asthma. Children of parents who have asthma or allergies are more likely to develop asthma. However, the fact that asthma runs in families does not necessarily mean that children whose parents have asthma will have it. It means only that their risk is increased. It is possible to develop asthma even if no one else in the family has it.

Can Asthma Be Prevented?

Asthma cannot be prevented, strictly speaking. However, certain precautions may reduce the risk of an individual developing the disease. Asthma is more common in children whose parents smoke. Asthma also is more common in environments that have higher concentrations of indoor allergens. Therefore, a child's risk of developing asthma may be decreased in a smoke-free home and a home without high concentrations of allergens, such as dust mites or cat dander. Indoor allergens may be a particular concern in families in which there is a history of asthma.

What Are the Symptoms of Asthma?

Asthma has four main symptoms:

- Shortness of breath
- Wheezing
- Coughing

- Tightness in the chest

Some patients have all of these symptoms. Others have only a single symptom, such as a persistent cough or shortness of breath. People with diseases other than asthma sometimes also have similar symptoms, so coughing, wheezing or shortness of breath does not always mean that the person has asthma

What Triggers an Asthma Attack?

Many things can trigger an asthma attack. Among the most common is the common cold. In fact, viral respiratory infections and flu are often responsible for many of the most severe asthma attacks. Many people ask physicians for antibiotics to treat the infection, but, by and large, these viruses have to run their course. Sometimes, a viral infection will cause asthma symptoms to flare up. Steroids may be prescribed to reduce the swelling in the bronchi.
Exercise also is a common trigger for asthma, particularly if it is performed vigorously outside in cold weather. Cold, dry air irritates the bronchi. If you suffer from exercise-induced asthma, your doctor may recommend that you take medication such as albuterol before a workout to help prevent an attack.
Another trigger is exposure to pollen and pets, especially cats. Some people have acute asthma attacks when exposed to allergens, but the effect can be subtler. Allergens can cause ongoing inflammation in the bronchi, making asthma symptoms more frequent, more severe and more difficult to control. Sometimes it is difficult to know if a particular allergen is responsible for asthma. Doctors often recommend checking whether a patient's asthma improves when the suspected allergen is removed. But this can be difficult. Some allergens, such as cat dander, may remain in the household environment for months.
Some medications can be triggers, among them a class of drugs known as beta-blockers, which are commonly used in the treatment of high blood pressure and heart disease. These drugs are prescribed under a variety of generic and brand names, including propranolol, sold under the brand name Inderal, and metoprolol, sold under the brand name Lopressor. (Beta-blocker eye drops, used to treat glaucoma, may make asthma worse on occasion, as well.) Aspirin and a number of other anti-inflammatory drugs, known collectively as nonsteroidal anti-inflammatory drugs, or NSAIDs, can also make asthma worse in some people.
Since people with asthma have sensitive and inflamed bronchi, it is no surprise that irritants such as smoke and pollution cause additional problems. People who have asthma should not smoke or be exposed to second-hand smoke. Wood-burning stoves and fireplaces can also contribute to symptoms. Outdoor air pollution can be a problem for people in urban areas. People who have asthma should minimize the time they spend outdoors when air pollution levels are high.
Finally, some people with asthma are sensitive to sulfites, which are used as a preservative in many processed foods, including dried fruit, potatoes, shrimp, beer and wine. Avoid those foods that are labeled as having been treated with sulfur dioxide, sodium sulfite, and sodium and potassium bisulfite.

Stress, Emotions and Asthma

Do stress and emotions affect asthma? And what effect does asthma have on stress and emotions? Some people say stress aggravates their asthma. Although there has been little research into the effects of stress and emotions on asthma, there is some evidence that stress can cause asthma to flare up. For those who have trouble managing stress, there are programs to learn how to deal with anxiety.

Not surprisingly, asthma can cause stress, not only in the individual who has it but also in the family, since it disrupts sleep, work and school schedules. And an asthma attack can be a frightening experience for onlookers and the person having it. Moreover, some of the drugs used to treat asthma can affect mood and emotions. Steroids make some people euphoric and others depressed. Other drugs cause anxiety or "the jitters." It may be difficult to strike the right balance with medications that cause a minimum of side effects while offering maximum control of the disease.

Treatment of Asthma

Asthma cannot be cured, but it can be successfully managed in most people. A doctor's first goal is to reduce and, if possible, eliminate symptoms while allowing the patient to maintain a normal activity level. The second goal is to maintain lung function as close to normal as possible. In many people with asthma, these two goals go hand-in-hand: asthma symptoms are often accompanied by abnormalities in lung function. However, some people have asthma symptoms even when tests of their lung function are normal. Other people have no symptoms even when their lung function is very abnormal. Thus, your physician might recommend treatment on the basis of either asthma symptoms or abnormal lung function (or both).

Controller vs. Rescue Medication

It is important for people who have asthma to understand the different kinds of medication used to treat the disease. One of the most important distinctions is between "controller" medications and "rescue" or "quick-relief" medications. Many of the problems associated with asthma arise from inflammation in the bronchi. Most controller medications reduce inflammation in the bronchi, thereby decreasing the sensitivity of the airways and preventing asthma symptoms. In general, controller medications must be used on a regular basis to be effective. They do not provide relief when asthma symptoms occur.

In contrast, rescue medications provide quick relief of symptoms, but do not reduce inflammation and thus have little effect on the frequency and severity of day-to-day symptoms. Many people who have asthma require both types of medications -- a controller medication to prevent or reduce the frequency of asthma symptoms and a rescue medication to quickly relieve the symptoms that occur.

Controller Medications

- **Oral corticosteroids** -- Oral corticosteroids, taken by mouth in pill or liquid form, are the most potent agents available to reduce bronchial inflammation and control asthma. Corticosteroids are a type of "steroid," a term which refers to a class of hormones produced by the adrenal gland (and to similar chemicals that can be manufactured).

  Long-term use of oral corticosteroids is associated with a number of potentially serious side effects. Among the most common are osteoporosis, which is a disorder that results in a thinning of the bones; thinning of the skin and easy bruising; cataracts; and immune system suppression, which leads to an increased risk of certain kinds of infection. Corticosteroids can also slow growth in children. The likelihood and severity of side effects from oral corticosteroids increase with higher doses and longer periods of treatment. When used occasionally for relatively brief periods, such as seven to 10 days around the time of an asthma attack, oral corticosteroids are unlikely to have serious or long-term consequences. A rare side effect of oral steroids is the development of avascular necrosis of the bone. This entails a disruption of the blood flow to a hip, shoulder or knee joint. A joint replacement may required to manage this side effect. The most commonly used oral corticosteroid is methylprednisolone, which is sold under the brand name Medrol and prednisone.

- **Inhaled corticosteroids** -- Inhaled corticosteroids are not as potent as oral corticosteroids, but are still effective in reducing bronchial inflammation. They are significantly lower in side effects and are the mainstay of asthma treatment. For many people they provide effective long-term asthma control. Since the medication is delivered directly to the bronchi, much lower dosages are necessary than when medication is taken by mouth, and there is little absorption of the inhaled medication. When used in low dosages, inhaled corticosteroids have remarkably few side effects, most of which are minor. In children, high dosages of inhaled corticosteroids may slow growth. There is some debate among doctors about whether higher dosages of inhaled corticosteroids cause significant side effects in adults, side effects such as osteoporosis or cataracts. There are many different types and brands of inhaled corticosteroids, but no one appears to work better than the others.

- **Leukotriene Inhibitors** -- A new type of oral medication has recently been approved in the United States for the treatment of asthma. These drugs, known as leukotriene inhibitors, interfere with the production or effects of leukotrienes, chemicals that appear to play a role in bronchial inflammation. These drugs often decrease the severity or frequency of attacks.

Overall, these drugs appear to be somewhat less effective than inhaled steroids, but they seem to have fewer side effects. Leukotriene inhibitors have been linked to a rare form of vasculitis, or an inflammation of the blood vessels. However, researchers disagree over whether leukotriene inhibitors cause the disease or simply expose it in patients who already have it. There have been only a few cases in the United States the risk of the disease is extremely small. This should not discourage patients from using leukotriene inhibiting drugs if they could benefit from them.

- **Beta-agonists** -- Beta-agonists relax the muscles that constrict the bronchi, which is why they are known as bronchodilators. Long-acting Beta-agonists can help prevent asthma, but should not be used to relieve asthma symptoms because they are not as effective as rescue medications. Beta-agonists are available in both inhaled and oral forms, but the inhaled form has fewer side effects than the oral forms. Side effects of these long-acting drugs include tremor, or shaking, and fast heartbeat. Side effects from the inhaled form are generally mild.

- **Other controller medications** -- Cromolyn, sold under the brand name Intal, and nedocromil, sold under the brand name Tilade, are inhaled medications that are used over the long term to prevent symptoms. They can also be used just before exercise to prevent exercise-induced symptoms. In general, these drugs are less effective than inhaled corticosteroids, but cause almost no significant side effects. They have been used most extensively in children because of their outstanding safety.

  Theophylline is an oral or medication sometimes used to improve long-term control of asthma symptoms. It is most often used when other medications, such as inhaled corticosteroids, have not been adequate. It is rarely used by itself or before other kinds of medications have been tried because side effects can be serious. When the amount of the drug in the bloodstream reaches very high levels, these side effects can include seizures and irregular heart rhythms, which can be deadly. As a result, use of theophylline requires careful attention, particularly since many other medications can affect the level of theophylline in the blood stream. You should notify your physician immediately if, while taking some form of theophylline, you experience nausea, vomiting or rapid heartbeat. Some people have headaches after beginning theophylline. Unless accompanied by other side effects, these headaches are unlikely to be serious and they often go away after taking the medication for a few days

Rescue Medications

- **Beta-agonists** -- Short-acting inhaled Beta-agonists dilate the bronchial tubes and make breathing easier. They are the most effective medication for providing quick relief of asthma symptoms, but they do not affect the underlying inflammation in the bronchi and therefore do not provide long-

term control of asthma symptoms. The most common side effects from Beta-agonists are shaking, and increased heart rate. These drugs are generally quite safe, even used on a regular basis. However, if you find that you need to use them frequently, it probably means that your asthma is not being adequately controlled and that you need additional controller treatment.

- Another medication occasionally used as rescue treatment is ipratropium, which is sold under the brand name Atrovent. Although it has very few side effects, it is less effective than short acting inhaled Beta-agonists. It can be useful in people who have problems or side effects from using short-acting inhaled Beta-agonists.

Types of Inhaler Delivery Systems

Inhaled medications can be taken through a metered-dose inhaler, dry-powder inhaler or a nebulizer, which is a device that generates a mist of medication similar to a humidifier. Some medications are available in only a single delivery system. Other medications are available in all three delivery systems. The effectiveness of a metered-dose inhaler depends on good technique. That is, you must be able to use the inhaler correctly so that the medication gets into the bronchi. With proper teaching and practice, many people can successfully use a metered-dose or dry-powder inhaler.

For some people, including small children and adults with arthritis or other conditions that impair their coordination or the use of their hands, using a metered-dose inhaler can be difficult. These people often do better with a nebulizer. Spacer devices, or holding chambers, can be attached to metered-dose inhalers. These devices reduce the amount of medication deposited in the mouth and throat, which renders the medication less effective in treating the asthma and contributes to side effects. Such devices can help those who have trouble coordinating their breathing with the use of the metered-dose inhaler.

Treatment Based on Asthma Severity

Although there is no single treatment for everyone with asthma, there are some guidelines. Most physicians believe that the severity of asthma should determine the nature of treatment. The asthma severity is usually assessed on the basis of the frequency of daytime and nighttime symptoms, as well as breathing test results. PPCP adheres to this guideline. We will assess your severity based on your symptoms and this will guide your treatment.

For people with occasional symptoms and nearly normal lung function, using rescue medication is often the only treatment necessary. If symptoms become more frequent, some type of controller medication will generally be required. Most often this is an inhaled corticosteroid or leukotriene-inhibitor drug. Sometimes cromolyn, sold under the brand name Intal, or nedocromil, sold under the brand name Tilade, is used, particularly in children. There is disagreement among physicians over which class of controller medication should be used first:

Inhaled corticosteroids are more potent, but the leukotriene-inhibitor agents may have fewer side effects. Factors such as the patient's age and preference are important in making the decision.
If the treatment does not control symptoms, more controller medications might be necessary. In a small minority of people with asthma, the condition can only be controlled by long-term use of oral corticosteroids. Despite concern about the side effects of such therapy, the benefits of improved symptoms and lung function might outweigh the risks and side effects.

Environmental Considerations

Making changes in a home or work environment can lead to improvement in symptoms for people who have allergies. Some people can identify specific allergies on the basis of their day-to-day experience. For example, they get the sniffles when they are around cats. Many allergies, however, are not so easy to identify and require specific allergy testing. The table below lists some of the measures recommended for some common allergies. Many environmental control measures are focused on the bedroom, since that is the room where most people spend the greatest amount of time. Because many environmental control measures involve changes that can be difficult and expensive, it is important to consider how severe the asthma symptoms are and how well symptoms respond to treatment when making a decision about environmental allergens. Environmental control measures can help improve symptoms, but they almost never completely eliminate them.

Allergy	**Action**
Dust mite	• Encase bedding in plastic • Remove carpet in bedrooms • Wash linens in hot water • Reduce indoor humidity
Pets	• Remove animal from home • Keep animal out of bedroom
Cockroach	• Avoid leaving food on counters, tables, etc. • Use a professional exterminator
Indoor mold	• Reduce indoor humidity
Pollens, outdoor mold	• Keep windows closed during the day

•

Exercise-Induced Asthma

Asthma symptoms can have a number of causes, including exercise. In fact, most people who have asthma will at some time have symptoms brought on by exercise. People who have symptoms only during exercise are said to have "exercise-induced asthma." Activities most likely to cause wheezing are those that are strenuous, such as running, bicycling and cross country skiing.

For people whose symptoms are almost exclusively related to exercise, use of an inhaled Beta-agonist, or cromolyn or nedocromil shortly before exercise can help prevent symptoms. A warm-up period of low to moderate intensity before vigorous exercise can also help. When exercise symptoms are accompanied by symptoms at other times of the day, treatment should be aimed at achieving better overall asthma control, rather than focusing exclusively on the exercise symptoms.

Exposure to cold air and low humidity, which increases heat and moisture loss from the airways, can cause exercise-induced asthma. Other things that can provoke asthma with exercise are nasal blockage, which prevents air from being humidified and warmed in the nose; air pollutants, such as sulfur dioxide; high pollen counts; viral respiratory tract infections; and hot muggy air. However, many asthmatics have found that with proper training, care and prescribed medications, they are able to excel at any sport. Drugs administered before exercise, such as albuterol, metaproterenol, terbutaline, cromolyn sodium and nedocromil, are all helpful treatment options in controlling and preventing exercise-induced bronchospasm.

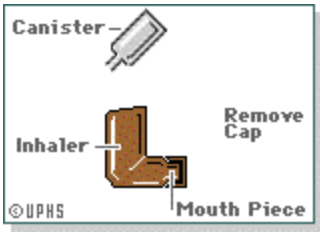
For years, asthmatic children and adults were barred from sports or vigorous activities. Today, with proper detection and treatment, those affected by exercise-induced asthma and bronchospasm can participate on a level playing field with those who do not have asthma. Still, some sports can be dangerous for some people with asthma. Scuba diving can be risky, but people who have normal lung function and no asthma symptoms can probably scuba dive with little risk. Discuss this with your physicianif you have further questions.

What to Do When Your Asthma Gets Worse

Have a plan of action for those times when your asthma may get worse. Making decisions becomes more difficult as the severity of the attack increases. You should outline with your doctor a course of action to be followed if your symptoms get worse or your peak-flow rates decrease. Sometimes people with asthma delay treatment, hoping their symptoms will subside without treatment. Unfortunately, that is often not the case. Asthma that continues to get worse -- for example, with a chest cold -- is unlikely to get better on its own. Delaying treatment when asthma gets worse can lead to severe, even life-threatening, illness. If your asthma does not respond to your action plan, contact your physician. And any time you have severe shortness of breath that does not respond promptly to your rescue medication, you need to seek medical attention immediately.

How to Use Your Peak Flow Meter

A simple device called a peak flow meter allows people with asthma to monitor lung function at home. These meters measure the amount of air you are able to exhale quickly. This can help show whether your airways are constricted (narrowed). If you can expel a lot of air quickly, your bronchial tubes are open.

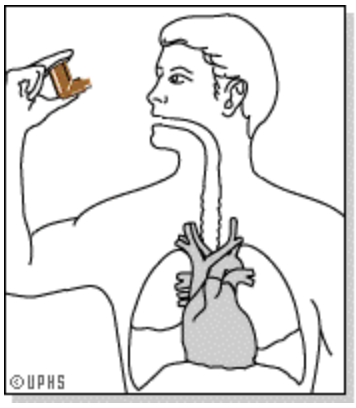


The information from your peak flow readings can help your healthcare provider decide whether to increase or decrease your drug dosages. Regular peak flow monitoring can sometimes detect loss of lung function even before you notice the symptoms. This enables you to take medications early enough to stop an impending asthma attack before it can start.

Perhaps most important, peak flow monitoring may indicate when you need to seek immediate medical care. Your healthcare provider will tell you at what level your peak flow reading may indicate that you need to contact your physician. You need to know your personal best.

How to Use Your Asthma Inhaler

If you have just received an inhaler, ask your physican or their staff to show you how to use it correctly. As many as half of the people who use inhalers do so incorrectly. Also, your physician should watch you use your inhaler at every office visit to make sure your are continuing to use it properly.



To use the inhaler

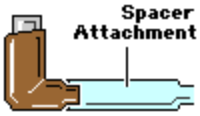
1. Remove the cap on your inhaler.
2. Hold the inhaler upright.
3. Shake your inhaler.
4. Tilt your head back.
5. Place the inhaler in one of the following ways:

A. Recommended:

Hold the inhaler so the mouthpiece is one to two inches away from your mouth. This will ensure you inhale more medication and less propellant. It is important to know that the material you see coming out of an inhaler is actually the propellant, not the

medication. The medication is contained in microscopic particles that you inhale.

B. Alternative option:



Put the mouthpiece in a "spacer" tube that can be put in your mouth. Spacers are useful for all patients, but are recommended for young children and older adults, as well as for use with inhaled steroids. If you use a spacer, make sure you clean it after taking your medication. Be sure to replace your spacer at least every six months.

C. For people who have difficulty with the above:

Place the inhaler in your mouth. Please note that this is the least preferable option for using your inhaler, as it will cause you to inhale more propellant. This means you will get less medication into your lungs.

6. As you start to breathe in slowly, press down on the inhaler to release medication.
7. Breathe in slowly.
8. Hold your breath for four seconds so the medication can spread through your lungs.
9. Repeat puffs as you have been directed. If you wait one minute between puffs, the next puff may penetrate your lungs more thoroughly.
10. If you are using a steroid inhaler, you should rinse your mouth after using your inhaler to prevent hoarseness or potential growth of yeast.

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