

ABOUT CHILDHOOD ASTHMA

Asthma is the leading serious chronic illness of children in the United States. In 2006, an estimated 6.8 million children under age 18 (almost 1.2 million under age 5) currently had asthma, 4.1 million of which had an asthma attack, and many others have "hidden" or undiagnosed asthma.¹ In 2007, the prevalence rate of asthma among Tennessee children under 18 years of age was 9.5 percent.²

In 2006, the highest current prevalence rate nationally was seen in those 5-17 years of age (106.3 per 1,000 population), with rates decreasing with age. Overall, the rate in those under 18 (92.8 per 1,000) was much greater than those over 18 (72.4 per 1,000).³ In 2007, current asthma prevalence was 6.3 percent among Tennessee's 0-5 year olds, compared to approximately 11 percent among 6-17 year olds.⁴

Nationwide, asthma is the third leading cause of hospitalization among children under the age of 15. Approximately 32.6 percent of hospitalizations due to asthma in 2005 were in those under age 15; however, only 27.8 percent of the U.S. population was younger than 15 years of age.⁵ In Tennessee, between 1997 and 2006 the asthma hospitalization rate was highest among 1-4 year olds (350/100,000), compared to 163/100,000 among 5-10 year olds, and 72/100,000 among 11-17 year olds.⁶

Asthma is one of the most common causes of school absenteeism across the nation.⁷ In 2003, children aged 5 to 17 years who reported at least one asthma attack in the previous year missed 12.8 million school days due to the disease.⁸

Even though asthma cannot be cured, it can almost always be controlled. For this reason, the American Lung Association has chosen control of childhood asthma as one of its top priorities. Tennessee has selected asthma as a public health concern, issuing the Burden of Asthma in Tennessee in 2008 and the STAT Plan to Reduce Asthma in Tennessee and Childhood Asthma Report in 2009.

The better you and your child understand asthma and its treatment, the better you will be able to control it.

HOW DO NORMAL LUNGS FUNCTION?

Lungs allow oxygen to enter the body in exchange for its waste product, carbon dioxide. As the air passes through the nose and mouth, it is rapidly warmed and moistened to avoid injury to the delicate lining of the airways.

The nose and airways also trap large particles (dust, pollen, molds, bacteria) and chemicals (smoke, sprays, odors) which could cause serious injury to the lungs.

The air is then transported through smaller airways. These airways branch like a tree, so that millions of small airways can carry oxygen to the tiny air sacs called alveoli.

The airways have a delicate cellular lining (mucosa), which is coated with a thin layer of mucus as is present in the nose. Foreign particles are trapped by the sticky mucus and eventually removed from the airways through the normal cleansing process.

The process is assisted by the movement of tiny "whip-like" structures called cilia which move the mucus and trapped foreign particles up toward the mouth and nose where they are coughed and sneezed out or swallowed.

Bundles of muscles surround the airways, and the contraction of these muscles allows airways to selectively direct the flow of air.

WHAT IS ASTHMA?

Asthma is an inflammatory condition of the bronchial airways. This inflammation causes the normal function of the airways to become excessive and over-reactive, thus producing increased mucus, mucosal swelling and muscle contraction.

These changes produce airway obstruction, chest tightness, coughing and wheezing. If severe this can cause serious shortness of breath and low blood oxygen.

Each individual suffers a different level of severity. Virtually all children with asthma, however, do enjoy a reversal of symptoms until something triggers the next episode.

WHAT IS THE CAUSE OF ASTHMA?

Inflammation of the airways is the common finding in all asthma patients. Recent studies indicate that this inflammation is almost always causative in the asthmatic condition. This inflammation is produced by allergies, viral respiratory infections and airborne irritants among other causes. This airway inflammation can cause scarring if it goes on for a long period of time.

More than 50 percent of current asthma cases in the United States can be attributed to allergies. Thirty percent of those are associated with cat allergies. Early exposure to cats may be a protective factor, but becomes a risk factor for asthma if an allergy develops. While preventing, blocking or reversing certain allergic reactions could reduce a large proportion of asthma cases, almost half of cases are not associated with allergies and require further research to determine their cause. ⁹

Secondhand smoke exposure in both adults and children is a risk factor for new asthma cases. Recent studies have suggested that children of smokers are twice as likely to develop asthma as the children of nonsmokers, and that even apparently healthy babies born to women who smoked during pregnancy have abnormally narrowed airways, which may predispose them to asthma and other respiratory disorders. This research was extended by a recent study that reported a child's risk of being diagnosed with asthma by the age of seven increased 23 percent if their mother smoked even less than 10 cigarettes a day during pregnancy. The chance of developing asthma increased to 35 percent if the

mother smoked more than 10 cigarettes a day while pregnant.¹⁰Data from several studies show that prenatal maternal smoking is a risk factor for asthma onset in children, especially young children. While the mechanism is not clear, it may be due to slowed lung growth.

Outdoor air pollution also worsens existing asthma. Outdoor pollutants known to trigger asthma attacks include ozone, particulate matter, nitrogen dioxide and sulfur dioxide.^{11, 12}

WHAT ARE THE SIGNS AND SYMPTOMS?

Common symptoms include coughing (constant or intermittent), wheezing or whistling sounds audible when a child exhales and shortness of breath or rapid breathing.¹³

Any child who has frequent coughing or respiratory infections (pneumonia or bronchitis) should be evaluated for asthma.

The child who coughs after running or crying may have asthma. Recurrent night cough is common, as asthma is often worse at night. Chest tightness and shortness of breath are other symptoms of asthma that may occur alone or in combination with any of the above symptoms. Since these symptoms can occur for reasons other than asthma, other respiratory diseases must always be considered.

In a young child the discomfort of chest tightness may lead to unexplained irritability. They may complain that their chest “hurts” or “feels funny.” Infants who have trouble feeding or who grunt during suckling may have asthma.¹⁴

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WHAT ABOUT HIDDEN ASTHMA?

Until rapid breathing, wheezing and coughing become obvious, the condition of many children with asthma will go undetected. These children with asthma usually suffer some degree of airway obstruction, and unless it is brought under control the children may suffer respiratory illnesses more frequently than necessary.

Hidden asthma, however, can produce so few recognizable symptoms that even a health care provider might not be able to distinguish abnormal breath sounds with his or her stethoscope, but it may cause subtle problems such as limitation of physical activity. Pulmonary function testing usually reveals these cases of airway obstruction.

WHAT USUALLY TRIGGERS ASTHMA?

Episodes of asthma often are triggered by some condition or stimulus. Common triggers of asthma are:

Exercise

Running can trigger an episode in over 80 percent of children with asthma. Bronchodilator medications used before exercise can prevent most of these episodes. With proper control of asthma, most children with asthma can participate fully in physical activities.

There might be exceptions, such as prolonged running, especially during cold weather, allergy season or illness from a "cold." Swimming seems to be the least asthma-provoking form of exercise. However, there have been recent concerns about excessively chlorinated pools precipitating asthma episodes.

Infections

Respiratory infections, including the flu, frequently trigger severe episodes of asthma. Research indicates that these infections are most frequently produced by viruses, rather than bacteria. Antibiotics are of no benefit for viral infections and thus may be of little value in an asthma episode. It is important for all children with asthma to get vaccinated for the flu each year. The American Lung Association's Asthma Clinical Research Centers have shown that the vaccine itself will not precipitate an attack.

Bronchodilator medication, good hydration, and when indicated, corticosteroids are required to control an asthma episode triggered by viral infections. Therefore, a parent should not be surprised if the physician does not prescribe an antibiotic when a child is having a respiratory infection and asthma. On the other hand, the doctor may decide to use an antibiotic if he or she suspects bacterial infection, such as sinusitis or bronchitis.

Note: Chronic sinusitis in childhood due to bacteria can be a very stubborn chronic trigger for asthma. Treatment for 10 days with antibiotics may not be effective. In these children, sinus x-rays are frequently required to diagnose the underlying condition.

Antibiotic treatment for 3 to 4 weeks or longer may be required to completely eradicate these infections. Asthma may also be triggered by an ear infection or bronchitis, which would also require antibiotic therapy.

Allergy

Many children with asthma have their symptoms triggered by allergies. Allergic children can suffer reactions to ordinarily harmless material (such as pollen, mold, food or animals).

During an allergic reaction, chemicals such as histamine are released from specialized cells. This may produce swelling of the lining of the airway, excessive mucus secretion and muscle contraction in the airways. In this way, an allergy can provoke an asthma episode.

The allergens involved are common indoor inhalants such as dust mites, feathers, molds, pets, insects (especially roaches), outdoor inhalants (molds and pollens) or ingested foods (milk, soy, egg, etc). Foods are much less frequent causes of asthma. These allergens may produce low-grade reactions which are of no obvious consequence; however, daily exposure to these allergens may result in a gradual worsening of asthma.

Allergy may be the cause of unrecognized or hidden asthma. Minor allergic reactions can be more important than more obvious or severe reactions, in that an allergic person tends to avoid exposure to allergens that have caused severe reactions, while ignoring the minor allergens.

For instance, if your child is highly allergic to cats and develops severe wheezing when he or she is around them, you'll probably avoid cats at all costs. But what about your dog that sleeps with your child and doesn't cause obvious wheezing? This could be an important factor. If so, skin testing usually will reveal any reaction the child has to the dog. The child would then do better with both the cat and dog removed from his or her environment.

Irritants

Cigarette smoke, air pollution, strong odors, aerosol sprays and paint fumes are some of the substances which irritate the tissues of the lungs and upper airways. The reaction (cough, wheeze, phlegm, runny nose, watery eyes) produced by these irritants can be identical to those produced by allergens.

Cigarette smoke is a good example, because it is highly irritating and can trigger asthma. Most people are not allergic to cigarette smoke; that is, there is no known immunologic reaction. Nevertheless, this irritant can be more significant than any allergen.

Secondhand smoke can cause serious harm to children. An estimated 400,000 to one million asthmatic children have their condition worsened by exposure to secondhand smoke.¹⁵

Irritants must be recognized and avoided. Cigarette smoking certainly should be avoided in the home of any child with asthma. It has been shown that when the parents of a child with asthma stop smoking, the child's asthma often improves.

Outdoor air pollution also worsens existing asthma. Outdoor pollutants known to trigger asthma attacks include ozone, particulate matter, nitrogen dioxide and sulfur dioxide.^{16, 17} Children are already at greater risk from outdoor air pollution than healthy adults; they have smaller air passages which are more easily blocked, they breathe more rapidly¹⁸ and are less likely to acknowledge breathing difficulties resulting from pollution and limit their exposure.¹⁹ For a child with asthma, these concerns are especially relevant.

If your child has asthma, limit their time outdoors on days with air quality warnings, while ozone levels are peaking in the afternoon and in areas near heavy traffic. Air

quality forecasts are often included in local weather forecasts or are available online at <http://airnow.gov/>.

Weather

Children with asthma have cited a number of climatic conditions as trigger factors. Many identify cold air as triggering asthma. Pulmonary function studies demonstrate that breathing cold air provokes asthma in most children with asthma.

Precautions may be necessary to avoid inhalation of cold air, such as wearing a special ski mask designed for this purpose. A heavy scarf, worn loosely over the nose and mouth, will also help avoid cold air-induced asthma.

The weather affects outdoor inhalant allergens (pollens and molds). On a windy day more allergens will be scattered in the air, while a heavy rainfall will wash the air clean of allergens. On the other hand, a light rain might wash out pollen, but actually increase mold concentration.

There does not seem to be one best climate for all children with asthma, and moving to a new area to reduce asthma severity often is met with disappointment in the long run, even after initial improvement.

Emotions

A common misbelief is that children with asthma have a major psychological problem that has caused the asthma. Emotional factors are not the cause of asthma, though emotional stress can infrequently trigger asthma.

A child's asthma might only be noticeable after crying, laughing or yelling in response to an emotional situation. These normal "emotional" responses involve deep rapid breathing which in turn can trigger asthma, as it does after running.

Emotional stress itself (anxiety, frustration, anger) also can trigger asthma, but the asthmatic condition precedes the emotional stress. Therefore, a child's asthma is not "in his or her head," as many people believe.

Emotions are associated with asthma for another reason. Many children with asthma suffer from severe anxiety during an episode as a result of suffocation produced by asthma. The anxiety and panic can then produce rapid breathing or hyperventilation, which further triggers the asthma.

During an episode, anxiety and panic should be controlled as much as possible. The parent should remain calm, encourage the child to relax and breathe easily and give appropriate medications.

Treatment should be aimed at controlling the asthma. When asthma is controlled, emotional stress will be reduced and other emotional factors can then be dealt with more effectively. Any chronic illness, especially if uncontrolled, can have associated secondary psychological problems. More severe psychological problems require a specialist to help the child and his or her family.

REMEMBER: Asthma is...

1. An **inflammatory condition** of the airways caused by allergens, irritants and respiratory infections.
2. Triggered by many different stimuli (**trigger factors**) that activate an over-reactive airway system.
3. Is reversible and **controllable** (with only a few rare exceptions).

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