# What is Asthma?

Asthma is a chronic lung condition that affects the airways. Asthma makes breathing difficult because the airways become swollen, produce too much mucus and the muscles around the airways tighten. Asthma can range from mild to severe and can be life threatening. Currently there is no cure for asthma, but it can be controlled by routine medical care, which should include a management plan developed by a health care provider, medication(s), avoidance of triggers, and good health habits.

Healthy People 2010, a national health promotion and disease prevention initiative, reports that nationwide, asthma is responsible for 5,000 deaths and 134 million days of restricted activity a year. (6)

## Normal Breathing

A person normally breathes in (inspiration) and out (expiration) without even thinking about how the respiratory system works. The process of air moving in and out of the lungs is called ventilation.

Air enters the respiratory system through the nose and mouth. The air is humidified (moistened), filtered and temperature controlled in the nasal cavity and pharynx (passageway from nasal cavity to larynx). The air travels through the larynx (voice box), the trachea (windpipe) and the airways (bronchial tubes or bronchi).

Think for a minute about the structure of a tree. In a tree, nutrients are distributed from the base of the tree, up the trunk, through the limbs, and out to the smaller branches, twigs and leaves. The lower airways resemble an upside down or inverted tree. Oxygen travels down the trachea where it can enter either the right or left lung through the mainstem bronchi. The trachea and bronchi have linings that filter, trap and help remove particles from the air. In each lung, the bronchi continue to divide and get progressively smaller. The small bronchi are called bronchioles. In total, each mainstem bronchus divides into more than 25 successively smaller branches and ends in balloon-like air sacs called alveoli. From the alveoli, oxygen enters the blood and carbon dioxide is removed from the blood and then exhaled. The primary muscle used in breathing is the diaphragm, the large muscle that separates the abdominal cavity from the thoracic (chest) cavity. When breathing becomes more difficult due to added work because of exercise or lung disease, the body uses accessory muscles in the neck, chest and abdomen to assist in breathing.

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## Breathing with Asthma

The bronchi and bronchioles are more sensitive in a person with asthma. The bronchi and bronchioles become unstable and produce increased mucus causing irritation and a cough. The bronchial muscles tighten and contract. As a result, the diameter of each bronchus narrows, the chest feels tight and the flow of air is partially blocked or obstructed. The lining of the airways becomes swollen and inflamed, which narrows the bronchus diameter and further reduces the flow of air.

During an asthma attack greater pressure is needed to push air through the bronchus. This results in the increased use of accessory muscles to breathe. These muscles are attached to the ribs, shoulders and neck. This extra work results in sweating, fatigue and airway irritation. Vibrations caused by forcing air through narrowed and uneven bronchial tubes filled with mucus results in wheezing, squeaking or whistling sounds with each breath, especially during expiration. Left untreated, airways can further constrict, resulting in greatly diminished or no breath sounds. The excessive amount of sticky mucus caught in the bronchi becomes irritating to the airways and results in a persistent cough. This cough and asthma are not contagious even though many of the symptoms of asthma are similar to those of an upper respiratory infection.

As the difficulty of forcing air into and out of the lungs progresses, the lack of oxygen results in anxiety, inability to speak in full sentences, headache and ultimately loss of consciousness and occasionally death. This sequence can usually be prevented by early recognition of symptoms and early intervention.



# Asthma Triggers

Asthma triggers are things that can cause asthma symptoms or an asthma attack. There are many different kinds of asthma triggers. Triggers can be an allergic reaction to allergens that irritate the lungs. The allergens that most commonly trigger asthma are dust mites, animal dander, cockroaches, pollen, grass and the mold alternaria. Common irritants such as vapors, fumes, cigarette smoke, air pollution, perfumes, cleaning products, upper respiratory tract infections, emotions, medications, the weather and physical activity also can trigger asthma attacks. An asthma attack or asthma symptoms also can occur without an allergic reaction.

Exposure to allergens and/or irritants may lead to increased difficulty in breathing during physical activity. Exercise and sports that require long periods of exertion without rest may trigger symptoms. Examples of these types of sports are basketball, soccer, hockey and running. For more information on activities and asthma, see Different Sports/Different Risks.

Students with asthma may be overly sensitive to changes in temperature and humidity, especially cold dry air. Because students tend to breath through their mouths during exertion, cold dry air can reach the lower airways before it is warmed and humidified by the nose. Other triggers include air pollutants, high pollen counts and viral respiratory tract infections.



# Asthma Symptoms

It is important to recognize the symptoms of asthma, or exercise-induced asthma (EIA) as athletic directors, coaches, athletic trainers, teachers and referees are often the first individuals to witness a student's initial attack.

## The symptoms of EIA may include:

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

Depending on the severity, symptoms can appear approximately five to 10 minutes after beginning physical activity, or five to 20 minutes after physical activity has ended. Some students with asthma may have symptoms only when they engage in physical activity. However, with strenuous physical activity, most students with asthma will have some asthma symptoms unless they take preventive medication prior to physical activity. (3)




# Asthma Medications

People with asthma generally require medications to control their disease. Current guidelines recommend medications based on four severity classifications. The four classifications are mild intermittent, mild persistent, moderate persistent, and severe. Students with only mild intermittent asthma disease typically require asthma medication on an as needed basis. The two types of medications used to control asthma are quick-relief medications and long-term controller medications.

## Quick-Relief Asthma Medication

Quick-relief (or rescue) medications are known for their rapid bronchodilator action. They work by relaxing the muscle bands that tighten around the airways and opening constricted airways during an acute asthma attack. They have a rapid onset of action and begin to work within minutes. These medications can last up to four to six hours. Every student with asthma should carry a quick-relief medication at all times if authorized to do so by his or her health care provider.

Students usually take this medication five to15 minutes before beginning an exercise routine. Due to the rapid onset of this class of medications, a student should have immediate relief (usually within six minutes) following use of the medication. For exercise-induced asthma, quick-relief medications should be limited. A student resorting to frequent use of the quick-relief medication has poor control over asthma and should consult their health care provider. Generally, good control over asthma is demonstrated when a patient refills his/her quick-relief medication only once or twice a year. (7)

The most common quick-relief medication is albuterol (Proventil, Ventolin). Other quick-relief products include metaproterenol (Alupent, Metaprel), pirbuterol (Maxair), or albuterol and ipratropium bromide (Combivent).

## Long-term Controller Medications

These medications reduce inflammation and/or prevent airway muscle constriction. These are ineffective in relieving acute symptoms and should not be used for "rescue/quick-relief." Students with persistent asthma should have one or more long-term controller medications. Yet, these powerful medications are often under-prescribed.

Inhaled corticosteroids are one type of long-term controller medication and have excellent anti-inflammatory properties in the lung tissue. Inhaled corticosteroids prevent permanent lung

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damage. Some common examples of inhaled corticosteroids are budesonide (Pulmicort), triamcinolone (Azmacort), flunisolide (AeroBid), and flucticasone (Flovent).
Long-acting beta agonist bronchodilators are another class of medications used to achieve asthma control. One dose lasts about 12 hours and is effective for nighttime symptoms. If used daily, these agents are effective for EIA. Two examples of long-acting beta 2 agonists are salmeterol (Serevent) and formoterol (Foradil). There is one controller medication for asthma which contains both an inhaled corticosteroid and a long-acting beta agonist bronchodilator. This medicine, Advair, is used for people with moderate persistent asthma and severe persistent asthma. (3, 7)

Leukotriene modifiers are another class of controller medication. These agents work primarily on specific chemical messengers to reduce inflammation. Montelukast (Singulair) and zafirlukast (Accolate) may be beneficial in EIA and prevention of asthma attacks. Leukotriene modifiers are most effective when used together with an inhaled corticosteroid, or the combination of an inhaled corticosteroid and a long-acting beta agonist bronchodilator. (3, 7)

Daily use of long-term controller medication can significantly reduce a student's need for quick-relief medication. The long-term controller medications can prevent inflammation associated with asthma and increase quality of life.

All students with asthma should have a written asthma action plan that is available to school nurses and coaches. The asthma action plan should identify which medications the student with asthma should be taking and when. For more information, see Asthma Action Plans.



# The Benefits of Physical Activity And Promoting Healthy Eating

Healthy eating and physical activity are essential to good health for everyone, including students with asthma. The nutrition and physical activity needs of students with asthma can be tailored to promote optimal health and energy levels. Making healthy behavior choices on a daily basis can greatly affect their level of function. Appropriate exercise increases cardiovascular tolerance, improves self-esteem, increases confidence and improves psychological and physical well-being.

## Students with Asthma Can Be Active Too!

Students with asthma can stay active in sports, physical activity and general play. In fact, regular physical activity may be a benefit by strengthening upper body muscles and mobilizing mucus from the bottom of the lungs. The key is to follow treatment protocols specified by health care providers and make smart choices about the types of physical activity students participate in. It is important to continue maintaining usual activities. Some activities are better for those with diagnosed asthma and exercise-induced asthma. For more information on recommended activities see Different Sports/Different Risks.

## Dairy Foods

It has been suggested that dairy foods might be an asthma trigger. It is actually very rare for dairy products to trigger an asthma attack, unless the person has a diagnosed food allergy to dairy. Benefits of dairy products as a source of vitamins, minerals, and calcium promote good health, strong bones and teeth. While milk products may make saliva thicker at the time of eating, they do not trigger the production of increased mucus.

## Healthy Eating

A well-balanced diet is very important for the nutrition of children and students. Eating five to nine servings a day of fruits and vegetables is recommended. In addition, wholegrain breads, cereals and lean protein sources are essential in healthy eating. Limiting the amount of fatty and sugary snacks will help with weight control. A well-balanced diet can also include moderate amounts of low-fat dairy foods, lean meats, fish, eggs, legumes, and nuts, unless any of these are identified as a potential food allergy.



warm up regimen may include five to 10 minutes of light physical activity and light stretching of all muscle groups. It is also important to have the student cool down following the physical activity program to gradually slow the heart rate and breathing. A cool down routine can include five to 10 minutes of easy walking and light stretching.

## Performance Tips

The student with EIA should always have a rescue inhaler within immediate reach. Students with EIA should have breaks during the activity and should be encouraged to drink plenty of water. Students with EIA should restrict physical activity when they have viral infections and when temperatures are cooler. On cold days or in the mornings when temperatures are cooler, a student with EIA should wear a light scarf over his/her nose and mouth to warm and moisten the air reaching the airways. If pollen is an asthma trigger, have them avoid physical activity during high pollen count days. Be aware of changing weather conditions which may affect pollen. Check with the National Allergy Bureau (NAB) (http://www.aaaai.org/nab) for pollen levels in your area. (2,4)

Episodes of exercised-induced asthma can be prevented most of the time if the medical care plan is followed. Under-treating EIA can limit the student's ability to perform during physical activity. Early recognition of the signs and symptoms and prompt treatment with short-acting medications will minimize the risk of a full asthma attack and allow the student to continue competing in sports and engaging in physical activity.



# Exercise-Induced Asthma

Students with exercise-induced asthma (EIA) have sensitive airways that react to sudden changes in temperature and humidity. With physical activity, students tend to breathe through their mouths, inhaling colder and drier air. This change in temperature and humidity causes the muscle bands around the airways to contract, which narrows the airway. With strenuous physical activity, many students with asthma will show signs of an asthma attack. Other students may have asthma symptoms only when they engage in physical activity.

## Diagnosis of Exercise-Induced Asthma

An appropriate diagnosis can provide improved management and successful treatment of EIA. During a visit with a health care provider, the student will exercise on a treadmill for six to eight minutes to produce a heart rate at 80 percent to 90 percent of the age-related maximal predicted values. Spirometry measures lung function by having the student forcibly exhale into a tube. A 12 percent to 15 percent decrease of volume in the exhaled air following exercise indicates EIA. Spirometry is performed prior to exercise, and at various intervals after the exercise has stopped. (3)

Health care providers can also evaluate a student's lung function "on the field" (prior to and following a six to eight minute run) by using a portable spirometer or a small peak flow meter, a hand-held device that measures how well air moves out of the lungs. With peak flow meters, the test is positive for EIA when there is a 15 percent to 20 percent decrease in post-exercise exhalation. (3)

## Treatment

After the diagnosis has been made, a majority of students will be on two types of medication to control EIA. There are long-term controllers and quick-relief (or rescue) medications. The student usually takes the long-acting medications once or twice a day at home. Long-acting medications will not help a student in an acute asthma attack. Most students with EIA will require an inhaled short-acting (also called rapid-acting or rescue) beta 2 medication prior to exercise. Albuterol inhalers are the most common type of short-acting medicine for EIA. To prevent EIA attacks, the student will use this inhaler a few minutes before physical activity and may need to repeat the dose during or immediately following strenuous physical activity. Short-acting inhalers have a rapid onset of action and can be effective for up to four to six hours. For a more detailed discussion, see Asthma Medication. (3)

## Physical Activity Tips

Always have the student with EIA warm up before beginning a full physical activity program. The

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# Asthma And Obesity

Several recent studies have sought to confirm the correlation between asthma and obesity. Medical research suggests that children and adults are at higher risk for asthma if they are obese (measured by body mass index). Body mass index (BMI) is a measure of body fat based on height and weight that applies to both adult men and women, adolescents and children. In developed nations, both obesity and asthma rates are increasing.

Data is being collected to determine whether asthma or obesity develops first. Preliminary research suggests asthma develops first, and because of respiratory limitations, the difficulty for asthma sufferers to engage in physical activity will lead to obesity. However, a Harvard study done by Dr. Carlos A. Camargo, Jr., found that obesity develops first. Additional weight may compress the airways making them smaller. This would affect reaction to cold and other asthma triggers. Another Harvard researcher, Scott T. Weiss, M.D. studied children who were overweight and found that they were almost twice as likely to develop asthma than normal weight children. When shortness of breath and wheezing occur in people with asthma, the airways become smaller as they begin to close. This prevents adequate air from getting into the lung airways. The airways may become inflamed, causing mucus to block the airways. It is suggested that extra weight could put additional pressure on the airways causing them to close.

## Asthma and Physical Activity

It is important for people with asthma to discuss how to engage in physical activity and develop with their health care provider a medication program that meets their specific needs.
The benefits of daily physical activity can assist with weight loss and maintenance of good health and help strengthen the lungs and heart. If asthma is well-managed, most should be able to participate in physical activity without the symptoms of asthma appearing.

## Asthma and Nutrition

Because food is not a common asthma trigger, there are no diet restrictions for people with asthma unless there is a food allergy. A modified food intake is required only when a specific sensitivity is diagnosed. A well-balanced eating plan is important to staying fit and healthy, and assisting in controlling asthma. Eating a variety of nutritious foods from all five food groups and eating in moderation is recommended.



# Different Sports/Different Risks

With proper medication and treatment, people with EIA can participate in any sport, although some activities are considered better than others. Sports requiring short bursts of energy and those sports with periods of rest will be least likely to trigger EIA. Vigorous running sports are more likely to induce EIA. Cold weather activities such as cross-country skiing, figure skating and ice hockey are also more likely to aggravate airways.

Swimming is often the sport of choice for students with asthma because of the many positive factors including a warm, humid atmosphere, year-round availability, toning of upper body muscles and the way the horizontal position may help move mucus from the bottom of the lungs. One drawback is that chemicals in the enclosed area can trigger an asthma attack. Walking, leisure biking, hiking, surfing and free downhill skiing are also activities less likely to trigger EIA because they allow athletes to regain control of their breathing.

Other asthma-friendly activities include martial arts, yoga, golfing, inline skating, and weightlifting. These activities are good choices because they allow students with asthma to breathe through their noses and control how hard and fast they breathe. They mix short, intense activities with long endurance workouts. They can be done in a controlled environment (for example, in a gym with air that is not too cold or dry) and around other people who can help if an attack occurs.

Team sports that require short bursts of energy with periods of rest, such as baseball, softball, football, wrestling, gymnastics, volleyball, tennis, golfing and short-term track and field events are less likely to trigger asthma than sports requiring continuous activity such as soccer, basketball, field hockey or long-distance running.

Just because a student has been diagnosed with EIA does not mean he/she cannot participate in sports and physical activity. Many world-class athletes and Olympians are affected by EIA and have achieved their athletic goals by maintaining a proper asthma management program. Such athletes include Amy VanDyken, Kurt Grote, Tom Dolan and Nancy Hogshead (swimming), Greg Louganis (diving), Rob Muzzio (decathlon), Jackie Joyner-Kersee (track and field), and Bruce Davidson (equestrian). NFL athletes Art Monk and Jerome Bettis and NBA athletes Dennis Rodman and Dominique Wilkins are among the outstanding professional athletes with asthma. Most physicians agree that with the proper precautions and therapy, all athletes and individuals with asthma can enjoy sports activity and good health. (1)

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Physical activity is beneficial for all students' physical health and emotional well-being. Students with asthma should be physically active, as long as they take proper precautions. Asthma is a common disease and affects as many as one out of 10 young athletes. However, asthma can be effectively managed and controlled so students with asthma can participate in sports and activities. Certain activities are better for students with EIA, and with an appropriate diagnosis and treatment, most students can participate in activities to their full ability.

Sports that require short bursts of energy and are **less** likely to trigger EIA include: (5)

- Swimming
- Football
- Baseball
- Wrestling
- Short-distance track and field events
- Volleyball
- Golf
- Leisure biking
- Gymnastics
- Hiking

Sports that require continuous activity and/or cold weather activities and are **more** likely to trigger EIA include: (5)

- Soccer
- Basketball
- Long-distance running
- Hockey
- Cross-country skiing

Many athletes with asthma have found that with proper training and medical treatment, asthma does not have to hold them back, even in activities that are more likely to trigger EIA. Coaches, athletic trainers and teachers should have specific written instructions in effectively managing the student's asthma, including the student's asthma action plan. For more information, see Asthma Action Plans.



**U.S. Environmental Protection Agency**
Indoor Environments Division
Arial Rios Building
1200 Pennsylvania Avenue, N.W. (Mail Code 6609J)
Washington, DC 20460
Phone 202-564-9370
Toll free 800-621-8431
Fax 202-565-2038/2039
Web site: www.epa.gov/iaq/asthma



# Resources

## American Lung Association (National Office)

1740 Broadway
New York, NY 10019-4374
Phone 800-586-4872
Fax 212-265-5642
Web site: www.lungusa.org

## National Heart, Lung and Blood Institute

Asthma Education and Prevention Program
P.O. Box 30105
Bethesda, MD 20824-0105
Phone 301-251-1222
Web site www.nhlbi.nih.gov
Resources: Asthma Management Model
www.nhlbisupport.com/asthma/index.html
Asthma Education and Prevention Program
www.nhlbi.nih.gov/about/naepp/index.htm
Asthma Awareness Curriculum for Elementary Classroom:
www.nhlbi.gov/health/prof/lung/asthma/school/index.htm
How Asthma Friendly is Your School
www.nhlbi.nih.gov/health/public/lung/asthma/friendhi.htm
Asthma and Physical Activity in the School
www.nhlbi.nih.gov/health/public/lung/asthma/phy_asth.htm
Guidelines for the Diagnosis and Management of Asthma
www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm

## U.S. Centers for Disease Control and Prevention

National Center for Environmental Health
Mail Stop F-29
4770 Buford Highway, N.E.
Atlanta, GA 30341-37241
Toll free 888-232-6789
Web site: http://www.cdc.gov/nceh/asthma/default.htm

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# Call To Action

"Are you willing to make a sustained commitment in furthering the statewide agenda for asthma? Are you willing to assist with the implementation of strategies and activities identified in the state's plan: Addressing Asthma in Illinois?"

After reviewing the work plan and your own organization's mission and goals, please identify **at least one** work group in which you or a representative from your organization will participate.

_____**Data, Assessment and Outcomes Work Group**

Identify data sources of local and statewide significance, disseminate and promote use of available data, coordinate expansion of data collection and identify and share successful local models.

_____**Schools Work Group**

Provide effective asthma educational materials and resources to school personnel, promote consistent messages in the school community on the management of asthma and provide school personnel with the necessary tools to develop strategies and policies to support the school community throughout the educational continuum, including day care through college, in the management of asthma.

_____**Occupational Asthma Work Group**

Assess the burden of asthma in the workplace, provide information to businesses that addresses asthma as a public health issue in the workplace and work toward ensuring that people affected by asthma in the workplace have access to resources.

_____**Education Work Group**

Identify education and training needs of various health professionals, assess successful strategies for potential statewide or regional replication and promote the National Heart, Lung and Blood Institute guidelines.

_____**Policy and Advocacy**

Identify key issues that need to be addressed from a policy/advocacy perspective, educate and raise awareness to policy makers on asthma, and advocate for asthma issues.

Name_____

Organization_____

Address_____

Phone_____Fax_____

E-mail_____

**Please return form to**

Illinois Department of Public Health
535 W. Jefferson St., Springfield, Illinois 62761
Fax 217-782-1235

If you have questions about participating in the state's asthma program, call 217-782-3300.



# When a Student is Having An Asthma Attack

Sometimes, no matter how carefully the asthma action plan is followed (i.e. taking asthma medications and avoiding asthma triggers), students may have asthma attacks. Asthma attacks are the result of a gradual worsening of symptoms over a few days. **If your student's asthma symptoms are getting worse, do not ignore them!** It is important that you understand the warning signs, be aware of the symptoms and triggers and most importantly have their asthma action plan at hand.

## The following are recommendations if the student is having an asthma attack:

- Remain calm
- Reassure the student
- Remove the student from the activity or trigger
- Follow the student's asthma action plan
- Use quick-relief medication as ordered by the student's physician
- Monitor peak flow every 15 minutes
- Give sips of room temperature water
- If there is no improvement within 15-30 minutes, or the student is getting worse, call 911

## Call 911 if.....

- Peak flow monitoring indicates less than 50 percent of personal best
- Retractions (neck area or space between ribs sinks in with each breath)
- The student sits hunched over to breathe
- The student has difficulty walking, talking or is unable to speak
- Lips or fingernails turn blue or gray

## NEVER leave a student alone when he/she is having asthma symptoms!!

Early appropriate intervention for asthma symptoms results in good outcomes for the student.



# Asthma Action Plans

Asthma experts recommend the use of written asthma action plans as part of the overall effort to educate patients and caregivers in asthma self-management. The action plan provides information about daily and emergency asthma care, including how to evaluate an emergency and respond appropriately.

An asthma action plan (also called management plan) is a written way to recognize, describe, document and respond to the early signs and symptoms of an asthma attack. Use of the plan can decrease repeated asthma attacks and emergency room visits. An important element in the success of asthma management is the communication and collaboration between the student, family, health care provider, and school personnel, including school nurses, teachers, coaches, athletic trainers and office staff.

## Asthma action plans should include:

- A list of triggers
- A list of peak flow meter readings and zones based on the student's personal best
- A list of the student's own symptoms of asthma and what to do when they occur
- A list of any allergies
- An emergency plan – when medicines are not working
- The name and dose of long-term medicine and quick-relief medicine
- Emergency phone numbers and location of emergency care
- Instructions about when to contact the doctor and who to call if the doctor is unavailable

Most asthma action plans are based on peak flow meter measurements and the student's early signs of an asthma attack. When asthma signs are present, the action plan helps everyone to know what medicine should be taken and what activity changes should be made. The action plan is what the health care provider and the student/family have agreed on as the best way to manage the student's asthma. Decisions can be made based on the written plan. Action plans should be given to everyone who has contact with the student and should be reviewed and updated at least once a year.

By working together with a health care provider, parent, and caregiver, and learning to manage asthma, the student can expect to have a trouble-free and fully active life.



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6 Illinois Department of Human Services (2001), Asthma Management: A Resource Manual for Schools.

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# Managing Asthma In The Physically Active Student

## Evaluation for Illinois Asthma Coach's Packet

School zip code_____

1. Have you had a chance to review the coaches' packet?

❑ YES ❑ NO

2. Have you had a chance to use the coaches' packet?

❑ YES ❑ NO

3. How did you use the packet?

❑ I have not used it yet.
❑ I have used it to_____

4. Did the guide fit your needs for this use (as described in item 3)?

❑ YES ❑ NO
If NO, please elaborate_____

5. Are there any changes you would like to see implemented in the packet?

❑ no changes
❑ recommended changes_____

6. What section(s) have you found to be most useful about the packet?

❑ no one section
❑ please list useful features_____

7. Would you be interested in receiving training on asthma?

❑ YES ❑ NO

**(Continued on back)**



8.Comments_____

_____

_____

For more information on the Illinois Asthma Program, contact:

Illinois Department of Public Health
Illinois Asthma Program
535 W. Jefferson Street
Springfield, IL 62761
Phone 217-782-3300 • Fax 217-782-1235