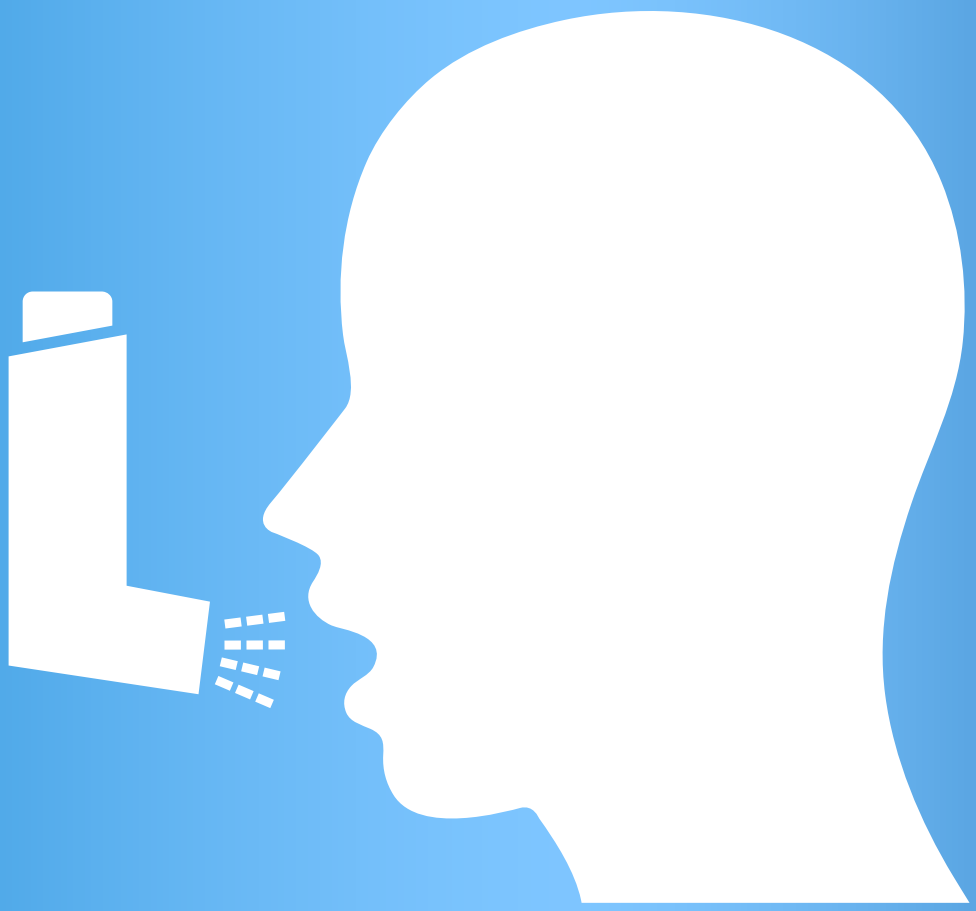
ASTHMA TOOLKIT



Illinois Primary Health Care Association
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Asthma occurs when the airways of the lungs narrow or become blocked due to an exacerbating factor, such as air pollution, allergens, exercise, stress, and environmental factors among others. In the United States, over 25 million people are known to have asthma. Approximately 7 million of these affected people are children. Moreover, four-thousand people die annually from asthma–related issues and asthma contributes to another 7,000 deaths every year.[1]

This toolkit has been developed as a comprehensive resource for healthcare providers and compiles available resources to assist clinicians with asthma control care. Another key focus of this toolkit is to improve patient's awareness of asthma care recommendations and tools for patient resources. Furthermore, the toolkit will help ensure providers are up to date with current multimedia tools, such as asthma–related podcasts and videos.

Multiple resources from different sources (Centers for Disease Control, Environmental Protection Agency, American Lung Association, USHHS, Illinois State specific resources, and others) have been compiled and categorized into guidelines, screening and assessment tools, management guidelines, medication lists, quality improvement strategies, provider checklists, and patient resources.

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What is Asthma?

Asthma is a chronic lung disease that causes inflammation and narrows airways. Asthma causes recurrent periods of wheezing, shortness of breath, chest tightness, and coughing. Asthma may affect people of all ages but most often it begins during childhood. Sometimes symptoms are mild and subside on their own or after minimal treatment with asthma medication. Other times, symptoms persist and increase in severity. Asthma attacks occur when symptoms get more intense or when more symptoms arise (Fig. 1). These attacks are also called exacerbations or flare-ups. Treating symptoms when they are first noticed is important. This early identification will help prevent symptoms from worsening and causing an asthma attack. Severe asthma attacks may require emergency care and they may also be fatal.

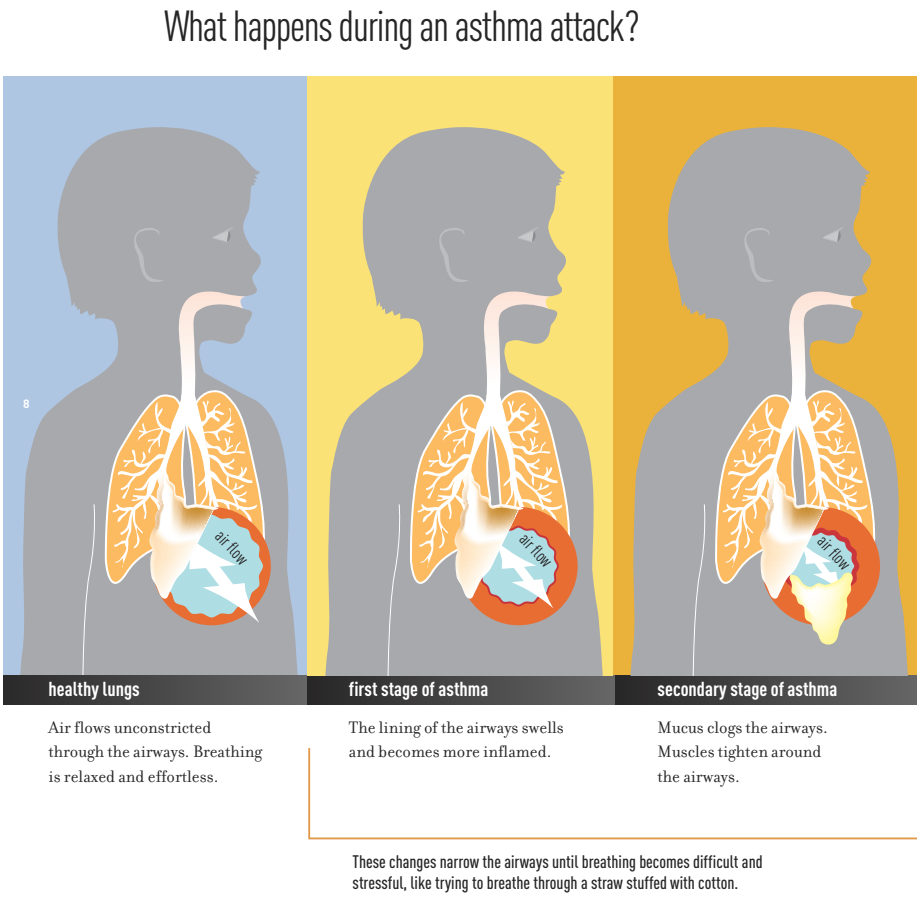


Figure 1. This image shows the different stages of asthma during an asthma attack (CDC)

What is Asthma - Multimedia

- The American Lung Association created an informative animation that explains what asthma is and how it affects people. The animation can be watched at https://www.youtube.com/watch?v=XohTFq14oX0
- Healthcare professionals may share the following "Asthma - What You Need to Know PSA" CDC podcast with patients to increase asthma awareness https://tools.cdc.gov/medialibrary/index.aspx#/media/id/303704
- AAFA's "Understanding Asthma Basics" video can be viewed at https://www.youtube.com/watch?v=CSpr9mvMtLo

Causes & Risk Factors

Understanding the experiences or exposures that may cause an asthma flare-up is a critical step to better asthma management. Developing an action plan or limiting the patient's exposure to asthma triggers can eliminate or reduce asthma symptoms and put them back on the right track to better control their asthma. The following factors contribute to the development of asthma genetics, allergies, respiratory infections, and the environment as it pertains to exposure to irritants and other asthma triggers.

Asthma affects people of all ages but it most often starts during childhood. Young children who often wheeze and have respiratory infections, as well as certain other risk factors, are at highest risk of developing asthma and this increased risk continues past 6 years of age. Asthma can affect anyone, but African Americans and Puerto Ricans are at a higher risk for developing asthma than those of other ethnic and racial groups. Overall, asthma is common among children and teens. In the U.S., approximately three students in an average classroom of 30 have asthma.

It is possible to develop asthma due to contact with certain chemical irritants or industrial dusts in the workplace. This type of asthma is known as occupational asthma. If asthma or atopy runs in a patient's family, then exposure to irritants (ex. tobacco smoke) may make the patient's airways more reactive to harmful substances in the air.

Symptoms

Common symptoms and signs of asthma include coughing, wheezing, chest tightness, and shortness of breath. However, not all patients who have asthma have these symptoms. Likewise, exhibiting these symptoms does not always mean that the patient has asthma. The best way to diagnose asthma for certain is to use a lung function test, a medical history (that includes type and symptom frequency), in addition to a physical exam. The types of symptoms, frequency with which they occur, and symptom severity may vary over time. Severe symptoms have the potential to be fatal which is why it is important to treat symptoms when they are first identified. With proper treatment most patients who have asthma can expect to have fewer, if any, symptoms.

Asthma Triggers

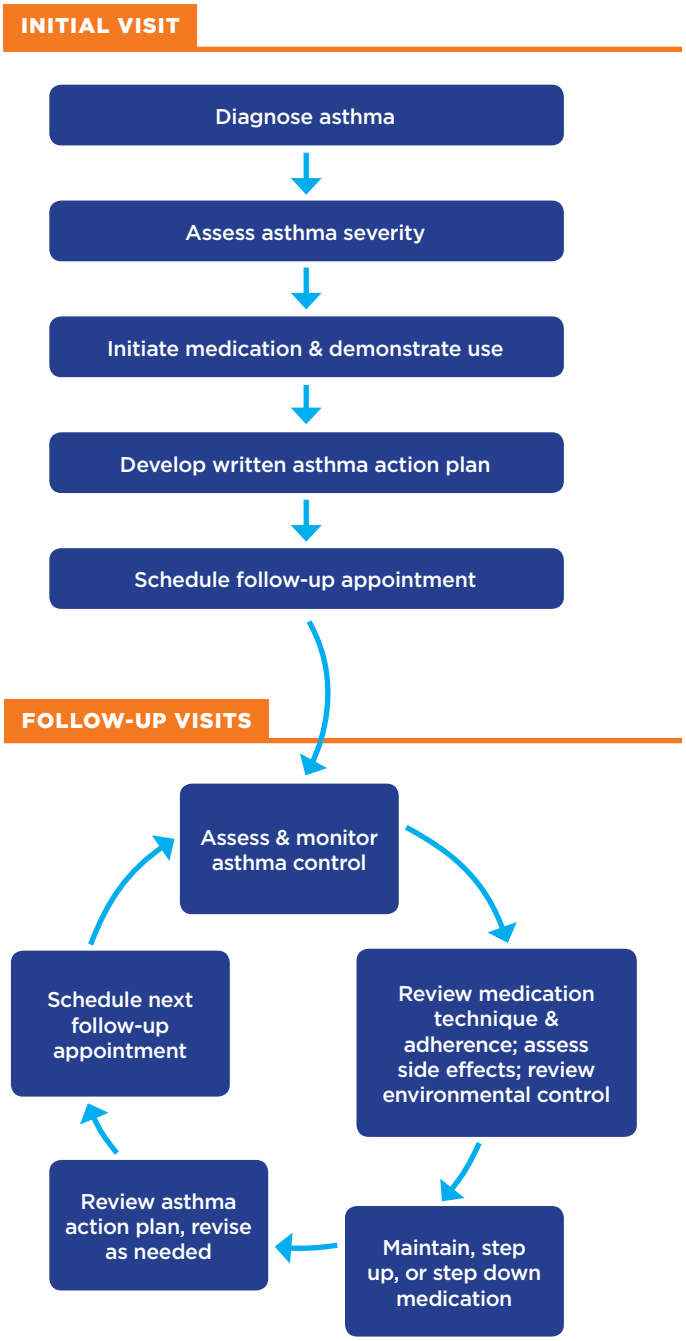
Typically, Americans spend up to 90% of their time indoors. Indoor allergens and irritants both play a key role in triggering asthma attacks. Asthma triggers can cause symptoms, an asthma episode, an attack, or exacerbate asthma. If a patient has asthma, they may react to only one trigger or may discover that several things act as triggers. Providers should work with patients to identify triggers and develop a subsequent treatment plan that includes ways to reduce exposures to asthma triggers (Image 1). Examples of asthma triggers include allergic reactions to dust mites, molds, cockroaches and pests, pets; exposure to nitrogen dioxide, outdoor air pollution, chemical irritants, and wood smoke; respiratory illness such as flu, colds, pneumonia, sore throats, sinus infections; and exercise and other activities that cause people to breath harder.

Image 1. Common Asthma Triggers

Please click on the following video to view more information regarding asthma triggers: https://www.youtube.com/watch?v=wBalpNH0h_g

Asthma Guidelines

The National Asthma Education and Prevention Program (NAEPP) has developed guidelines for the diagnosis and management of asthma. The guidelines were then published in an expert panel report (EPR 3) in 2007. The EPR 3 Asthma Guidelines were developed by an expert panel who were commissioned by the NAEPP Coordinating Committee. This committee was coordinated by the National Heart, Lung, and Blood Institute of the National Institutes of Health (NIH). The expert panel organized a literature review and guidelines that report around the following four essential components of asthma care: assessment and monitoring, patient education, control of factors contributing to asthma severity, and pharmacologic treatment. Subtopics were developed for each of these four broad categories. A subsequent quick reference guide was created to help clinicians provide quality health care to people who have asthma. The diagram below is from the quick guide and shows the overall steps in providing quality asthma care:



Guidelines for Diagnosis & Management of Asthma

Excerpts from the quick reference guide include a table on key clinical activities and special circumstances. They are listed as follows:

KEY CLINICAL ACTIVITIES FOR QUALITY ASTHMA CARE

(See complete table in *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma* [EPR-3])

Clinical Issue	Key Clinical Activities and Action Steps
➡ ASTHMA DIAGNOSIS	
	Establish asthma diagnosis. ▪ Determine that symptoms of recurrent airway obstruction are present, based on history and exam. • History of cough, recurrent wheezing, recurrent difficulty breathing, recurrent chest tightness • Symptoms occur or worsen at night or with exercise, viral infection, exposure to allergens and irritants, changes in weather, hard laughing or crying, stress, or other factors ▪ In all patients ≥5 years of age, use spirometry to determine that airway obstruction is at least partially reversible. ▪ Consider other causes of obstruction.
➡ LONG-TERM ASTHMA MANAGEMENT	
GOAL: Asthma Control	**Reduce Impairment** ▪ Prevent chronic symptoms. ▪ Require infrequent use of short-acting beta$_2$-agonist (SABA). ▪ Maintain (near) normal lung function and normal activity levels. **Reduce Risk** ▪ Prevent exacerbations. ▪ Minimize need for emergency care, hospitalization. ▪ Prevent loss of lung function (or, for children, prevent reduced lung growth). ▪ Minimize adverse effects of therapy.
Assessment and Monitoring	**INITIAL VISIT: Assess asthma severity to initiate treatment** (see page 5)**.** **FOLLOW-UP VISITS: Assess asthma control to determine if therapy should be adjusted** (see page 6)**.** ▪ Assess at each visit: asthma control, proper medication technique, written asthma action plan, patient adherence, patient concerns. ▪ Obtain lung function measures by spirometry at least every 1–2 years; more frequently for asthma that is not well controlled. ▪ Determine if therapy should be adjusted: Maintain treatment; step up, if needed; step down, if possible. **Schedule follow-up care.** ▪ Asthma is highly variable over time. See patients: • Every 2–6 weeks while gaining control • Every 1–6 months to monitor control • Every 3 months if step down in therapy is anticipated
Use of Medications	**Select medication and delivery devices that meet patient's needs and circumstances.** ▪ Use stepwise approach to identify appropriate treatment options (see page 7). ▪ Inhaled corticosteroids (ICSs) are the most effective long-term control therapy. ▪ When choosing treatment, consider domain of relevance to the patient (risk, impairment, or both), patient's history of response to the medication, and willingness and ability to use the medication. **Review medications, technique, and adherence at each follow-up visit.**

KEY CLINICAL ACTIVITIES FOR QUALITY ASTHMA CARE *(continued)*

Clinical Issue	Key Clinical Activities and Action Steps
Patient Education for Self-Management	**Teach patients how to manage their asthma.** ▪ Teach and reinforce at each visit: • Self-monitoring to assess level of asthma control and recognize signs of worsening asthma (either symptom or peak flow monitoring) • Taking medication correctly (inhaler technique, use of devices, understanding difference between long-term control and quick-relief medications) - ***Long-term control medications*** (such as inhaled corticosteroids, which reduce inflammation) prevent symptoms. Should be taken daily; will not give quick relief. - ***Quick-relief medications*** (short-acting beta$_2$-agonists or SABAs) relax airway muscles to provide fast relief of symptoms. Will not provide long-term asthma control. If used >2 days/week (except as needed for exercise-induced asthma), the patient may need to start or increase long-term control medications. • Avoiding environmental factors that worsen asthma **Develop a written asthma action plan** in partnership with patient/family (sample plan available at *www.nhlbi.nih.gov/health/public/lung/asthma/asthma_actplan.pdf*). ▪ Agree on treatment goals. ▪ Teach patients how to use the asthma action plan to: • Take daily actions to control asthma • Adjust medications in response to worsening asthma • Seek medical care as appropriate ▪ Encourage adherence to the asthma action plan. • Choose treatment that achieves outcomes and addresses preferences important to the patient/family. • Review at each visit any success in achieving control, any concerns about treatment, any difficulties following the plan, and any possible actions to improve adherence. • Provide encouragement and praise, which builds patient confidence. Encourage family involvement to provide support. **Integrate education into all points of care involving interactions with patients.** ▪ Include members of all health care disciplines (e.g., physicians, pharmacists, nurses, respiratory therapists, and asthma educators) in providing and reinforcing education at all points of care.
Control of Environmental Factors and Comorbid Conditions	**Recommend ways to control exposures to allergens, irritants, and pollutants that make asthma worse.** ▪ Determine exposures, history of symptoms after exposures, and sensitivities. (In patients with persistent asthma, use skin or in vitro testing to assess sensitivity to perennial indoor allergens to which the patient is exposed.) • Recommend multifaceted approaches to control exposures to which the patient is sensitive; single steps alone are generally ineffective. • Advise all asthma patients and all pregnant women to avoid exposure to tobacco smoke. • Consider allergen immunotherapy by trained personnel for patients with persistent asthma when there is a clear connection between symptoms and exposure to an allergen to which the patient is sensitive. **Treat comorbid conditions.** ▪ Consider allergic bronchopulmonary aspergillosis, gastroesophageal reflux, obesity, obstructive sleep apnea, rhinitis and sinusitis, and stress or depression. Treatment of these conditions may improve asthma control. ▪ Consider inactivated flu vaccine for all patients >6 months of age.

ASTHMA CARE FOR SPECIAL CIRCUMSTANCES

Clinical Issue	Key Clinical Activities and Action Steps
Exercise-Induced Bronchospasm	**Prevent EIB.*** ▪ Physical activity should be encouraged. For most patients, EIB should not limit participation in any activity they choose. ▪ Teach patients to take treatment before exercise. SABAs* will prevent EIB in most patients; LTRAs,* cromolyn, or LABAs* also are protective. Frequent or chronic use of LABA to prevent EIB is discouraged, as it may disguise poorly controlled persistent asthma. ▪ Consider long-term control medication. EIB often is a marker of inadequate asthma control and responds well to regular anti-inflammatory therapy. ▪ Encourage a warm-up period or mask or scarf over the mouth for cold-induced EIB.
Pregnancy	**Maintain asthma control through pregnancy.** ▪ Check asthma control at all prenatal visits. Asthma can worsen or improve during pregnancy; adjust medications as needed. ▪ Treating asthma with medications is safer for the mother and fetus than having poorly controlled asthma. Maintaining lung function is important to ensure oxygen supply to the fetus. ▪ ICSs* are the preferred long-term control medication. ▪ Remind patients to avoid exposure to tobacco smoke.

CDC Expert Commentary

The CDC collaborated with Medscape to create videos designed to deliver CDC's authoritative guidance directly to Medscape's physicians, nurses, pharmacists, and other health care professionals. To access the videos -> click on the weblinks below -> register for free Medscape account -> watch video.

Help Patients with Asthma Use Inhalers the Right Way
Dr. Joy Hsu explains the importance of teaching people with asthma how to use their medications properly and shares an instructional tool CDC created to assist physicians. (3:06)
Watch the video here: https://www.medscape.com/viewarticle/861672

Acetaminophen and Asthma
Dr. Elizabeth Herman comments on recent questions regarding the use of acetaminophen and either the development of asthma or the severity of asthma symptoms. (5:34)
Watch the video here: https://www.medscape.com/viewarticle/759821

The Prescription for Wintertime Asthma Control
Dr. Elizabeth Herman tells clinicians how a few minutes of counseling can help keep their patients with asthma healthy all winter. (3:25)
Watch the video here: https://www.medscape.com/viewarticle/758093

The 15-Minute Asthma Visit
Dr. David Callahan outlines how clinicians can provide evidence-based care for patients with asthma in a 15-minute office visit. (5:32)
Watch the video here: https://www.medscape.com/viewarticle/745863

Asthma Control During Travel
Dr. David Callahan outlines how clinicians can prepare patients with asthma for symptom-free travel. (3:46)
Watch the video here: https://www.medscape.com/viewarticle/741288

Training Resources for Health Care Providers

Spirometry
Spirometry is a test used to assess how well a person's lungs work. The test measures how much air is inhaled, how much air is exhaled, and how quickly one exhales. Spirometry is used to diagnose asthma, chronic obstructive pulmonary disease (COPD), and other conditions that may affect breathing. Also, spirometry may be used to periodically monitor lung condition and check whether a treatment is helping the patient breathe better.

NIOSH-approved spirometry training course
The National Institute for Occupational Safety and Health (NIOSH) approves a spirometry training course when it determines that the course director, faculty, practicum equipment, and curriculum meet the minimum OSHA/NIOSH criteria. Upon successful completion of a NIOSH approved course, students are provided with a training certificate that is issued by the course director. Certificates are valid for up to 5 years. All NIOSH approved Spirometry Training Course Sponsors offer initial 2 to 3 day courses and some sponsors also offer 1 day refresher courses. A map of existing approved courses may be viewed by visiting the following CDC webpage: https://www.cdc.gov/niosh/topics/spirometry/approved-course.html

Asthma Educator Institute
The American Lung Association developed the Asthma Educator Institute, a two-day preparatory course for individuals that want to implement asthma guidelines-based care and those qualified to take the National Asthma Educator Certification Board (NAECB) examination. The American Lung Association Asthma Educator Institute was developed in January of 2003 and mirrors the National Institute of Health, Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma.

The curriculum covers the detailed content outline in the NAECB Candidate Handbook and includes case reviews, hands-on skills demonstration and practice. The course is delivered by asthma experts, including Certified Asthma Educators (AE-C), respiratory therapists, nurse practitioners, physicians, health educators and pharmacists. For more information, including past and upcoming courses, please click on the following link: http://www.lung.org/lung-health-and-diseases/lung-disease-lookup/asthma/asthma-education-advocacy/asthma-educator-institute.html

The PACE Curriculum
The PACE program curriculum is delivered in two 2 ½ hour sessions, which are ideally spaced one week apart to give participants an opportunity to try out the concepts from the first session. Their experiences can then be discussed at the second session. The PACE program was first created by public health professionals and physicians at the University of Michigan Center for Managing Chronic Disease and their colleagues at Columbia University. The seminar works best when there are three to four instructors:

- Primary care provider
- Asthma specialist
- Health educator
- Expert in practice coding and billing (for optional segment)

Resources for organizing and leading PACE include everything needed to deliver the PACE curriculum. Below is a brief overview of the curriculum and didactic methods used.

The following video explains the PACE curriculum available in the link below:
https://www.youtube.com/watch?v=zn0ju9g9Pz0&list=PL_ntiNjc6Gvn9CyCUgIxSsO5PPm9okM18&index=5

Target Audience
Eight to ten primary care physicians per PACE session is ideal for ensuring full participation.

Location and Equipment

The NIH recommends using a site with a central location for all participants that provides comfortable surroundings and has audiovisual equipment and support. The session coordinator will need a laptop computer and projector to run the slide presentations. The videos can be presented using a DVD player and a television monitor, or they can be projected from a laptop.

Resources for Organizing and Leading a PACE Seminar

Session basics, training videos for facilitators, PowerPoint presentations, and other materials for each organizing and leading PACE sessions include everything you need to deliver the PACE curriculum: https://www.nhlbi.nih.gov/health-pro/resources/lung/physician-asthma-care-education/resources-for-pace-seminar.htm

Asthma Control Test

The Asthma Control Test helps patients and their health care providers determine if asthma symptoms are well controlled. There are two different test depending on the patient's age. One test is for adults and adolescents ages 12 years and older and the second is for children ages 4 to 11 years. For patient's aged 4 to 11 years old, children will respond to 3 questions then parents or guardians will need to help the child respond to a series of 4 subsequent questions. Patients 12 years and older will fill out a similar test that is 5 questions long. For convenience, both tests can be printed then filled out. Scores from the tests should be shared with healthcare providers (See App. E).

Weblinks for Asthma Control Test

- Children 4-11 years: https://www.asthma.com/additional-resources/childhood-asthma-control-test.html
- Children and adolescents 12 years and older: - https://www.asthma.com/additional-resources/asthma-control-test.html

Child Asthma Risk Assessment Tool (CARAT)

The Child Asthma Risk Assessment Tool (CARAT) was designed to help clinicians, asthma counselors, and parents determine potential risks for children who have asthma. The tool quickly provides a personal risk profile for a child with asthma. A detailed questionnaire looks at a variety of potential risks for a child and then reports on those factors affecting that child. It is designed to help clinicians, asthma counselors, and parents determine risks for children with asthma.
CARAT is available at http://carat.scgcorp.com/risk-profile/

Asthma Diagnosis Protocols from Asthma and Allergy Foundation of America (AAFA)
To diagnose asthma, physicians will need to discuss the patient's medical history with the patient and perform a physical exam. The patient may need a lung function test and possibly other tests (i.e. chest or sinus x-ray). First, if the doctor thinks a patient has asthma, they will conduct a physical exam. The doctor will check ears, eyes, nose, throat, skin, chest and lungs. This exam may include a lung function test that detects how well patient's exhale air from their lungs. Next, patient may also need an X-ray of patient's lungs or sinuses.

Lung Function Test
To confirm asthma, the doctor may have patients perform lung function tests, which measure their breathing. Lung function tests are often done before and after inhaling a medicine known as a bronchodilator which opens your airways. If lung function improves significant with use of a bronchodilator, the patient probably has asthma. The doctor may also prescribe a trial period with asthma medicine to see if it helps symptoms. Common lung function tests used to diagnose asthma include:

Different Types of Asthma

There are four levels of asthma that are based on how severe the condition is.

Intermittent Asthma — You have symptoms less than twice a week and wake up less than two nights a month.
Mild Persistent Asthma — You have symptoms two or more days a week and wake up three to four nights a month.
Moderate Persistent Asthma — You have symptoms at least every day and wake up one or more nights a week.
Severe Persistent Asthma — You have symptoms during the day and wake up every night due to asthma.

The frequency of symptoms and level of function determines how severe asthma is. During an initial visit, doctors will ask questions around how often the patient has symptoms and wake up at night from coughing or trouble breathing. They may also ask how often the patient has trouble doing normal activities or use a rescue inhaler. Doctors may share the following video with patients to explain the differences between levels of severity for asthma: https://www.youtube.com/watch?v=LRRr1A_-gqM&feature=youtu.be

Allergy Testing for Persons with Asthma

The CDC created the following fact sheet that discusses how allergies affect individuals with asthma and allergy testing:

Allergy Testing for Persons with Asthma

Frequently Asked Questions

What are allergies?

Allergy problems ("allergies") happen when a person's immune system overreacts to an allergen. An allergen is any substance that causes the immune system to overreact ("allergic reaction").

How do allergies affect asthma?

For persons with asthma and allergies, exposure to allergens can increase asthma symptoms and trigger asthma attacks. In these individuals, exposure to allergens can also cause symptoms such as sneezing, stuffy nose, or itchy eyes.

Why is allergy testing for inhalant allergens important in asthma?

Inhalant allergens (e.g., pollens, molds, animal dander, and house dust mites) appear to be the most important for children and adults with asthma. Allergic individuals with asthma often experience chest, nose, or eye symptoms soon after they are exposed to inhalant allergens. Food allergens are not a common cause of asthma symptoms.

When should allergy testing be administered in persons with asthma?

The recommendation is that children and adults with persistent asthma receive allergy testing, particularly for indoor inhalant allergens (animal dander, house dust mites, cockroaches, and certain molds). Also, allergy testing can be considered for persons with intermittent asthma.

What does allergy testing look for?

Allergy testing looks for a substance in the body called Immunoglobulin E (IgE). IgE is a cause of allergies. Some individuals have IgE for only one type of allergen (e.g., cat), other individuals have IgE for multiple types of allergens (e.g., cat, cockroach, and ragweed), and others have no IgE for any allergens. Allergy testing can show whether an individual has IgE for zero, one, or more than one allergen.

Allergy testing for persons with asthma usually looks for IgE for inhalant allergens that are known to commonly affect asthma symptoms. Some inhalant allergen sources can be present in any season, such as animal dander, indoor mold, and cockroach. In contrast, levels of pollens and outdoor mold can vary by season, depending on the geographic region.

Also, allergens tested during inhalant allergy testing can vary by geographic region, because some allergens are found only in certain parts of the United States.

National Center for Environmental Health
Division of Environmental Hazards and Health Effects

How is allergy testing administered?

Allergy testing can use skin testing or blood testing to look for IgE for allergens. Each method has its benefits and its drawbacks.

Compared to blood testing, allergy skin testing provides results more quickly (within one hour). However, not all health-care providers have the resources and knowledge to conduct allergy skin testing. Also, some individuals with asthma cannot receive skin testing because of certain medical problems they have or because of certain medications they take.

If allergy skin testing is not possible, blood testing for allergies can be used. Waiting for allergy blood test results usually takes longer than waiting for allergy skin test results. Persons who receive allergy blood testing usually wait at least one day (or several days or weeks) for their test results.

How are allergy test results used?

Both allergy test results and asthma symptoms are important information for persons with asthma. Because allergies found during allergy testing do not always trigger asthma symptoms, health care providers can find out if an individual's asthma symptoms relate to his or her allergy test results. Sometimes, allergens found during allergy testing can affect an individual's asthma without him or her realizing it. Health care providers can use their expertise to assess which allergy test results are most important for each individual with asthma.

If one or more allergens appear to affect an individual's asthma, the recommendation is that the individual reduce or avoid exposure to those allergens. For example, during peak pollen times and peak pollen seasons, persons with asthma who are allergic to pollens are advised to stay indoors with windows closed in an air-conditioned environment.

Another recommendation is that these individuals take multiple actions to avoid exposure to allergens, because single actions alone are not as effective. For example, an integrated pest management program is recommended for persons with asthma who are allergic to cockroaches. Integrated pest management includes: blocking cockroach entry into the home by sealing cracks and holes; removing sources of cockroach food by using sealed food containers and disposing of trash frequently; and, when necessary, applying low-toxicity pesticides (out of the reach of children and pets).

Additional Resources

Centers for Disease Control and Prevention

- Asthma: Basic Information: http://www.cdc.gov/asthma/faqs.htm
- Asthma: A Presentation of Asthma Management and Prevention (Slide Presentation and Speaker Notes): http://www.cdc.gov/asthma/speakit/default.htm
- Mold website:http://www.cdc.gov/mold/default.htm

Centers for Disease Control and Prevention and the Task Force on Community Preventive Services

- Home-based Multi-trigger, Multi-component Environmental Interventions: http://www.thecommunityguide.org/asthma/index.html

National Heart, Lung, and Blood Institute

- National Asthma Education and Prevention Program: Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma (July 2007 update): http://www.nhlbi.nih.gov/guidelines/asthma/index.htm

Guidelines for Diagnosis and Management of Asthma

Excerpts from the NIH quick reference guide include stepwise tables that list steps for assessing and classifying asthma during initial visits and follow-up visits, respectively.

INITIAL VISIT: CLASSIFYING ASTHMA SEVERITY AND INITIATING THERAPY

(in patients who are not currently taking long-term control medications)

Level of severity (Columns 2–5) is determined by events listed in Column 1 for both impairment (frequency and intensity of symptoms and functional limitations) and risk (of exacerbations). Assess impairment by patient's or caregiver's recall of events during the previous 2–4 weeks; assess risk over the last year. Recommendations for initiating therapy based on level of severity are presented in the last row.

Components of Severity		Intermittent			Persistent								
					Mild			Moderate			Severe		
		Ages 0–4 years	Ages 5–11 years	Ages ≥12 years	Ages 0–4 years	Ages 5–11 years	Ages ≥12 years	Ages 0–4 years	Ages 5–11 years	Ages ≥12 years	Ages 0–4 years	Ages 5–11 years	Ages ≥12 years
Impairment	Symptoms	≤2 days/week			>2 days/week but not daily			Daily			Throughout the day		
Impairment	Nighttime awakenings	0	≤2x/month		1–2x/month	3–4x/month		3–4x/month	>1x/week but not nightly		>1x/week	Often 7x/week	
Impairment	SABA* use for symptom control (not to prevent EIB*)	≤2 days/week			>2 days/week but not daily	>2 days/week but not daily and not more than once on any day		Daily			Several times per day		
Impairment	Interference with normal activity	None			Minor limitation			Some limitation			Extremely limited		
Impairment	Lung function		Normal FEV_1 between exacerbations	Normal FEV_1 between exacerbations									
Impairment	➔ FEV_1* (% predicted)	Not applicable	>80%	>80%	Not applicable	>80%	>80%	Not applicable	60–80%	60–80%	Not applicable	<60%	<60%
Impairment	➔ FEV_1/FVC*		>85%	Normal†		>80%	Normal†		75–80%	Reduced 5%†		<75%	Reduced >5%†
Risk	Asthma exacerbations requiring oral systemic corticosteroids‡	0–1/year			≥2 exacerb. in 6 months, or wheezing ≥4x per year lasting >1 day AND risk factors for persistent asthma	*Generally, more frequent and intense events indicate greater severity.*							
Risk						≥2/year	*Generally, more frequent and intense events indicate greater severity.*						
Risk		*Consider severity and interval since last asthma exacerbation. Frequency and severity may fluctuate over time for patients in any severity category. Relative annual risk of exacerbations may be related to FEV_1.**											
Recommended Step for Initiating Therapy *(See "Stepwise Approach for Managing Asthma Long Term," page 7)* *The stepwise approach is meant to help, not replace, the clinical decisionmaking needed to meet individual patient needs.*		Step 1			Step 2			Step 3	Step 3 medium-dose ICS* option	Step 3	Step 3	Step 3 medium-dose ICS* option or Step 4	Step 4 or 5
								Consider short course of oral systemic corticosteroids.					
		In 2–6 weeks, depending on severity, assess level of asthma control achieved and adjust therapy as needed. For children 0–4 years old, if no clear benefit is observed in 4–6 weeks, consider adjusting therapy or alternate diagnoses.											

* **Abbreviations:** EIB, exercise-induced bronchospam; FEV_1, forced expiratory volume in 1 second; FVC, forced vital capacity; ICS, inhaled corticosteroid; SABA, short-acting $beta_2$-agonist.

† Normal FEV_1/FVC by age: 8–19 years, 85%; 20–39 years, 80%; 40–59 years, 75%; 60–80 years, 70%.

‡ Data are insufficient to link frequencies of exacerbations with different levels of asthma severity. Generally, more frequent and intense exacerbations (e.g., requiring urgent care, hospital or intensive care admission, and/or oral corticosteroids) indicate greater underlying disease severity. For treatment purposes, patients with ≥2 exacerbations may be considered to have persistent asthma, even in the absence of impairment levels consistent with persistent asthma.

FOLLOW-UP VISITS: ASSESSING ASTHMA CONTROL AND ADJUSTING THERAPY

Level of control (Columns 2–4) is based on the most severe component of impairment (symptoms and functional limitations) or risk (exacerbations). Assess impairment by patient's or caregiver's recall of events listed in Column 1 during the previous 2–4 weeks and by spirometry and/or peak flow measures. Symptom assessment for longer periods should reflect a global assessment, such as inquiring whether the patient's asthma is better or worse since the last visit. Assess risk by recall of exacerbations during the previous year and since the last visit. Recommendations for adjusting therapy based on level of control are presented in the last row.

Components of Control		Well Controlled			Not Well Controlled			Very Poorly Controlled		
		Ages 0–4 years	Ages 5–11 years	Ages ≥12 years	Ages 0–4 years	Ages 5–11 years	Ages ≥12 years	Ages 0–4 years	Ages 5–11 years	Ages ≥12 years
Impairment	Symptoms	≤2 days/week	≤2 days/week but not more than once on each day	≤2 days/week	>2 days/week	>2 days/week or multiple times on ≤2 days/week	>2 days/week	Throughout the day		
	Nighttime awakenings	≤1x/month		≤2x/month	>1x/month	≥2x/month	1–3x/week	>1x/week	≥2x/week	≥4x/week
	Interference with normal activity	None			Some limitation			Extremely limited		
	SABA* use for symptom control (not to prevent EIB*)	≤2 days/week			>2 days/week			Several times per day		
	Lung function									
	➔ FEV_1* (% *predicted*) or peak flow (% *personal best*)	Not applicable	>80%	>80%	Not applicable	60–80%	60–80%	Not applicable	<60%	<60%
	➔ FEV_1/FVC*		>80%	Not applicable		75–80%	Not applicable		<75%	Not applicable
	Validated questionnaires†									
	➔ ATAQ*	Not applicable	Not applicable	0	Not applicable	Not applicable	1–2	Not applicable	Not applicable	3–4
	➔ ACQ*			≤0.75‡			≥1.5			Not applicable
	➔ ACT*			≥20			16–19			≤15
Risk	Asthma exacerbations requiring oral systemic corticosteroids§	0–1/year			2–3/year	≥2/year		>3/year	≥2/year	
		Consider severity and interval since last asthma exacerbation.								
	Reduction in lung growth/Progressive loss of lung function	Not applicable	Evaluation requires long-term follow-up care.		Not applicable	Evaluation requires long-term follow-up care.		Not applicable	Evaluation requires long-term follow-up care.	
	Treatment-related adverse effects	*Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.*								
Recommended Action for Treatment *(See "Stepwise Approach for Managing Asthma Long Term," page 7)* *The stepwise approach is meant to help, not replace, the clinical decisionmaking needed to meet individual patient needs.*		*Maintain current step.* *Regular follow-up every 1–6 months.* *Consider step down if well controlled for at least 3 months.*			Step up 1 step	Step up at least 1 step	Step up 1 step	*Consider short course of oral systemic corticosteroids.* *Step up 1–2 steps.* *Reevaluate in 2 weeks to achieve control.*		
					Reevaluate in 2–6 weeks to achieve control. *For children 0–4 years, if no clear benefit observed in 4–6 weeks, consider adjusting therapy or alternative diagnoses.*					
					Before step up in treatment: Review adherence to medication, inhaler technique, and environmental control. If alternative treatment was used, discontinue and use preferred treatment for that step. For side effects, consider alternative treatment options.					

* **Abbreviations:** ACQ, Asthma Control Questionnaire©; ACT, Asthma Control Test™; ATAQ, Asthma Therapy Assessment Questionnaire©; EIB, exercise-induced bronchospasm; FVC, forced vital capacity; FEV_1, forced expiratory volume in 1 second; SABA, short-acting $beta_2$-agonist.

† Minimal important difference: 1.0 for the ATAQ; 0.5 for the ACQ; not determined for the ACT.

‡ ACQ values of 0.76–1.4 are indeterminate regarding well-controlled asthma.

§ Data are insufficient to link frequencies of exacerbations with different levels of asthma control. Generally, more frequent and intense exacerbations (e.g., requiring urgent care, hospital or intensive care admission, and/or oral corticosteroids) indicate poorer asthma control.

NIH Quick Reference Guidelines

An excerpt from the NIH's quick reference guide reviews long-term asthma care activities:

STEPWISE APPROACH FOR MANAGING ASTHMA LONG TERM

The stepwise approach tailors the selection of medication to the level of asthma severity (see page 5) or asthma control (see page 6). The stepwise approach is meant to help, not replace, the clinical decision making needed to meet individual patient needs.

ASSESS CONTROL:

STEP UP IF NEEDED (first, check medication adherence, inhaler technique, environmental control, and comorbidities)

STEP DOWN IF POSSIBLE (and asthma is well controlled for at least 3 months)

At each step: Patient education, environmental control, and management of comorbidities

		STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6
0–4 years of age		**Intermittent Asthma**	**Persistent Asthma: Daily Medication** Consult with asthma specialist if step 3 care or higher is required. Consider consultation at step 2.				
	Preferred Treatment†	SABA* as needed	low-dose ICS*	medium-dose ICS*	medium-dose ICS* + either LABA* or montelukast	high-dose ICS* + either LABA* or montelukast	high-dose ICS* + either LABA* or montelukast + oral corticosteroids
	Alternative Treatment†,‡		cromolyn or montelukast				
	If clear benefit is not observed in 4–6 weeks, and medication technique and adherence are satisfactory, consider adjusting therapy or alternate diagnoses.						
	Quick-Relief Medication	▪ SABA* as needed for symptoms; intensity of treatment depends on severity of symptoms. ▪ With viral respiratory symptoms: SABA every 4–6 hours up to 24 hours (longer with physician consult). Consider short course of oral systemic corticosteroids if asthma exacerbation is severe or patient has history of severe exacerbations. ▪ Caution: Frequent use of SABA may indicate the need to step up treatment.					
5–11 years of age		**Intermittent Asthma**	**Persistent Asthma: Daily Medication** Consult with asthma specialist if step 4 care or higher is required. Consider consultation at step 3.				
	Preferred Treatment†	SABA* as needed	low-dose ICS*	low-dose ICS* + either LABA,* LTRA,* or theophylline[(b)] **OR** medium-dose ICS	medium-dose ICS* + LABA*	high-dose ICS* + LABA*	high-dose ICS* + LABA* + oral corticosteroids
	Alternative Treatment†,‡		cromolyn, LTRA,* or theophylline§		medium-dose ICS* + either LTRA* or theophylline§	high-dose ICS* + either LTRA* or theophylline§	high-dose ICS* + either LTRA* or theophylline§ + oral corticosteroids
			Consider subcutaneous allergen immunotherapy for patients who have persistent, allergic asthma.**				
	Quick-Relief Medication	▪ SABA* as needed for symptoms. The intensity of treatment depends on severity of symptoms: up to 3 treatments every 20 minutes as needed. Short course of oral systemic corticosteroids may be needed. ▪ Caution: Increasing use of SABA or use >2 days/week for symptom relief (not to prevent EIB*) generally indicates inadequate control and the need to step up treatment.					
≥12 years of age		**Intermittent Asthma**	**Persistent Asthma: Daily Medication** Consult with asthma specialist if step 4 care or higher is required. Consider consultation at step 3.				
	Preferred Treatment†	SABA* as needed	low-dose ICS*	low-dose ICS* + LABA* **OR** medium-dose ICS*	medium-dose ICS* + LABA*	high-dose ICS* + LABA* **AND** consider omalizumab for patients who have allergies††	high-dose ICS* + LABA* + oral corticosteroid§§ **AND** consider omalizumab for patients who have allergies††
	Alternative Treatment†,‡		cromolyn, LTRA,* or theophylline§	low-dose ICS* + either LTRA,* theophylline,§ or zileuton‡‡	medium-dose ICS* + either LTRA,* theophylline,§ or zileuton‡‡		
			Consider subcutaneous allergen immunotherapy for patients who have persistent, allergic asthma.**				
	Quick-Relief Medication	▪ SABA* as needed for symptoms. The intensity of treatment depends on severity of symptoms: up to 3 treatments every 20 minutes as needed. Short course of oral systemic corticosteroids may be needed. ▪ Caution: Use of SABA >2 days/week for symptom relief (not to prevent EIB*) generally indicates inadequate control and the need to step up treatment.					

* **Abbreviations:** EIB, exercise-induced bronchospasm; ICS, inhaled corticosteroid; LABA, inhaled long-acting beta$_2$-agonist; LTRA, leukotriene receptor antagonist; SABA, inhaled short-acting beta$_2$-agonist.
† Treatment options are listed in alphabetical order, if more than one.
‡ If alternative treatment is used and response is inadequate, discontinue and use preferred treatment before stepping up.
§ Theophylline is a less desirable alternative because of the need to monitor serum concentration levels.
** Based on evidence for dust mites, animal dander, and pollen; evidence is weak or lacking for molds and cockroaches. Evidence is strongest for immunotherapy with single allergens. The role of allergy in asthma is greater in children than in adults.
†† Clinicians who administer immunotherapy or omalizumab should be prepared to treat anaphylaxis that may occur.
‡‡ Zileuton is less desirable because of limited studies as adjunctive therapy and the need to monitor liver function.
§§ Before oral corticosteroids are introduced, a trial of high-dose ICS + LABA + either LTRA, theophylline, or zileuton, may be considered, although this approach has not been studied in clinical trials.

Asthma Action Plan (CDC)

All people with asthma should have an asthma action plan (See App. A). An asthma action plan, also known as a management plan, is a written plan that the patient develops with their provider to help control their asthma. The asthma action plan shows daily treatment, such as what kind of medicines to take and when to take them. The plan also describes how to control asthma long term and how to handle progressively worsening asthma or attacks. The plan explains when to call the doctor or go to the emergency room. For a parent or health care provider, if a child has asthma then all of the people who care for him or her should know about the child's asthma action plan (See App. B). These caregivers may include babysitters and workers at daycare centers, camps, and schools. These caretakers can help the child follow his or her action plan.

Other asthma plan templates can be found under the "Additional Resources" section of this toolkit (See page 39). These templates include plans that can be downloaded then printed out, electronic forms, and computer-based interactive plans. Health care providers can review these various plans on a case-by-case basis to find the best plan that works for a patient's specific needs.

How to Use Inhalers (CDC)

Patients can control their asthma and avoid an attack by taking their medicine exactly as the physician or other medical professional instruct them to do and by avoiding asthma triggers. The CDC has created a series of instructional videos on using metered dose inhalers. There are also step-by-step print outs (App. F) that providers can print out or send to patients, which show patients how to use their inhalers. The table below contains links for instructional videos and step-by-step guides on how to use inhalers.

Using a metered dose inhaler with a spacer		
Video	Video Links	Step-by-Step Guide
	English Video: https://www.youtube.com/watch?v=BbONuRXJdr0 Spanish Video: https://www.youtube.com/watch?v=NdFstn28hWM	English Version: https://www.cdc.gov/asthma/pdfs/Inhaler_Spacer_FactSheet.pdf Spanish Version: https://www.cdc.gov/asthma/inhaler_video/con_espaciodor.pdf
Using a metered dose inhaler (inhaler in mouth)		
Video	Video Links	Step-by-Step Guide
	English Video: https://www.youtube.com/watch?v=Lx_e5nXfi5w Spanish Video: https://www.youtube.com/watch?v=TFexVujeJVk	English Version: https://www.cdc.gov/asthma/pdfs/Inhaler_in_Mouth_FactSheet.pdf Spanish Version: https://www.cdc.gov/asthma/inhaler_video/de_dosis_fija.pdf

Managing Asthma: Flu Shots (CDC)

The influenza virus infects the respiratory tract (nose, throat, lungs). People with asthma have an increased likelihood of serious health problems from contracting the flu. However, most people with asthma do not get their annual flu shot. Therefore, if a patient has asthma they must work with a health care provider and take steps to prevent getting the flu. Respiratory infections such as the flu can affect the lungs, which may cause an asthma attack. Flu vaccine is the first and most important step patients can take to protect themselves from the virus and asthma-related complications.

Adults with asthma should receive flu vaccinations to avoid respiratory infections as they are more serious for patients with asthma because it can often lead to pneumonia and acute respiratory disease. Adults with asthma are at high risk of developing complications after contracting the influenza virus, yet most adults with asthma do not receive an annual flu vaccination. Only one-third of all asthmatic adults and one-fifth of asthmatic adults younger than 50 years of age receive the flu vaccine annually.

Providers should speak to patients about the pneumococcal vaccine to protect themselves against pneumonia. Pneumococcal infections are a serious complication of influenza infections and can potentially cause death. The pneumococcal vaccine may be given concurrently with the influenza vaccine. Health care providers should speak with patients about any additional vaccines the patient might need.

- CDC's Breathe Easier podcast (1:00) – Health care providers can share this podcast with patients. This podcast provides information about why the risk for serious medical consequences is higher than normal when asthma is combined with a case of the flu. Click to listen: https://tools.cdc.gov/medialibrary/index.aspx#/media/id/303620

SAMPRO Toolkit

For asthma care, School-based Asthma Management Program (SAMPRO™) advocates four components to integrate schools, and specifically school nurses, within the site's asthma care team. SAMPRO recommends standardized school based asthma management and provides websites and other useful resources for the care of children with asthma at schools. The toolkit is primarily intended for school nurses, clinicians, health care administrators, or education administrators who are interested in implementing the program at their organization or school. The toolkit contains several resources to help the user implement the key components of the SAMPRO protocols:

- A slide set may be downloaded and used to teach users about how to approach the program and to teach others in the community about the program.
- Establishing the Circle of Support: Tools for engaging clinicians, school nurses, and families, and how to foster good communication between them.
- Using and transmitting the Asthma Emergency Treatment Plan and an Asthma Action Plan (See App. B)
- Tools for the school nurse to provide asthma education to school personnel

To download and view the toolkit users need to register for a free HIPxChange account at: https://www.hipxchange.org/content/sampro™-registration

Illinois School Requirements

Illinois Public Act 099-0842 was signed by Governor Bruce Rauner on August 19, 2016. This act requires the Illinois State Board of Education (ISBE) to develop a model asthma episode emergency response protocol, Each Illinois school district, charter school, and non-public school also had to adopt similar protocols by January 1, 2017. The model protocol and other resources are available on the ISBE website. The same law also requires that schools request an Asthma Action Plan (AAP) from parents of students with asthma. If provided, the action plan must be kept on file in the school nurse's office (see App. D). In the absence of a school nurse, the action plan must be kept in the school administrator's office.

Furthermore, the law requires school personnel who work with students to complete training on asthma management, prevention of asthma symptoms, and emergency response in the school setting every two years. The training offered by ISBE meets the legal requirement but is not the only way a school district may meet the training requirements. School personnel can register for the "Asthma Management for School Staff" ISBE training at: https://register.gotowebinar.com/recording/5518200754880259073

The Respiratory Health Association (RHA) offers another training program that meets the requirement, which educates teachers, school staff, and other caregivers of children with asthma. The RHA's one hour "Asthma Management" program can be accessed at: https://lungchicago.org/what-we-offer/our-programs-initiatives/asthma-management/

The full text of Illinois Public Act 099-0842 can be found at: http://www.ilga.gov/legislation/publicacts/fulltext.asp?Name=099-0842

How is Asthma Treated?

There are several types of medications available for asthma treatment . However, each patient's asthma is different. The patient and health care provider should work together to establish the best treatment plan based on the patient's symptoms and needs (See App. C). After the health care provider diagnoses the patient's asthma, they will be prescribed medications that help control asthma (Image 2). These medications will help patients breathe better, have fewer asthma symptoms, and a better quality of life. Some asthma medications work quickly to relax airways and help people breathe easier, while other treatments reduce the inflammation and swelling in the airways in order to prevent asthma symptoms. Providers and patients can work together to write out a medicine schedule that considers health care literacy (App. G).

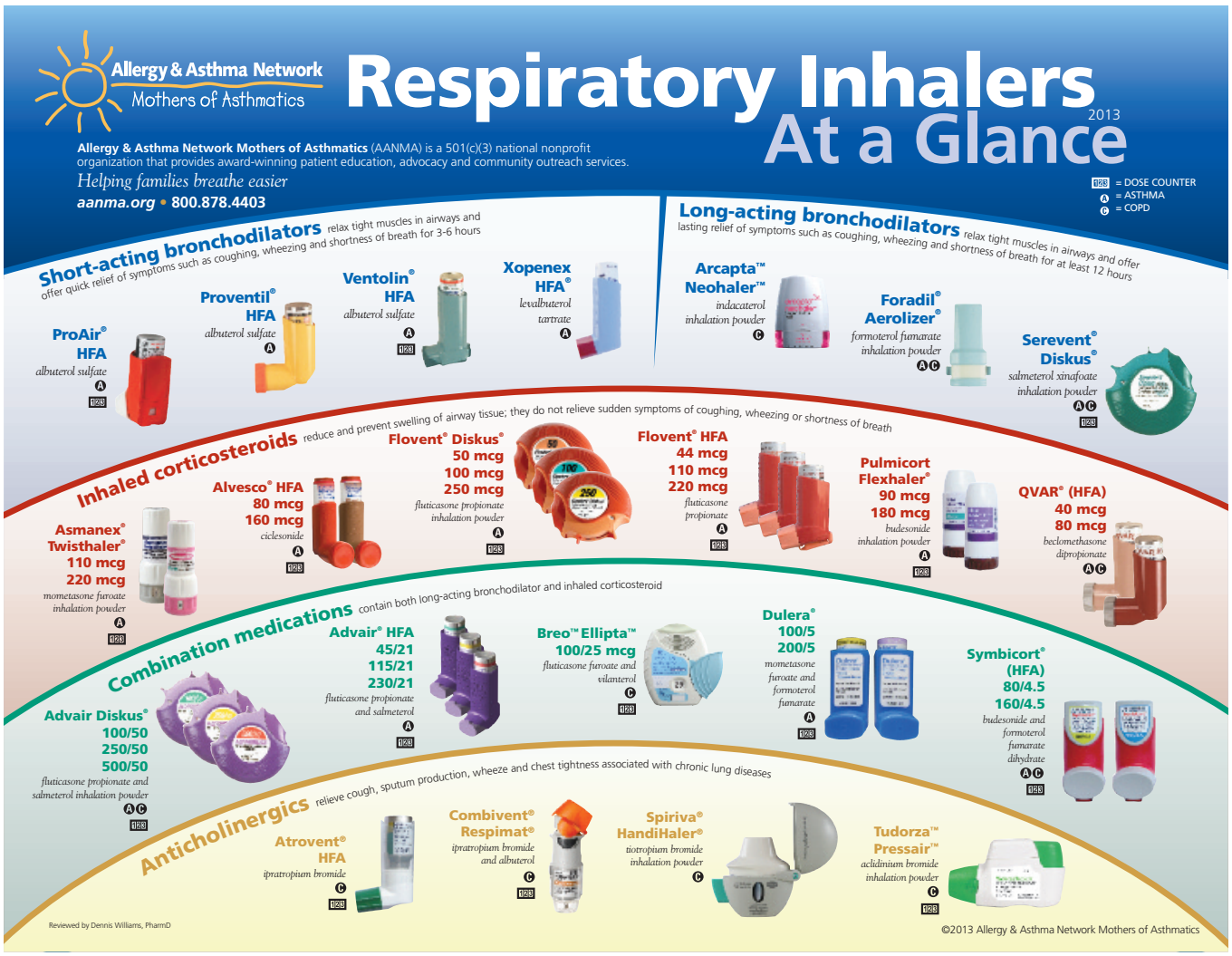


Image 2. Examples of Respiratory Inhalers [17]

Types of Medicines

The following list of medications was compiled by the American Lung Association (ALA):

- **Bronchodilators** relax the muscles around the airways, also known as breathing tubes. There are two types of bronchodilators and patients may be prescribed one or both types. First, short-acting bronchodilators work quickly to help patient's feel relief from symptoms quickly. Long-acting bronchodilators last for a long time and should not be used for quick relief. These medications are only recommended for use when combined with an anti-inflammatory asthma medicine.
- **Anti-Inflammatories** reduce the mucus production and swelling inside the airways making it easier to breathe. These medicines may also be referred to as corticosteroids or steroids. Often times, these are inhaled medications. It is important that patient's rinse out their mouths with water immediately after use to avoid contracting thrush, which is a yeast infection of the throat. Some corticosteroids are available in pill form and typically used for short periods of time in special circumstances, such as when your symptoms get worse.

- **Combination Medicines –** A few medications may combine inhaled bronchodilators and inhaled corticosteroids.
- **Anticholinergics** are a class of medications that prevent the muscle bands from constricting around the airways. This type of medicine can be inhaled using a metered-dose inhaler or nebulized from a prescribed solution. Typically, this class of medicine is used in combination with an inhaled corticosteroid and should be taken daily for long-term control. They are often added on to treatment to relieve cough, mucus production, wheezing or chest tightness.
- **Severe Asthma Treatments –** For more severe forms of asthma that are not well-controlled with standard therapy, there are several approved medicines now available. Research has helped to identify different types of airway inflammation in asthma such as allergic (atopic) and eosinophilic asthma (eosinophils are a type of white blood cells associated with allergies). Studies have found targeted therapies for each of these subgroups (or phenotypes) in asthma. These medicines are administered in the doctor's office once a month by either a shot or IV.
- **Antibiotics –** People with asthma can have flare-ups that may be caused by bacterial or viral infections. A physician may prescribe an antibiotic or an anti-viral to keep on hand and have filled if the patient feels an infection coming on.
- **Treating Severe Persistent Asthma** – New treatments are available for patients with severe persistent asthma whose asthma is not controlled with inhaled corticosteroids and long-acting bronchodilators.

Medication, Device, and Technique Fact Sheets

The Chicago Asthma Consortium (CAC) has developed medication guides and checklists for providers. Each guide starts with an introduction about the medication or device, followed by recommended dosages, indications, contraindications, and potential side effects. Cleaning instructions and inhalation technique checklists are also provided for devices. The checklists can be used by providers and a disclaimer should be read to the patient. Providers can access these fact sheets and checklists by visiting the websites below:

Medication/Device	Checklist Link
Aerolizer	http://chicagoasthma.org/wp-content/uploads/2015/07/Aerolizer.pdf
Diskus	http://chicagoasthma.org/wp-content/uploads/2015/07/Diskus.pdf
Ellipta	http://chicagoasthma.org/wp-content/uploads/2015/07/Ellipta.pdf
Flexhaler	http://chicagoasthma.org/wp-content/uploads/2015/07/Flexhaler.pdf
Handihaler	http://chicagoasthma.org/wp-content/uploads/2015/07/Handihaler.pdf
Metered-dose Inhaler and Spacer	http://chicagoasthma.org/wp-content/uploads/2015/07/Metered-dose-Inhaler-and-Spacer.pdf
Nebulizer	http://chicagoasthma.org/wp-content/uploads/2015/07/Nebulizer.pdf
Peak Flow Meter	http://chicagoasthma.org/wp-content/uploads/2015/07/Peak-Flow-Meter.pdf
Respimat	http://chicagoasthma.org/wp-content/uploads/2015/07/Respimat.pdf
Twisthaler	http://chicagoasthma.org/wp-content/uploads/2015/07/Twisthaler.pdf

Guidelines for Diagnosis & Management of Asthma

Excerpts from the NIH quick reference guide include estimated daily dosages for long-term asthma control which are listed as follows:

ESTIMATED COMPARATIVE DAILY DOSAGES: INHALED CORTICOSTEROIDS FOR LONG-TERM ASTHMA CONTROL

	0–4 years of age			5–11 years of age			≥12 years of age		
Daily Dose	**Low**	**Medium***	**High***	**Low**	**Medium***	**High***	**Low**	**Medium***	**High***
MEDICATION									
Beclomethasone MDI†	N/A	N/A	N/A	80–160 mcg	>160–320 mcg	>320 mcg	80–240 mcg	>240–480 mcg	>480 mcg
40 mcg/puff				1–2 puffs 2x/day	3–4 puffs 2x/day		1–3 puffs 2x/day	4–6 puffs 2x/day	
80 mcg/puff				1 puff 2x/day	2 puffs 2x/day	≥3 puffs 2x/day	1 puff am, 2 puffs pm	2–3 puffs 2x/day	≥4 puffs 2x/day
Budesonide DPI†	N/A	N/A	N/A	180–360 mcg	>360–720 mcg	>720 mcg	180–540 mcg	>540–1,080 mcg	>1,080 mcg
90 mcg/inhalation				1–2 inhs† 2x/day	3–4 inhs† 2x/day		1–3 inhs† 2x/day		
180 mcg/ inhalation					2 inhs† 2x/day	≥3 inhs† 2x/day	1 inh† am, 2 inhs† pm	2–3 inhs† 2x/day	≥4 inhs† 2x/day
Budesonide Nebules	0.25–0.5 mg	>0.5–1.0 mg	>1.0 mg	0.5 mg	1.0 mg	2.0 mg	N/A	N/A	N/A
0.25 mg	1–2 nebs†/day			1 neb† 2x/day					
0.5 mg	1 neb†/day	2 nebs†/day	3 nebs†/day	1 neb†/day	1 neb† 2x/day				
1.0 mg		1 neb†/day	2 nebs†/day		1 neb†/day	1 neb† 2x/day			
Ciclesonide MDI†	N/A	N/A	N/A	80–160 mcg	>160–320 mcg	>320 mcg	160–320 mcg	>320–640 mcg	>640 mcg
80 mcg/puff				1–2 puffs/day	1 puff am, 2 puffs pm– 2 puffs 2x/day	≥3 puffs 2x/day	1–2 puffs 2x/day	3–4 puffs 2x/day	
160 mcg/puff				1 puff/day	1 puff 2x/day	≥2 puffs 2x/day		2 puffs 2x/day	≥3 puffs 2x/day
Flunisolide MDI†	N/A	N/A	N/A	160 mcg	320–480 mcg	≥480 mcg	320 mcg	>320–640 mcg	>640 mcg
80 mcg/puff				1 puff 2x/day	2–3 puffs 2x/day	≥4 puffs 2x/day	2 puffs 2x/day	3–4 puffs 2x/day	≥5 puffs 2x/day

* It is preferable to use a higher mcg/puff or mcg/inhalation formulation to achieve as low a number of puffs or inhalations as possible.

† **Abbreviations:** DPI, dry powder inhaler (requires deep, fast inhalation); inh, inhalation; MDI, metered dose inhaler (releases a puff of medication); neb, nebule.

ESTIMATED COMPARATIVE DAILY DOSAGES: INHALED CORTICOSTEROIDS FOR LONG-TERM ASTHMA CONTROL *(continued)*

	0–4 years of age			5–11 years of age			≥12 years of age		
Daily Dose	**Low**	**Medium***	**High***	**Low**	**Medium***	**High***	**Low**	**Medium***	**High***
MEDICATION									
Fluticasone MDI†	176 mcg	>176–352 mcg	>352 mcg	88–176 mcg	>176–352 mcg	>352 mcg	88–264 mcg	>264–440 mcg	>440 mcg
44 mcg/puff	2 puffs 2x/day	3–4 puffs 2x/day		1–2 puffs 2x/day	3–4 puffs 2x/day		1–3 puffs 2x/day		
110 mcg/puff		1 puff 2x/day	≥2 puffs 2x/day		1 puff 2x/day	≥2 puffs 2x/day		2 puffs 2x/day	3 puffs 2x/day
220 mcg/puff								1 puffs 2x/day	≥2 puffs 2x/day
Fluticasone DPI†	N/A	N/A	N/A	100–200 mcg	>200–400 mcg	>400 mcg	100–300 mcg	>300–500 mcg	>500 mcg
50 mcg/inhalation				1–2 inhs† 2x/day	3–4 inhs† 2x/day		1–3 inhs† 2x/day		
100 mcg/inhalation				1 inh† 2x/day	2 inhs† 2x/day	>2 inhs† 2x/day		2 inhs† 2x/day	≥3 inhs† 2x/day
250 mcg/inhalation						1 inh† 2x/day		1 inh† 2x/day	≥2 inhs† 2x/day
Mometasone DPI†	N/A	N/A	N/A	110 mcg	220–440 mcg	>440 mcg	110–220 mcg	>220–440 mcg	>440 mcg
110 mcg/inhalation				1 inh†/day	1–2 inhs† 2x/day	≥3 inhs† 2x/day	1–2 inhs† pm	3–4 inhs† pm or 2 inhs† 2x/day	≥3 inhs† 2x/day
220 mcg/inhalation					1–2 inhs†/day	≥3 inhs† divided in 2 doses	1 inh† pm	1 inh† 2x/day or 2 inhs† pm	≥3 inhs† divided in 2 doses

* It is preferable to use a higher mcg/puff or mcg/inhalation formulation to achieve as low a number of puffs or inhalations as possible.
† **Abbreviations:** DPI, dry powder inhaler (requires deep, fast inhalation); inh, inhalation; MDI, metered dose inhaler (releases a puff of medication); neb, nebule.

Therapeutic Issues Pertaining to Inhaled Corticosteroids (ICSs) for Long-Term Asthma Control

- **The most important determinant of appropriate dosing is the clinician's judgment of the patient's response to therapy.** The clinician must monitor the patient's response on several clinical parameters (e.g., symptoms; activity level; measures of lung function) and adjust the dose accordingly. Once asthma control is achieved and sustained at least 3 months, the dose should be carefully titrated down to the minimum dose necessary to maintain control.
- Some doses may be outside package labeling, especially in the high-dose range. Budesonide nebulizer suspension is the only inhaled corticosteroid (ICS) with FDA-approved labeling for children <4 years of age.
- Metered-dose inhaler (MDI) dosages are expressed as the actuator dose (amount leaving the actuator and delivered to the patient), which is the labeling required in the United States. This is different from the dosage expressed as the valve dose (amount of drug leaving the valve, not all of which is available to the patient), which is used in many European countries and in some scientific literature. Dry powder inhaler (DPI) doses are expressed as the amount of drug in the inhaler following activation.
- For children <4 years of age: The safety and efficacy of ICSs in children <1 year of age has not been established. Children <4 years of age generally require delivery of ICS (budesonide and fluticasone MDI) through a face mask that fits snugly over nose and mouth to avoid nebulizing in the eyes. Face should be washed after treatment to prevent local corticosteroid side effects. For budesonide, the dose may be given 1–3 times daily. Budesonide suspension is compatible with albuterol, ipratropium, and levalbuterol nebulizer solutions in the same nebulizer. Use only jet nebulizers, as ultrasonic nebulizers are ineffective for suspensions. For fluticasone MDI, the dose should be divided 2 times daily; the low dose for children <4 years of age is higher than for children 5–11 years of age because of lower dose delivered with face mask and data on efficacy in young children.

USUAL DOSAGES FOR OTHER LONG-TERM CONTROL MEDICATIONS*

Medication	0–4 years of age	5–11 years of age	≥12 years of age
Combined Medication (inhaled corticosteroid + long-acting beta$_2$-agonist)			
Fluticasone/Salmeterol — DPI† 100 mcg/50 mcg, 250 mcg/50 mcg, or 500 mcg/50 mcg MDI† 45 mcg/21 mcg, 115 mcg/21 mcg, or 230 mcg/21 mcg	N/A†	1 inhalation 2x/day; dose depends on level of severity or control	1 inhalation 2x/day; dose depends on level of severity or control
Budesonide/Formoterol — MDI† 80 mcg/4.5 mcg or 160 mcg/4.5 mcg	N/A†	2 puffs 2x/day; dose depends on level of severity or control	2 puffs 2x/day; dose depends on level of severity or control
Mometasone/Formoterol — MDI† 100 mcg/5 mcg	N/A†	N/A†	2 inhalations 2x/day; dose depends on severity of asthma
Leukotriene Modifiers			
Leukotriene Receptor Antagonists (LTRAs) Montelukast — 4 mg or 5 mg chewable tablet, 4 mg granule packets, 10 mg tablet	4 mg every night at bedtime (1–5 years of age)	5 mg every night at bedtime (6–14 years of age)	10 mg every night at bedtime
Zafirlukast — 10 mg or 20 mg tablet *Take at least 1 hour before or 2 hours after a meal. Monitor liver function.*	N/A†	10 mg 2x/day (7–11 years of age)	40 mg daily (20 mg tablet 2x/day)
5-Lipoxygenase Inhibitor Zileuton — 600 mg tablet *Monitor liver function.*	N/A†	N/A†	2,400 mg daily (give 1 tablet 4x/day)
Immunomodulators			
Omalizumab (Anti IgE†) — Subcutaneous injection, 150 mg/1.2 mL following reconstitution with 1.4 mL sterile water for injection *Monitor patients after injections; be prepared to treat anaphylaxis that may occur.*	N/A†	N/A†	150–375 mg subcutaneous every 2–4 weeks, depending on body weight and pretreatment serum IgE level
Cromolyn			
Cromolyn — Nebulizer: 20 mg/ampule	1 ampule 4x/day, N/A† <2 years of age	1 ampule 4x/day	1 ampule 4x/day
Methylxanthines			
Theophylline — Liquids, sustained-release tablets, and capsules *Monitor serum concentration levels.*	Starting dose 10 mg/kg/day; usual maximum: ▪ <1 year of age: 0.2 (age in weeks) + 5 = mg/kg/day ▪ ≥1 year of age: 16 mg/kg/day	Starting dose 10 mg/kg/day; usual maximum: 16 mg/kg/day	Starting dose 10 mg/kg/day up to 300 mg maximum; usual maximum: 800 mg/day
Inhaled Long-Acting Beta$_2$-Agonists (LABAs) – used in conjunction with ICS† for long-term control; LABA is NOT to be used as monotherapy			
Salmeterol — DPI† 50 mcg/blister	N/A†	1 blister every 12 hours	1 blister every 12 hours
Formoterol —DPI† 12 mcg/single-use capsule	N/A†	1 capsule every 12 hours	1 capsule every 12 hours
Oral Systemic Corticosteroids			
Methylprednisolone — 2, 4, 8, 16, 32 mg tablets **Prednisolone** — 5 mg tablets; 5 mg/5 cc, 15 mg/5 cc **Prednisone** — 1, 2.5, 5, 10, 20, 50 mg tablets; 5 mg/cc, 5 mg/5 cc	▪ 0.25–2 mg/kg daily in single dose in a.m. or every other day as needed for control ▪ Short course "burst": 1–2 mg/kg/day, max 60 mg/d for 3–10 days	▪ 0.25–2 mg/kg daily in single dose in a.m. or every other day as needed for control ▪ Short course "burst": 1–2 mg/kg/day, max 60 mg/d for 3–10 days	▪ 7.5–60 mg daily in single dose in a.m. or every other day as needed for control ▪ Short course "burst": to achieve control, 40–60 mg/day as single or 2 divided doses for 3–10 days

* Dosages are provided for those products that have been approved by the U.S. Food and Drug Administration or have sufficient clinical trial safety and efficacy data in the appropriate age ranges to support their use.

† **Abbreviations:** DPI, dry powder inhaler; IgE, immunoglobulin E; MDI, metered-dose inhaler; N/A, not available (not approved, no data available, or safety and efficacy not established for this age group).

The most important determinant of appropriate dosing is the clinician's judgment of the patient's response to therapy. The clinician must monitor the patient's response on several clinical parameters (e.g., symptoms; activity level; measures of lung function) and adjust the dose accordingly. Once asthma control is achieved and sustained at least 3 months, the dose should be carefully titrated down to the minimum dose necessary to maintain control.

Partners for Asthma Action

Partners for Asthma Action (PAA) helps children from low-income families manage their asthma and lead full and productive lives. The PAA program helps doctors and health care systems reduce patients' asthma symptoms by using medical interventions and by reducing exposure to environmental asthma triggers. The goals of the program are to enhance awareness of treatment and education resources, help reduce the costs of asthma care, fully utilize local public health and social service agencies to remove environmental asthma triggers, and identify then refer children with poorly managed asthma. Through PAA, the American Lung Association has partnered with 90 clinics in Chicago, Indianapolis, Milwaukee, Minneapolis (St. Paul), and St. Louis to impact over 180,000 low-income children living with asthma. The result of this program is more standardized, efficient and improved quality of care for children with asthma. Young patients have improved their health through better use of controller medication, home-based education, environmental adjustments to reduce triggers, and proactive asthma care action plans. Also, the effective treatment and care of asthma saves money. After one year in the program, hospitalizations and asthma related emergency room (ER) visits were reduced by 55%.

To learn more watch this video on clinical quality improvement results https://www.youtube.com/watch?v=Peq3pFYcrvI

Illinois State Asthma Plan

The Illinois Department of Public Health (IDPH) developed the 2015-2020 Illinois Asthma State Plan, which is regularly updated to reflect innovation in the strategies and interventions designed to address asthma in Illinois (DPH). The Illinois Asthma State Plan is a framework for action, collaboration, and communication. There are three main areas of focus within the plan with goals and objectives developed by the Illinois Asthma Partnership (IAP). Each priority area addresses specific concerns and needs using a public health approach to reflect the plan's overarching goal to reduce the burden of asthma.
Full pdf of the asthma plan can be downloaded at: http://www.dph.illinois.gov/sites/default/files/publications/publicationsohpmillinois-asthma-state-plan.pdf

EXHALE

Team members at the National Center for Environmental Health (NCEH) and Centers for Disease Control and Prevention (CDC) have created the EXHALE technical package, which represents strategies, based on the best available evidence, that can improve asthma control and reduce health care costs. It is intended as a resource to inform decision-making in communities, organizations, and states. The strategies included in the technical package are complementary and are intended to work in combination to reinforce the efficacy of each individual component. Health care providers may work with their respective organizations to implement EXHALE strategies to control asthma effectively. Monitoring and evaluation play a key role in implementing EXHALE and identifying additional effective programs, policies, or practices. As new evidence becomes available, this technical package can be refined to reflect the current state of the science. The following table summarizes the strategies in the EXHALE technical package, as well as specific ways (i.e., approaches) to advance these strategies:

EXHALE		
	Strategy	Approach
E	Education on asthma self-management	• Expanding access to and delivery of asthma self-management education (AS-ME)
X	X-tinguishing smoking and secondhand smoke	• Reducing tobacco smoking • Reducing exposure to secondhand smoke
H	Home visits for trigger reduction and asthma selfmanagement education	• Expanding access to and delivery of home visits (as needed) for asthma trigger reduction and AS-ME
A	Achievement of guidelines-based medical management	• Strengthening systems supporting guidelines-based medical care, including appropriate prescribing and use of inhaled corticosteroids • Improving access and adherence to asthma medications and devices
L	Linkages and coordination of care across settings	• Promoting coordinated care for people with asthma
E	Environmental policies or best practices to reduce asthma triggers from indoor, outdoor, and occupational sources	• Facilitating home energy efficiency, including home weatherization assistance programs • Facilitating smokefree policies • Facilitating clean diesel school buses • Eliminating exposure to asthma triggers in the workplace whenever • possible • Reducing exposure to asthma triggers in the workplace (ifeliminating exposures is not possible)

The full EXHALE technical package can be downloaded at https://www.cdc.gov/asthma/pdfs/EXHALE_technical_package-508.pdf

CDC: Resources for Health Care Professionals

Vital Signs: Asthma in Children – United States, 2001-2016

- Medscape, LLC provides online continuing education (CE) for selected journal articles, which allows clinicians the opportunity to earn Medscape CE credit.
- Click on weblink to register for free then access CE via HTML or PDF download
- Weblink: https://www.cdc.gov/mmwr/cme/medscape_cme.html

Home Characteristics and Asthma Triggers – Checklist for Home Visitors

- This checklist was developed by CDC, EPA, and HUD to guide home visitors in identifying environmental asthma triggers most commonly found in homes. It includes sections on the building, home interior, and room interior and provides low-cost action steps for remediation.
- Click on the following link to download and print the checklist: https://www.cdc.gov/asthma/pdfs/home_assess_checklist_P.pdf

Particle Pollution and Your Patients' Health

- EPA evidence-based training for health care profession related to cardiovascular and health effects associated with particle pollution exposure.
- Click on the following link to access resource: https://www.epa.gov/pmcourse

Asthma: A Presentation of Asthma Management and Prevention (Slide Presentation and Speaker Notes)

- 75-slide presentation depicts the pathophysiology of asthma; prevalence, mortality, and morbidity measures at the national level; risk factors; medical management; and the public health response needed to successfully fight asthma.
- Click on the following link to download the PowerPoint: https://www.cdc.gov/asthma/speakit/default.htm

Quality Measures Summary

- Quality measures are tools that help measure or quantify health care processes, outcomes, patient perceptions, organizational structure, and systems and are associated with the ability to provide high-quality health care.
- Click on the following link to download the PDF: https://www.cdc.gov/asthma/pdfs/quality_measures_summary_3_18_15.pdf

National Heart Lung and Blood Institute (NHLBI)

The guidelines published by NHLBI describe essential components of high-quality asthma care
Click here to download pdf: https://www.nhlbi.nih.gov/files/docs/guidelines/asthsumm.pdf

Chicago Asthma Consortium (CAC)

Asthma Resource Collection 2017

- Asthma resources to aid asthma patients and their caregivers
- PDF can be downloaded by clicking on: http://chicagoasthma.org/wp-content/uploads/2014/11/Chicago-Asthma-Consortium-Asthma-Resource-Collection-2017-1.pdf

The Asthma Friendly Childcare Toolkit

- Toolkit for understanding and managing asthma with respect to childcare
- PDF can be downloaded by clicking on: http://cac.websitetesturl.com/wp-content/uploads/2015/01/IDPHAsthmaFriendlyChildcareToolkit.pdf

Resources for Schools

Self-Administration and Self-Carry of Medications for Asthma and Allergy – Illinois State Board of Education Guidance Document April 2015

- This documents provides nonregulatory guidance on current state of self- administration and self-carry of medication for asthma and allergies
- PDF can be downloaded at: http://cac.websitetesturl.com/wp-content/uploads/2014/12/guidance-15-02-self-admin-epi-1.pdf

Other school based resources for asthma care (brochures, request forms, first aid poster, and emergency protocols) can be found here: http://chicagoasthma.org/community-partners/schools/

Educational Meetings

- CAC hosts 2-3 regional educational and networking meetings per year to provide education on asthma care guidelines, cutting edge topics, and forums to discuss emerging research
- Meetings are intended for physicians, researchers, nurses, respiratory therapists, pharmacists, community asthma educators, program managers and advocates.
- Past meeting: The Future of Asthma Care: Pediatric Asthma Management and Practice Transformation November 14, 2017
- Access meeting by clicking on: http://chicagoasthma.org/the-future-of-asthma-care-pediatric-asthma-management-and-practice-transformation/
- Other past educational meetings and upcoming meetings can be accessed at: http://chicagoasthma.org/education/

Illinois Primary Health Care Association (IPHCA)

- Webinar: Asthma Control and Management Part I |Topic: Pediatric Asthma Care: Applying Guidelines to Optimize Outcomes
  Presenter: Anna Volerman- Beaser, MD
  Date: August 24, 2018
  Recording: https://attendee.gotowebinar.com/register/1639356836757856257

- Webinar: Asthma Control and Management Part II |Topic: Pediatric Asthma Management
  Presenter: Anna Volerman- Beaser, MD
  Date: August 31, 2018
  Recording: https://attendee.gotowebinar.com/recording/1623404022791948033

Podcasts – Audio and Video Tools

Asthma Community Network – Conversations for Advancing Action

- This podcast series explores various best practices for reducing the impact of asthma with a focus on underserved communities.
- Podcasts can be played here: http://www.asthmacommunitynetwork.org/podcasts

CDC: Podcast Series

Asthma - Get the Facts!

- In this podcast for kids, the Kidtastics talk about basic asthma facts. Listen to this podcast here: https://tools.cdc.gov/medialibrary/index.aspx#/media/id/303285 (1:45)

Creating an Asthma-Friendly School

- This podcast features real-life success stories of students with asthma who, thanks to their schools' implementation of asthma-friendly policies and programs, now have their asthma under control. Listen to this podcast here: https://tools.cdc.gov/medialibrary/index.aspx#/media/id/303285 (13:44)

Don't Let Asthma Keep You Out of The Game

- In this podcast for kids, the Kidtastics talk about how to stay active if you have asthma. Listen to this podcast here: https://tools.cdc.gov/medialibrary/index.aspx#/media/id/303285 (3:26)

Asthma – What You Need to Know

- Children and adults can have asthma and attacks can be frightening. To help control asthma, know the warning signs of an attack, stay away from asthma triggers, and follow your health care provider's advice. Listen to this podcast here: https://tools.cdc.gov/medialibrary/index.aspx#/media/id/303703 (1:19)

Patient Resources

CDC: Personal Asthma Action Plans

- "Connecticut Department of Health Asthma Action Plans in PDF and Word formats. Includes Authorization for Administration of Medicine." Open the following link to print a copy and fill in the requested information: https://portal.ct.gov/DPH/Health-Education-Management--Surveillance/Asthma/Asthma-Action-Plan%20
- Pediatric/Adult Asthma Coalition of New Jersey Asthma Action Plans in English, Spanish, or English/Spanish Open the link and fill in all the required information before you print them out: http://pacnj.org/pacnj-asthma-treatment-plan/
- Minnesota Department of Health's interactive Asthma Action Plan is a computer-based program that uses information entered by the healthcare provider to create a personalized plan for each patient. Open Link to download or access via web: http://www.asthma-iaap.com

American Lung Association (ALA)

The ALA has created an online library that includes videos and other resources for asthma patients and caregivers. Some weblinks for available videos and resources are posted below.

Videos

What is Asthma?

- Click on the following link to watch this informative animation that explains what asthma is and how it affects people who suffer from it: https://www.youtube.com/watch?v=XohTFq14oX0

How to Clean a Nebulizer

- The following video shows how to properly clean a nebulizer with the American Lung Association: https://www.youtube.com/watch?v=HFT4v7EhLUw

How to Use a Flexhaler

- Click on the following link to watch this American Lung Association video to learn the correct way to use your Flexhaler asthma inhaler: https://www.youtube.com/watch?v=kD4CdrT-l84

Avoiding and Controlling Asthma Triggers

- This checklist is for patients to review their triggers and decide which ALA tips and and solutions they will use
- To download the pdf click on the following: http://www.lung.org/assets/documents/asthma/avoiding-and-controlling-triggers.pdf

Getting Ready for Your Office Visit

- Informs patients about what to expect during a doctor's appointment: http://www.lung.org/assets/documents/asthma/Get-Ready_Office-Visit.pdf

Additional ALA patient resources and videos can be viewed at: http://www.lung.org/lung-health-and-diseases/lung-disease-lookup/asthma/patient-resources-and-videos/

Asthma 101 Booklet

The Asthma and Lung Association (ALA) has published an Asthma 101 booklet, which is an excellent starting point to learn about asthma. This 47-page booklet describes how asthma impacts the lungs, signs and symptoms, medication and environmental treatment, and self-management strategies. The booklet reviews scope of asthma information, medication, action plans, control of asthma, exercise and asthma, and has additional information about the connection between asthma and allergies. The booklet is available for download at: http://www.lung.org/local-content/wisconsin/documents/asthma-101-english.pdf

Educational Program for Teaching Patients

The Asthma and Allergy Foundation of America (AAFA) offers patient education programs for people all ages that are available in English and Spanish. Many of the educational tools can downloaded free of charge and others can be ordered through AAFA. Patients can also download items for free from AAFA's Patients and Caregivers web page. Also, if the young patient has food allergies, parents and providers can visit Kids With Food Allergies. It's a division of AAFA and has extra resources. The table below provides tool descriptions and download links. Patients simply click on the download link to open page -> click add to cart -> register for free account -> download tool

Tool	Description
Asthma Action Plan	This plan has information and instructions for patient on how to manage their asthma. https://secure.aafa.org/np/clients/aafa/product.jsp?product=21& (see App. A)
Student Asthma Action Card	Contains sections for asthma triggers, daily medicines, and emergency directions. https://secure.aafa.org/np/clients/aafa/product.jsp?product=11&
Child Care Asthma/Allergy Action Card	Parents can print this out for their children. Contains you need to care for your young child with asthma or allergies. The card has sections for information about a medication plan and a list of your child's signs and symptoms. It also has steps on how to handle asthma and allergy emergencies. https://secure.aafa.org/np/clients/aafa/product.jsp?product=12&
Anaphylaxis Emergency Action Plan	This PDF file tells patient and others what to do if the patient has allergic symptoms or a severe allergic reaction (anaphylaxis). https://secure.aafa.org/np/clients/aafa/product.jsp?product=13&
QuickAsthmaCards	These offer a fast way for people to learn life-saving information. Patients can put their own information on these cards. Patient can carry them in their purse, briefcase, or backpack and give copies to caregivers, teachers, and family members. https://secure.aafa.org/np/clients/aafa/product.jsp?product=14&
Your Guide to Managing asthma	A guide for patients help them know more about this chronic disease and how to keep it under control. https://secure.aafa.org/np/clients/aafa/product.jsp?product=76&

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ASTHMA ACTION PLAN

Asthma and Allergy Foundation of America
aafa.org

Name:	Date:
Doctor:	Medical Record #:
Doctor's Phone #: Day	Night/Weekend
Emergency Contact:	
Doctor's Signature:	

The colors of a traffic light will help you use your asthma medicines.

GREEN means Go Zone!
Use preventive medicine.

YELLOW means Caution Zone!
Add quick-relief medicine.

RED means Danger Zone!
Get help from a doctor.

Personal Best Peak Flow: _____

GO — Use these daily controller medicines:

You have *all* of these:
- Breathing is good
- No cough or wheeze
- Sleep through the night
- Can work & play

Peak flow: from _____ to _____

MEDICINE	HOW MUCH	HOW OFTEN/WHEN
For asthma with exercise, take:		

CAUTION — Continue with green zone medicine and add:

You have *any* of these:
- First signs of a cold
- Exposure to known trigger
- Cough
- Mild wheeze
- Tight chest
- Coughing at night

Peak flow: from _____ to _____

MEDICINE	HOW MUCH	HOW OFTEN/ WHEN
CALL YOUR ASTHMA CARE PROVIDER.		

DANGER — Take these medicines and call your doctor now.

Your asthma is getting worse fast:
- Medicine is not helping
- Breathing is hard & fast
- Nose opens wide
- Trouble speaking
- Ribs show (in children)

Peak flow: reading below _____

MEDICINE	HOW MUCH	HOW OFTEN/WHEN

GET HELP FROM A DOCTOR NOW! Your doctor will want to see you right away. It's important!
If you cannot contact your doctor, go directly to the emergency room. DO NOT WAIT.
Make an appointment with your asthma care provider within two days of an ER visit or hospitalization.

Asthma Action Plan

For: _____ Doctor: _____ Date: _____

Doctor's Phone Number _____ Hospital/Emergency Department Phone Number _____

GREEN ZONE — Doing Well

- No cough, wheeze, chest tightness, or shortness of breath during the day or night
- Can do usual activities

And, if a peak flow meter is used,

Peak flow: more than _____
(80 percent or more of my best peak flow)

My best peak flow is: _____

Take these long-term control medicines each day (include an anti-inflammatory).

Medicine	How much to take	When to take it
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
Before exercise ❒ _____	❒ 2 or ❒ 4 puffs _____	5 minutes before exercise

YELLOW ZONE — Asthma Is Getting Worse

- Cough, wheeze, chest tightness, or shortness of breath, or
- Waking at night due to asthma, or
- Can do some, but not all, usual activities

-Or-

Peak flow: _____ to _____
(50 to 79 percent of my best peak flow)

First — **Add: quick-relief medicine—and keep taking your GREEN ZONE medicine.**

_____ (short-acting beta$_2$-agonist)
❒ 2 or ❒ 4 puffs, every 20 minutes for up to 1 hour
❒ Nebulizer, once

Second

If your symptoms (and peak flow, if used) return to GREEN ZONE after 1 hour of above treatment:
❒ Continue monitoring to be sure you stay in the green zone.

-Or-

If your symptoms (and peak flow, if used) do not return to GREEN ZONE after 1 hour of above treatment:
❒ Take: _____ (short-acting beta$_2$-agonist) ❒ 2 or ❒ 4 puffs or ❒ Nebulizer
❒ Add: _____ (oral steroid) mg per day For _____(3–10) days
❒ Call the doctor ❒ before/ ❒ within _____ hours after taking the oral steroid.

RED ZONE — Medical Alert!

- Very short of breath, or
- Quick-relief medicines have not helped, or
- Cannot do usual activities, or
- Symptoms are same or get worse after 24 hours in Yellow Zone

-Or-

Peak flow: less than _____
(50 percent of my best peak flow)

Take this medicine:

❒ _____ (short-acting beta$_2$-agonist) ❒ 4 or ❒ 6 puffs or ❒ Nebulizer

❒ _____ (oral steroid) mg

Then call your doctor NOW. Go to the hospital or call an ambulance if:
- You are still in the red zone after 15 minutes AND
- You have not reached your doctor.

DANGER SIGNS
- **Trouble walking and talking due to shortness of breath**
- **Lips or fingernails are blue**

- **Take ❒ 4 or ❒ 6 puffs of your quick-relief medicine AND**
- **Go to the hospital or call for an ambulance _____ (phone) NOW!**

See the reverse side for things you can do to avoid your asthma triggers.

How To Control Things That Make Your Asthma Worse

This guide suggests things you can do to avoid your asthma triggers. Put a check next to the triggers that you know make your asthma worse and ask your doctor to help you find out if you have other triggers as well. Then decide with your doctor what steps you will take.

Allergens

❒ **Animal Dander**

Some people are allergic to the flakes of skin or dried saliva from animals with fur or feathers.

The best thing to do:

- Keep furred or feathered pets out of your home.

If you can't keep the pet outdoors, then:

- Keep the pet out of your bedroom and other sleeping areas at all times, and keep the door closed.
- Remove carpets and furniture covered with cloth from your home. If that is not possible, keep the pet away from fabric-covered furniture and carpets.

❒ **Dust Mites**

Many people with asthma are allergic to dust mites. Dust mites are tiny bugs that are found in every home—in mattresses, pillows, carpets, upholstered furniture, bedcovers, clothes, stuffed toys, and fabric or other fabric-covered items.

Things that can help:

- Encase your mattress in a special dust-proof cover.
- Encase your pillow in a special dust-proof cover or wash the pillow each week in hot water. Water must be hotter than 130° F to kill the mites. Cold or warm water used with detergent and bleach can also be effective.
- Wash the sheets and blankets on your bed each week in hot water.
- Reduce indoor humidity to below 60 percent (ideally between 30—50 percent). Dehumidifiers or central air conditioners can do this.
- Try not to sleep or lie on cloth-covered cushions.
- Remove carpets from your bedroom and those laid on concrete, if you can.
- Keep stuffed toys out of the bed or wash the toys weekly in hot water or cooler water with detergent and bleach.

❒ **Cockroaches**

Many people with asthma are allergic to the dried droppings and remains of cockroaches.

The best thing to do:

- Keep food and garbage in closed containers. Never leave food out.
- Use poison baits, powders, gels, or paste (for example, boric acid). You can also use traps.
- If a spray is used to kill roaches, stay out of the room until the odor goes away.

❒ **Indoor Mold**

- Fix leaky faucets, pipes, or other sources of water that have mold around them.
- Clean moldy surfaces with a cleaner that has bleach in it.

❒ **Pollen and Outdoor Mold**

What to do during your allergy season (when pollen or mold spore counts are high):

- Try to keep your windows closed.
- Stay indoors with windows closed from late morning to afternoon, if you can. Pollen and some mold spore counts are highest at that time.
- Ask your doctor whether you need to take or increase anti-inflammatory medicine before your allergy season starts.

Irritants

❒ **Tobacco Smoke**

- If you smoke, ask your doctor for ways to help you quit. Ask family members to quit smoking, too.
- Do not allow smoking in your home or car.

❒ **Smoke, Strong Odors, and Sprays**

- If possible, do not use a wood-burning stove, kerosene heater, or fireplace.
- Try to stay away from strong odors and sprays, such as perfume, talcum powder, hair spray, and paints.

Other things that bring on asthma symptoms in some people include:

❒ **Vacuum Cleaning**

- Try to get someone else to vacuum for you once or twice a week, if you can. Stay out of rooms while they are being vacuumed and for a short while afterward.
- If you vacuum, use a dust mask (from a hardware store), a double-layered or microfilter vacuum cleaner bag, or a vacuum cleaner with a HEPA filter.

❒ **Other Things That Can Make Asthma Worse**

- Sulfites in foods and beverages: Do not drink beer or wine or eat dried fruit, processed potatoes, or shrimp if they cause asthma symptoms.
- Cold air: Cover your nose and mouth with a scarf on cold or windy days.
- Other medicines: Tell your doctor about all the medicines you take. Include cold medicines, aspirin, vitamins and other supplements, and nonselective beta-blockers (including those in eye drops).

U.S. Department of Health and Human Services
National Institutes of Health

National Heart Lung and Blood Institute

For More Information, go to: www.nhlbi.nih.gov

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Appendix C

Asthma Action Plan

AMERICAN LUNG ASSOCIATION®

Name _____ DOB ____/____/_____

Severity Classification ☐Intermittent ☐Mild Persistent ☐Moderate Persistent ☐Severe Persistent

Asthma Triggers (list) _____

Peak Flow Meter Personal Best _____

Green Zone: Doing Well

Symptoms: Breathing is good – No cough or wheeze – Can work and play – Sleeps well at night

Peak Flow Meter _____ (more than 80% of personal best)

Control Medicine(s)	Medicine	How much to take	When and how often to take it
	_____	_____	_____
	_____	_____	_____

Physical Activity ☐Use albuterol/levalbuterol ____ puffs, 15 minutes before activity

☐with all activity ☐when you feel you need it

Yellow Zone: Caution

Symptoms: Some problems breathing – Cough, wheeze, or chest tight – Problems working or playing – Wake at night

Peak Flow Meter _____ to _____ (between 50% and 79% of personal best)

Quick-relief Medicine**(s)** ☐Albuterol/levalbuterol ____ puffs, every 4 hours as needed

Control Medicine**(s)** ☐Continue Green Zone medicines

☐Add _____ ☐Change to _____

You should feel better within 20–60 minutes of the quick-relief treatment. If you are getting worse or are in the Yellow Zone for more than 24 hours, THEN follow the instructions in the RED ZONE and call the doctor right away!

Red Zone: Get Help Now!

Symptoms: Lots of problems breathing – Cannot work or play – Getting worse instead of better – Medicine is not helping

Peak Flow Meter _____ (less than 50% of personal best)

Take Quick-relief Medicine NOW! ☐Albuterol/levalbuterol ____ puffs, _____ (how frequently)

Call 911 immediately if the following danger signs are present

- Trouble walking/talking due to shortness of breath
- Lips or fingernails are blue
- Still in the red zone after 15 minutes

Emergency Contact Name _____ Phone (_____) _____-_____

Healthcare Provider Name _____ Phone (_____) _____-_____

1-800-LUNGUSA | LUNG.org

Date ____/____/_____

Appendix C

Asthma Action Plan for Home and School

AMERICAN LUNG ASSOCIATION.

Name _____ **DOB** ____/____/_____

Severity Classification ☐Intermittent ☐Mild Persistent ☐Moderate Persistent ☐Severe Persistent

Asthma Triggers (list) _____

Peak Flow Meter Personal Best _____

Green Zone: Doing Well

Symptoms: Breathing is good – No cough or wheeze – Can work and play – Sleeps well at night
Peak Flow Meter _____(more than 80% of personal best)

Control Medicine(s)	Medicine	How much to take	When and how often to take it	Take at
	_____	_____	_____	☐Home ☐School
	_____	_____	_____	☐Home ☐School

Physical Activity ☐Use albuterol/levalbuterol ____ puffs, 15 minutes before activity ☐with all activity ☐when the child feels he/she needs it

Yellow Zone: Caution

Symptoms: Some problems breathing – Cough, wheeze, or chest tight – Problems working or playing – Wake at night
Peak Flow Meter _____ to _____(between 50% and 79% of personal best)

Quick-relief Medicine**(s)** ☐Albuterol/levalbuterol ____ puffs, every 4 hours as needed

Control Medicine**(s)** ☐Continue Green Zone medicines

☐Add _____ ☐Change to _____

The child should feel better within 20–60 minutes of the quick-relief treatment. If the child is getting worse or is in the Yellow Zone for more than 24 hours, THEN follow the instructions in the RED ZONE and call the doctor right away!

Red Zone: Get Help Now!

Symptoms: Lots of problems breathing – Cannot work or play – Getting worse instead of better – Medicine is not helping
Peak Flow Meter _____ (less than 50% of personal best)

Take Quick-relief Medicine NOW! ☐Albuterol/levalbuterol ____ puffs, _____ (how frequently)

Call 911 immediately if the following danger signs are present
- Trouble walking/talking due to shortness of breath
- Lips or fingernails are blue
- Still in the red zone after 15 minutes

School Staff: Follow the Yellow and Red Zone instructions for the quick-relief medicines according to asthma symptoms.
The only control medicines to be administered in the school are those listed in the Green Zone with a check mark next to "Take at School".

☐**Both the Healthcare Provider and the Parent/Guardian** feel that the child has demonstrated the skills to carry and self-administer their quick-relief inhaler, including when to tell an adult if symptoms do not improve after taking the medicine.

Healthcare Provider

Name _____ Date _____ Phone (_____) _____-_____ Signature _____

Parent/Guardian

☐I give permission for the medicines listed in the action plan to be administered in school by the nurse or other school staff as appropriate.
☐I consent to communication between the prescribing health care provider or clinic, the school nurse, the school medical advisor and school-based health clinic providers necessary for asthma management and administration of this medicine.

Name _____ Date _____ Phone (_____) _____-_____ Signature _____

School Nurse

☐The student has demonstrated the skills to carry and self-administer their quick-relief inhaler, including when to tell an adult if symptoms do not improve after taking the medicine.

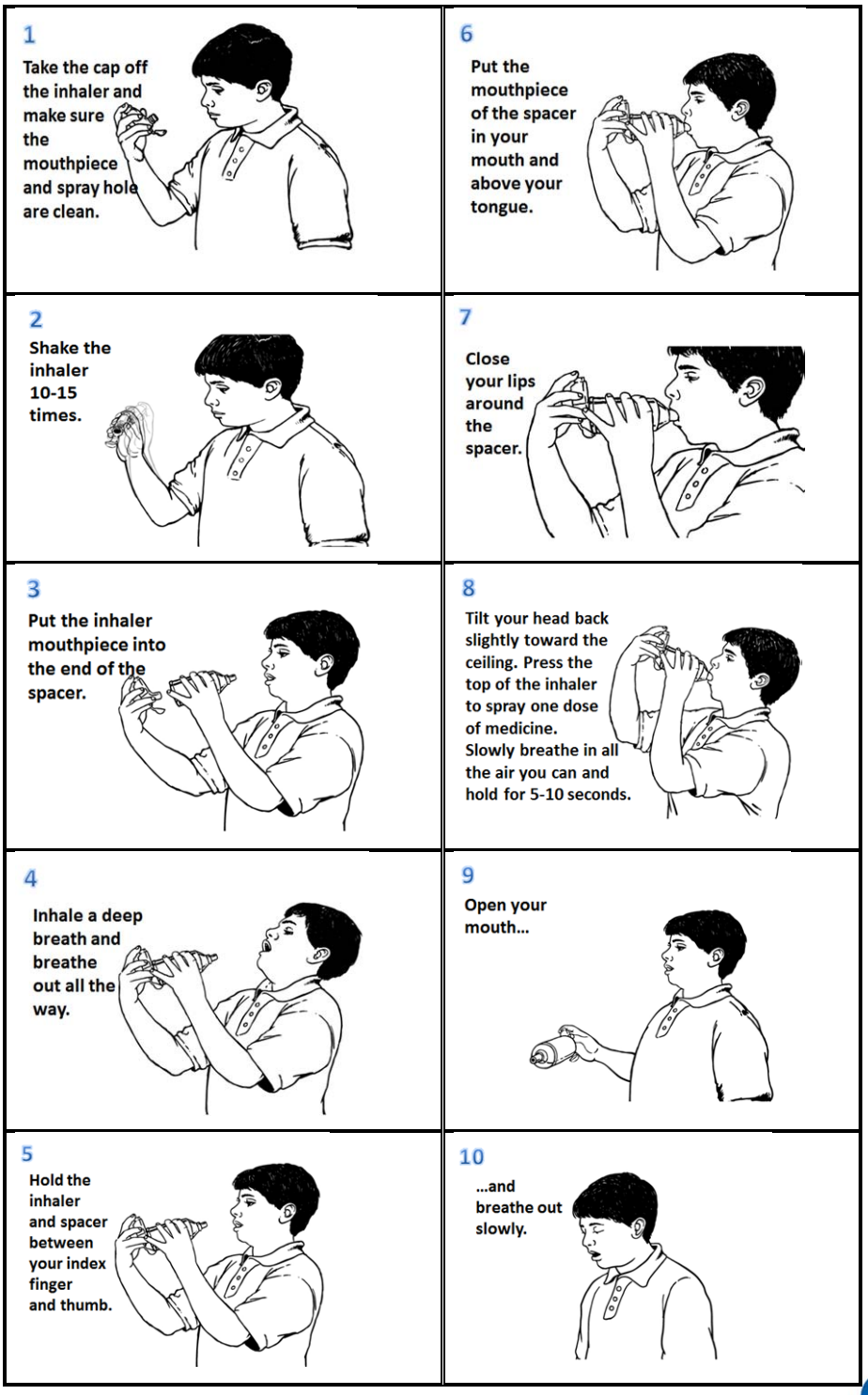
Name _____ Date _____ Phone (_____) _____-_____ Signature _____

1-800-LUNGUSA | LUNG.org

Please send a signed copy back to the provider listed above.

Know How to Use Your Asthma Inhaler

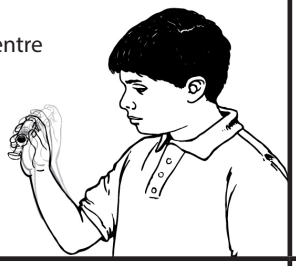
Using a metered dose inhaler with a spacer



Cómo usar un inhalador de dosis fija con espaciador

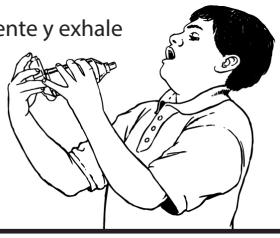
1
Quite la tapa del inhalador para asegurarse de que la boquilla y el orificio del aerosol estén limpios.

2
Agite el inhalador entre 10 y 15 veces.

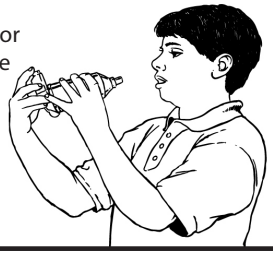


3
Coloque la boquilla del inhalador en el extremo del espaciador.

4
Inhale profundamente y exhale completamente.



5
Sostenga el inhalador y el espaciador entre sus dedos índice y pulgar.

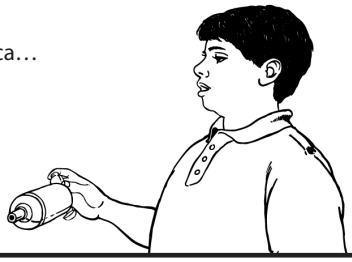


6
Póngase la boquilla del espaciador en la boca y por encima de la lengua.

7
Cubra bien el espaciador con los labios.

8
Incline un poco la cabeza hacia atrás. Oprima el inhalador una vez e inhale despacio y profundamente. Inhale la mayor cantidad de aire que pueda y sostenga la respiración durante 5 a 10 segundos.

9
Abra la boca…



10
…y exhale despacio.

National Center for Environmental Health
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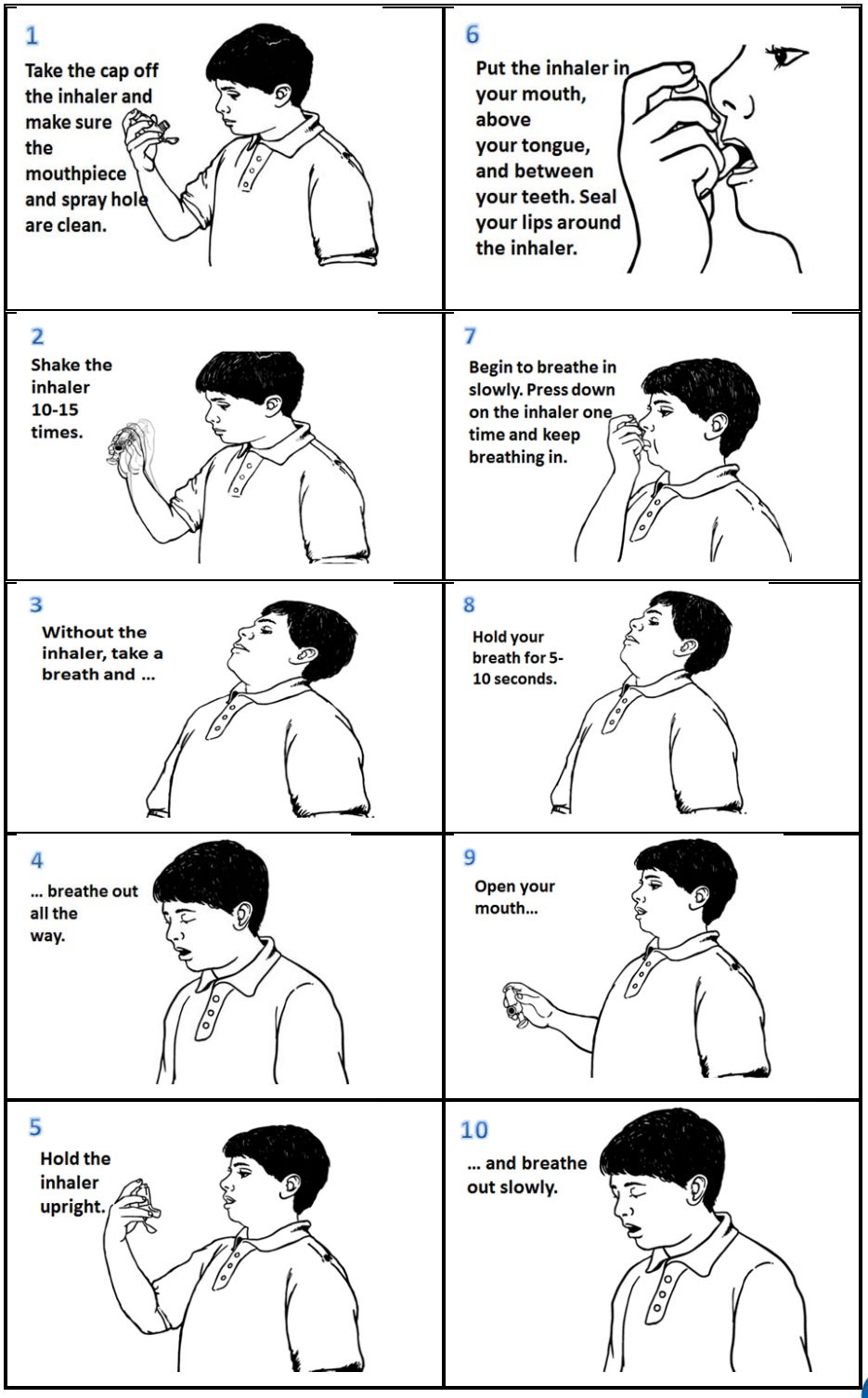
Know How to Use Your Asthma Inhaler

Using a metered dose inhaler (inhaler in mouth)



Cómo usar un inhalador de dosis fija (inhalador de boca)

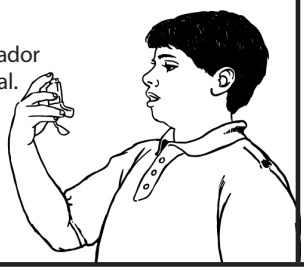
1
Quite la tapa del inhalador para asegurarse de que la boquilla y el orificio del aerosol estén limpios.

2
Agite el inhalador entre 10 y 15 veces.

3
Sin usar el inhalador, inhale y…

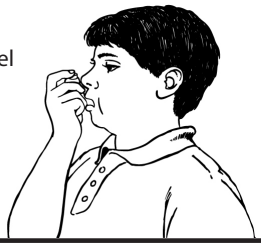
4
…exhale completamente.

5
Mantenga el inhalador en posición vertical.

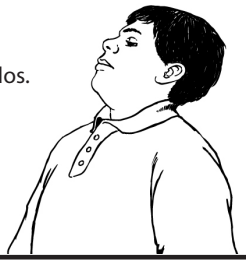


6
Póngaselo en la boca, sobre la lengua y entre los dientes.

7
Comience a inhalar lentamente. Oprima el inhalador una vez y continúe inhalando.



8
Retenga la respiración durante 5 a 10 segundos.



9
Abra la boca…

10
…y exhale despacio.

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Medicine Schedule

Making a Medicine Schedule

To keep your asthma under control, always take your medicines as directed by your healthcare provider. To help keep track of your medicines, you can use a medicine schedule.

Once you fill out the chart below:

- Make a photocopy. Put it on your bathroom mirror, refrigerator, or anywhere else you will see it often.
- Show the list to all the healthcare providers you see. Do so before a doctor, dentist, or anyone else writes a prescription for you. You can also show it to your pharmacist if you have questions about any medicines.
- Keep a copy of your medicine schedule in your purse or wallet.
- Update your schedule each time your medicines change.

Your Medicine Schedule				
Type of Medicine	*Medicine Name*	*What Days Taken*	*When Taken*	*How Much Is Taken*
Example:	QVAR HFA	Every day	2x per day	2 puffs
Asthma medicine(s)				
Long-term control				
Quick-relief				
Other prescription medicine(s)				
Aspirin and other pain reliever(s)				
Vitamin(s)				
Nasal spray				
Antacid				
Other medicines or treatments				

To learn more about asthma and asthma management, take Asthma Basics.