

# Tackling Asthma and its Social Determinants



## Preface

Asthma is the most common chronic disease in children. Over 70,000 children in the state of Arkansas live with asthma. It is the leading cause of missed school days, work days for parents, and has an immense impact on quality of life, the health care system, and financial repercussions for both individual families and society.

The Asthma Education Curriculum for School Nurses was created with the goal to integrate school nurses within the health care team for children suffering the burden of asthma. School nurses have the unique opportunity to bridge the gap between students with asthma and their health care providers. Their strong partnership with families is built on a foundation of advocacy and empathy for the student dealing with a serious chronic disease. This partnership has the potential to bolster asthma self-management at home, impact health outcomes, and increase adherence to agreed upon treatment plans.

The following information serves as an asthma care blue print for the school nurse. It incorporates nationally recognized best practices and recommendations in approaching the asthma treatment and education of students. The creation of a circle of support amongst the families, clinicians, and school nurse that is centered around the child with asthma is the key driver behind the creation and implementation of a school nurse curriculum.

2019



The curriculum is designed to help convey key points regarding asthma management that are founded in national best practice guidelines. This includes the National Asthma Education and Prevention Program (NAECP) Expert Panel Report 3 (EPR-3) Guidelines for the Diagnosis and Management of Asthma, 2007. In addition, the 2018 Global Initiative for Asthma Report, Global Strategy for Asthma Management and Prevention set the foundation of the recommendations provided in this material.

The ideas and expertise developed in this curriculum were a collaborative effort of the Arkansas Children's Asthma Clinical and Research Program. It is intended to be reviewed and distributed to school nurses participating in the School Nurse Academy across the state of Arkansas.



# Tackling Asthma and its Social Determinants



## Introduction

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Creating a circle of support around the child dealing with the burden of asthma is a top priority in the state of Arkansas. Asthma related absences influence academic achievement. This leads to decreased levels of reading proficiency and increased risk of learning disabilities. Improving health and school related outcomes for children with asthma requires care coordination amongst families, providers, and school nurses.

Upon completion of this curriculum, participants will gain knowledge regarding the asthma condition in a way that will enable them to share that knowledge with peers and educate families when the opportunity arises. Participants will gain confidence in identifying and treating asthma flare-ups in the school setting.

As part of this curriculum key tools and resources will be provided to participants that can be utilized in a practical way to serve the pediatric asthma population in their school districts. Over 80% of health outcomes are attributed to social, economic, environmental, and health behavior factors and just 20% to clinical care. This curriculum would not be complete without addressing how social determinants of health impact children with asthma and how to identify children at risk with uncontrolled asthma.

The curriculum is designed to be taught in modules which covers the following categories of information:

**Describe and Define Asthma**

**Diagnosing Asthma**

**Asthma Control**

**Asthma Action Plan**

**Managing an Asthma Flare-up**

**Social Determinants of Health**



# Tackling Asthma

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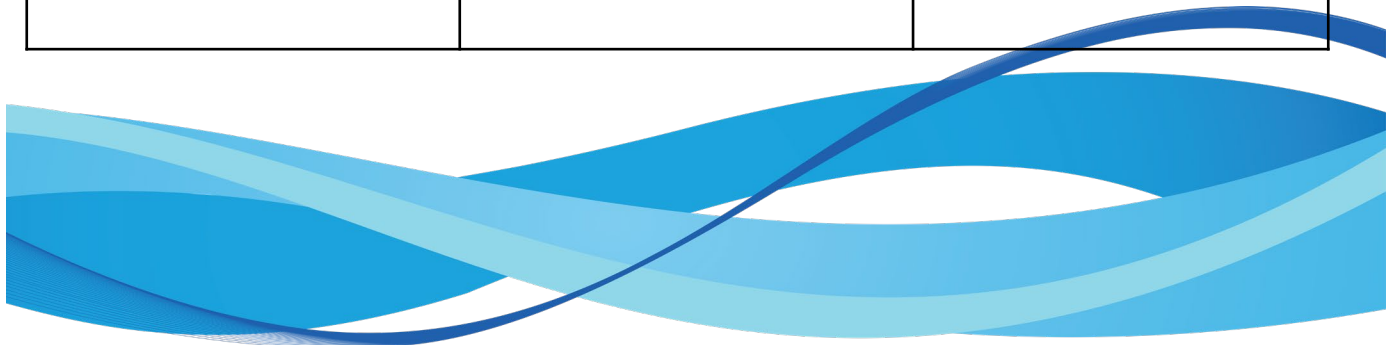
### Module 1: Outline

2019



## Define and Describe Asthma

Objectives	Presentation/Outline Content	Activities and Materials
<ul style="list-style-type: none"> <li>Describe the normal process of breathing</li> <li>Define asthma in an easily understandable way for children and parents/caregivers</li> <li>Recall the hallmarks of what is happening inside the lungs during an asthma flare-up</li> </ul>	<ul style="list-style-type: none"> <li>Presentation <b>slides 3 &amp; 4</b> have video simulation of what happens during normal breathing. Describe to participants each step as the videos support visual learning</li> <li>Presentation <b>slide 5</b> illustrates what is happening inside the airways. The 3 big processes include inflammation, bronchoconstriction, and mucus production</li> <li>Presentation <b>slide 6</b> gives clear and concise definition for asthma and intentionally explains asthma in plain language to describe with students/families</li> </ul>	<ul style="list-style-type: none"> <li>Each participant gets a <b>drinking straw</b> and a <b>coffee stirrer</b></li> <li>Advise those participants with asthma or other health issues to not participate in activity</li> <li>Have each participant breathe through the drinking straw for 30 seconds</li> <li>Have each participant breathe through the coffee stirrer for 15 seconds</li> <li>Discuss as a group how this activity felt</li> </ul> <hr/> <ul style="list-style-type: none"> <li><b>Game of "eye spy"</b></li> <li>Set up examples of triggers around the room before the presentation. Include sprays, fake rodents, scentsy pots, air fresheners, ash tray, etc.</li> <li>Have participants identify them around the room</li> </ul>



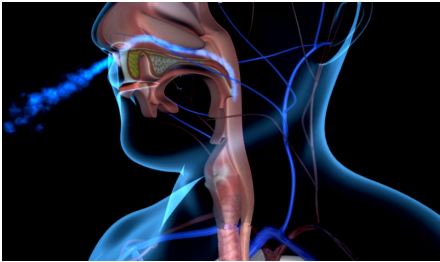
# Tackling Asthma



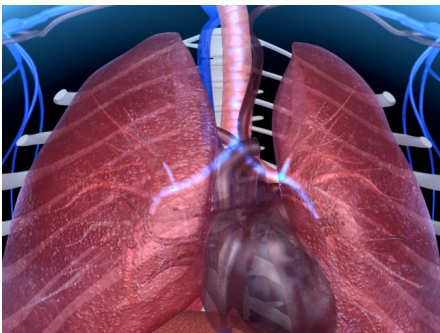
## Module 1: Define and Describe Asthma

Breathing is a vital function of life. Everything that happens physiologically during just one breath is a series of steps that must follow an exact sequence. Our brains take care of the process automatically, and we do not have to think about it unless there is a problem like asthma. So where does it go wrong with asthma? The answer is within the anatomy of the lungs and understanding breathing. Let's do a quick review of the action of breathing.

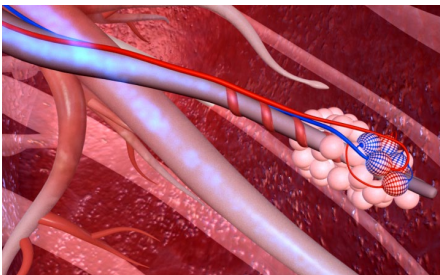
### 1. Normal Breath



Breathing starts when the brain stem signals the body to inhale air through the nose or mouth. At the same time, the diaphragm (**not pictured**) is contracting or tightening and moves downward allowing the lungs to expand.



Air continues to travel down the trachea into the right and left main stem bronchus and filters into the smaller bronchioles on the way to the alveoli. Further into the lungs, the hyaline cartilage decreases in the walls of the airway and the amount of smooth muscle surrounding the smallest bronchioles increases.



The alveolar duct and alveoli are surrounded by capillaries which permits rapid diffusion of oxygen and carbon dioxide. This is where gas exchange takes place. Exhalation happens in reverse order. Oxygen in and carbon dioxide out.

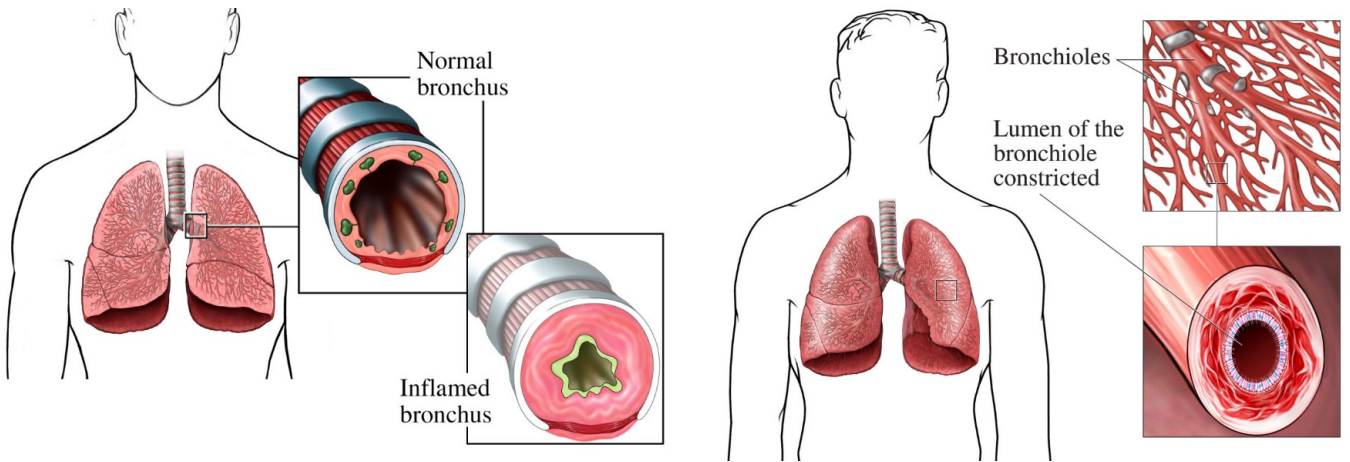


# Tackling Asthma



## 2. Asthma Airways

The lumen of the airway becomes swollen allowing less air to move in and out of the lungs. Excessive mucus clogs the airway and causes smooth muscle bands to tighten.



## 3. Describing Asthma in Plain Language

**Asthma** is a chronic condition in which **airways narrow** and **swell** and **produce extra mucus**. This can make it hard to breathe and causes coughing, wheezing, chest tightness, or feeling like you can't catch your breath

**Asthma** can't be cured, but its symptoms can be **CONTROLLED**

**Asthma** signs and symptoms include coughing, tight feeling in chest, trouble sleeping because of coughing or wheezing (high pitched whistling noise in chest), and shortness of breath

**Asthma** triggers are things that cause asthma to flare-up. They can be different for everyone with asthma. **Trigger avoidance** is key to controlling asthma

[www.mayoclinic.org](http://www.mayoclinic.org)



# Tackling Asthma

## and its Social Determinants



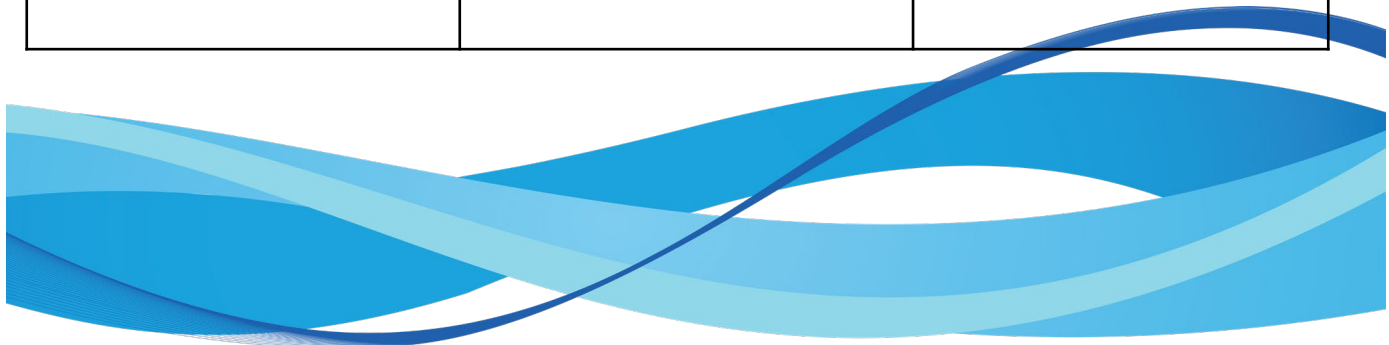
### Module 2: Outline

2019



## Diagnosing Asthma

Objectives	Presentation/Outline Content	Activities and Materials
<ul style="list-style-type: none"> <li>Recall key characteristics of asthma</li> <li>Recognize children who have potentially undiagnosed asthma</li> <li>Understand ways that school nurses can play a role in asthma diagnosis through advocacy</li> <li>Describe the role of pulmonary function testing in the diagnosis of asthma when appropriate</li> </ul>	<ul style="list-style-type: none"> <li>Presentation <b>slide 2</b> key points: Generally, more than one type of respiratory symptom is present. There is not one test to diagnose asthma but a combination of history of symptoms, family history, and physical exam. pulmonary function testing (pft) can help diagnose and manage asthma by assessing periodically and with medication changes. Access to testing can be a barrier.</li> <li>Point out on the pft graph that green represents before albuterol and red represents post albuterol. Notable difference in how the green is scooped, indicating obstruction</li> <li><b>Slide 3 (see activity)</b></li> <li><b>Slide 4</b> discuss resources available on flash drive and other web-based resources</li> </ul>	<ul style="list-style-type: none"> <li><b>Slide 3:</b> Open up discussion on ways that school nurses can help kids who they suspect have asthma or those with newly diagnosed asthma</li> </ul>



# Tackling Asthma



## Module 2: Diagnosing Asthma

It is difficult to diagnosis asthma in children under the age of 2 years old. There is not a specific test to confirm asthma. The diagnosis is based off a number of diagnostic features. The patient and family history along with a physical exam should be conducted by the provider.

### 1. Key Characteristics of Asthma

#### DIAGNOSTIC FEATURE

#### CRITERIA FOR MAKING THE DIAGNOSIS OF ASTHMA

##### 1. History of variable respiratory symptoms

Wheeze, shortness of breath, chest tightness and cough

Description may vary between cultures and by age, e.g. children may be described as having heavy breathing

- Generally more than one type of respiratory symptom
- Symptoms are variable over time and vary in intensity
- Symptoms are often worse at night or on waking
- Symptoms are often triggered by exercise, laughter, allergens, cold air
- Symptoms often appear or worsen with viral infections

##### 2. Confirmed variable expiratory airflow limitations

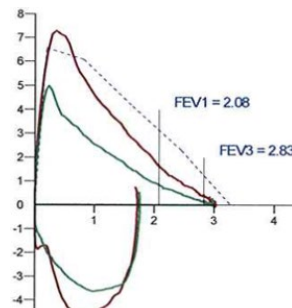
Pulmonary Function Testing (PFTs) can be attempted starting around age 6

Response to bronchodilator in **FEV1** of >12% indicates asthma

**FEV1** represents flow as a function of volume in time (amount of air that can be blown out in 1 second)

Asthma shows an obstructive pattern on PFTs

- Identify presence (or absence) of pulmonary dysfunction
- Evaluate bronchodilator response (or lack of)
- Trend patient progress with medications



Example of a pre and post pulmonary function test



# Tackling Asthma



## DIAGNOSTIC FEATURE ASTHMA

## CRITERIA FOR MAKING THE DIAGNOSIS OF

### 3. History and Family History

- |   |  |
|---|--|
| <p><b>Family History of Asthma or Allergy</b></p> <p><b>Patient with allergic rhinitis or Atopic dermatitis</b></p> <p><b>Physical Exam can be normal</b></p> | <ul style="list-style-type: none"><li>• Increases the probability that the respiratory symptoms are due to asthma</li><li>• Patients should be asked about specific respiratory symptoms</li><li>• If patient is in a flare-up, decreased breath sounds or expiratory wheezes may be present</li></ul> |
|---|--|

## 2. How You Can Help Students with Asthma

- Reassure them they are not alone; many kids have asthma
- Know and teach students to recognize the early warning signs of an asthma flare-up
- Show concern and take symptoms seriously
- Find out what can trigger a student's asthma and help them avoid triggers
- Facilitate the two-way release if one is not on file already
- Ask parents to request an asthma action plan from their child's provider
- Give the student's medicine as directed using proper inhaler technique
- Encourage parents to attend regular asthma check-up visits with provider





# Tackling Asthma



## Asthma Resources

There are many organizations that want to provide the best information to help students and families understand their asthma. Below is a list of trusted resources that can answer any additional questions you may have regarding asthma.



[www.allergyasthmanetwork.org](http://www.allergyasthmanetwork.org)



[www.aaaai.org](http://www.aaaai.org)



[www.lung.org/asthma](http://www.lung.org/asthma)



[www.epa.gov/asthma](http://www.epa.gov/asthma)



[www.ginasthma.org](http://www.ginasthma.org)



[www.iggyandtheinhalers.com](http://www.iggyandtheinhalers.com)

# Tackling Asthma

## and its Social Determinants



### Module 3: Outline

2019



## Asthma Control

Objectives	Presentation/Outline Content	Activities and Materials
<ul style="list-style-type: none"> <li>Recognize the goals for asthma management as defined by national best practice guidelines</li> <li>Distinguish between asthma controller medications and reliever medication</li> <li>Assess asthma that is controlled vs. not controlled</li> <li>Demonstrate appropriate technique for inhaler use.</li> </ul>	<ul style="list-style-type: none"> <li>Presentation <b>slide 6</b> key points: These are the current goals for asthma management per best practice guidelines.</li> <li>Key point <b>slide 6</b>: Asthma management is a dynamic, ongoing process between patient and healthcare team</li> <li><b>Slides 7 through 10</b> discuss the indications, desired effects, and potential side effects for commonly used asthma medications</li> <li><b>Slide 12</b> is 4 questions over the student's previous 4 weeks to indicate control or uncontrolled asthma. Key point: When talking with providers this is a good approach to use if you think your student's asthma is not well controlled.</li> <li><b>Slide 13</b> ensures a consistent way of teaching proper inhaler technique. Key point: Over half of students forget how to do proper technique within 4 weeks of training.</li> </ul>	<ul style="list-style-type: none"> <li><b>Slide 7-10</b>: Use the teach-back method to gage understanding of what each class of medications are used for. Ask for volunteers to explain in their own words the following:               <ul style="list-style-type: none"> <li>How do ICS help keep asthma under control?</li> <li>What is a reliever medication?</li> <li>Describe why a student would be receiving a LABA?</li> <li>What does an LTRA do for patients with asthma?</li> </ul> </li> <li><b>Activity Materials</b></li> <li>New Valved Holding Chamber</li> <li>Placebo Inhaler</li> <li>You can have one individual come up in front of the group to demonstrate or you can set up a station</li> <li>Review <b>pgs. 17-20</b> for age appropriate techniques</li> </ul>

# Tackling Asthma



## Module 3: Asthma Control

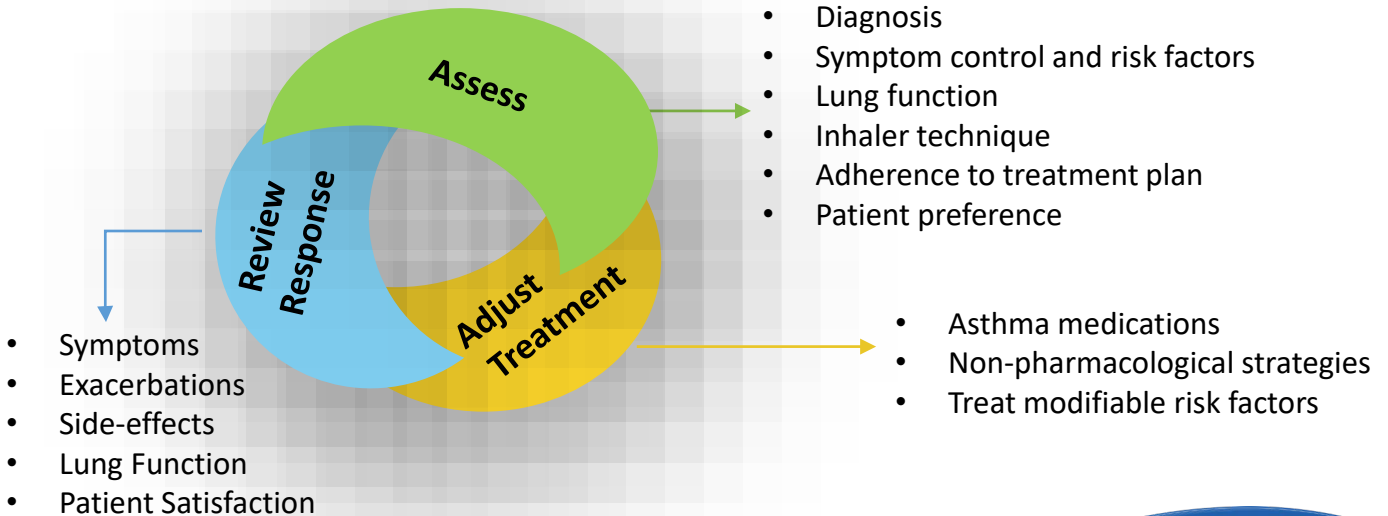
Controlling the symptoms of asthma helps reduce the risk of future exacerbations

### 1. Control-based asthma management goals

- 1 Good symptom control
- 2 Minimize future risk of exacerbation
- 3 Minimize fixed airway limitation
- 4 Minimize side effects of treatment
- 5 Identify patient and family goals regarding their asthma

*Global Initiative for Asthma (GINA):2018 Global Strategy for Asthma Management and Prevention.*

### 2. Control-based asthma management cycle per GINA guidelines



# Tackling Asthma



## 3. Pharmaceutical Strategies

**Inhaled Corticosteroids (ICS)** are the first line of defense in controlling asthma. Many children can achieve control with a low dose of ICS taken daily or twice daily. ICS suppress airway inflammation. This is a hallmark of what happens in the lungs of a patient with asthma.



Most of the time, these inhalers are given at home. However, due to lack of adherence in the home setting, a provider may ask the school nurse to give this medication.

**\*Key takeaway: This is a maintenance inhaler, not a reliever.**

The strength and dosage of ICS is determined by age group. Guidelines recommend starting with the lowest dose possible for the individual age group.

### Indications for ICS

One or more risk factors for exacerbation

Waking more than once per month due to asthma

Symptoms or reliever use more than twice a week

### Desired Effects

Decrease airway inflammation

Control symptoms

Reduce future risk of exacerbations

Stop decline in lung function

### Potential Side Effects

Thrush

Pharyngitis

Adrenal crisis

Suppressed growth velocity

Osteoporosis



# Tackling Asthma



## 3. Pharmaceutical Strategies Continued

**Long acting beta-agonist (LABA) + ICS** is the next step up when the maximum amount of ICS has been reached and symptoms remain out of control despite evidence of medication adherence. This combination of medications decreases inflammation in the airways and helps smooth muscles surrounding the airways stay relaxed.



Before stepping up therapy, the following actions should be considered: Check inhaler technique, investigate poor adherence, assess triggers at home/school or comorbidities contributing to lack of control on ICS alone. **\*Key takeaway: this is a maintenance inhaler, not a reliever.** The strength and dosage of ICS is determined by age group. Guidelines recommend starting with the lowest dose possible for the individual age group.

### Indications for LABA + ICS

Persistent symptoms for 2 to 3 months despite adherence to ICS

Exercise induced asthma not controlled with ICS + SABA

### Desired Effects

Suppress airway inflammation

Relax smooth muscle bands

Reduce future risk of exacerbations

Stop decline in lung function

### Potential Side Effects

Palpitations

Tremors

Headache

Muscle Cramps

Decreased Potassium



# Tackling Asthma



## 3. Pharmaceutical Strategies Continued

**Leukotriene receptor antagonist (LTRA)** such as montelukast sodium and zileuton are not recommended as a monotherapy. LTRAs relieve symptoms of allergic rhinitis and seasonal allergies that can drive asthma. They block Leukotrienes, which are a specific inflammatory mediator involved in asthma that corticosteroids do not cover. Leukotrienes can produce bronchospasm, mucus, mucosal edema, hyper responsiveness of the airways, and eosinophil recruitment in the lungs.



These medications can interact with blood thinners. Montelukast sodium specific side effects include mood changes, nightmares, and even aggression. Both LTRAs come in different strengths and frequency. Singualr is generally a daily medication. Zileuton can be taken twice daily. The strength and dosage are dependent on the age group.

Indications for LTRA	Desired Effect	Potential Side Effects
<p>Asthma driven by allergic rhinitis, indoor allergens, and seasonal allergies</p> <p>Exercise induced asthma not controlled with ICS + SABA alone</p>	<p>Decrease Leukotrienes</p> <p>Decrease inflammation in the airways</p> <p>Reduce future risk of exacerbations</p>	<p>Upset stomach</p> <p>Diarrhea</p> <p>Trouble Sleeping</p> <p>Headache</p> <p>Weakness</p> <p>Muscle Pain</p> <p>Cold Symptoms</p> <p>Mood changes</p> <p>Skin rashes</p>



# Tackling Asthma



## 3. Pharmaceutical Strategies Continued

**Short Acting Beta Agonist (SABA)** is a bronchodilator. It quickly opens up tight airway passages by relaxing the muscle bands that surround the airway. It is referred to as the reliever medication because it works very fast to decrease the symptoms of a flare-up or to pre-treat before exercise. Students with asthma should always have an extra albuterol inhaler at school for quick and convenient access.

**\*Always use a chamber with HFA's**



**\*New Dry Powder Inhaler  
DO NOT USE A CHAMBER**



### Indications for SABA

Prescribed for anyone with a diagnosis of asthma

Treatment or prevention of bronchospasm

### Desired Effect

Relieve symptoms associated with an asthma flare-up

Prevent exercise induced bronchospasm

Dilate the smooth muscle surrounding the airway

### Potential Side Effects

Increased heart rate & blood pressure

Jitteriness

Excessive use can be fatal

Paradoxical bronchospasm



# Tackling Asthma



## 4. Non-Pharmaceutical Strategies

A comprehensive patient centered approach requires more than medicine. This should be explored more under social determinants of health, but this is a quick overview of strategies that can help control asthma.

- No safe level of 2<sup>nd</sup> hand smoke
- Exercise should be encouraged
  - Provide advice on talking with provider on prevention and management of exercise-induced bronchospasm
- Healthy diet and weight reduction
- **AVOID INDOOR AND OUTDOOR TRIGGERS**
- Deal with emotional stress
- Identify barriers to medication adherence
  - Intention vs. Non-Intentional



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# Tackling Asthma



## 5. Assessing Control

The *Gina* guidelines created this quick guide to assessing a patient's asthma control over the previous 4 weeks. Knowing the answer to these 4 questions will help you advocate with parents and providers that a student's asthma may not be well controlled.



In the past 4 weeks, has the patient had:		Well Controlled	Partly Controlled	Uncontrolled
Daytime symptoms more than twice/week?	Yes <input type="checkbox"/> No <input type="checkbox"/>	None of these	1 or 2 of these	3 or 4 of these
Any night waking due to asthma?	Yes <input type="checkbox"/> No <input type="checkbox"/>			
Reliever needed more than twice/week?	Yes <input type="checkbox"/> No <input type="checkbox"/>			
Any activity limitation due to asthma?	Yes <input type="checkbox"/> No <input type="checkbox"/>			

If a student's asthma is uncontrolled, this is an opportunity to communicate to providers (two way release) or parents to be proactive before symptoms worsen.



# Tackling Asthma



## Teach to Goal Inhaler Demonstration

### Step wise Approach

- 1) Ask patient and family to demonstrate the technique they use at home.
- 2) Positively reinforce the steps that are correct.
- 3) Coach patient and family on any steps that were omitted or done incorrectly.
- 4) Have patient and family repeat demonstration.
- 5) Repeat these steps if necessary until patient and family have mastered technique.

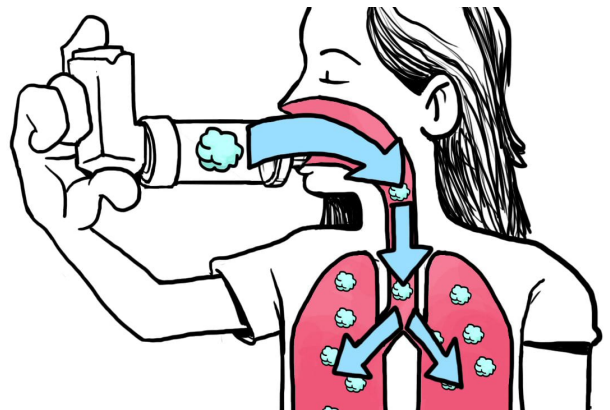
\* If patient has never used inhalers before, step one should be educator demonstration.

### Considerations

- 1) Assess patient is using correct valved holding chamber for age and ability.
- 2) Demonstration is an EVERYTIME event.

### Key Goals

- Consistent messaging for patients and families through a standardized approach.
- Better retention of proper technique through teach to goal learning strategy.



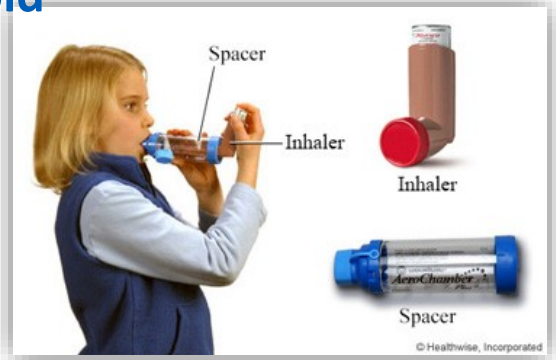
# Tackling Asthma



## Inhaler Technique Using Breath Hold

Using the inhaler the right way will help you and your child make sure the medicine gets into the lungs. When in doubt, ask your provider to show you how.

All inhalers and valved holding chambers need to be primed. Priming is a way to mix the medication in the inhaler so the dose your child receives is correct.



**1**

Remove cap and shake inhaler for 5 seconds.

**2**

Place inhaler in the back of the spacer

**3**

Remove spacer cap

**4**

Breathe air out away from the inhaler and spacer until lungs feel empty



**5**

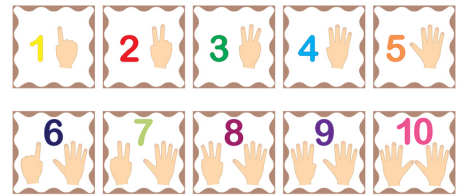
Put lips around the mouthpiece to make a tight seal

**6**

Press the canister once and breathe in slowly and steadily until lungs are full

**7**

Hold breath for 10 seconds



Current as of: December 6, 2017

Author: [Healthwise Staff](#)

Medical Review: John Pope, MD - Pediatrics & Donald Sproule, MDCM, CCFP - Family Medicine & Adam Husney, MD - Family Medicine & Lora J. Stewart, MD - Allergy and Immunology & Martin J. Gabica, MD - Family Medicine



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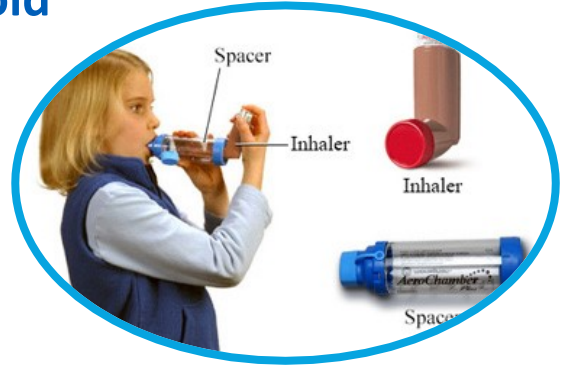
# Tackling Asthma



## Inhaler Technique Without Breath Hold

Using the inhaler the right way will help you and your child make sure the medicine gets into the lungs. When in doubt, ask your provider to show you how.

Very young children may not be ready to coordinate and hold their breath. If this is the case, they can follow the steps below with a mask or mouthpiece:



- 1** Remove cap and shake inhaler for 5 seconds.
- 2** Place inhaler in the back of the spacer
- 3** Remove spacer cap
- 4** Breathe air out away from the inhaler and spacer until lungs feel empty



- 5** Put lips around the mouthpiece to make a tight seal
- 6** Press the canister once and breathe in slowly and steadily **four times**



All inhalers need to be primed. Priming is a way to mix the medication in the inhaler so the dose your child receives is correct.

Current as of: December 6, 2017  
 Author: [Healthwise Staff](#)  
 Medical Review: John Pope, MD - Pediatrics & Donald Sproule, MDCM, CCFP - Family Medicine & Adam Husney, MD - Family Medicine & Lora J. Stewart, MD - Allergy and Immunology & Martin J. Gabica, MD - Family Medicine

# Tackling Asthma



## Inhaler Technique with Mask for Young Children

Using the inhaler the right way will help you and your child make sure the medicine gets into the lungs. When in doubt, ask your provider to show you how. Very young children will need a mask valved holding chamber and an adult to give the inhaler.



Lots of verbal praise for doing a good job and wearing the mask will go a long way with young children.

- 1** Remove cap and shake inhaler for 5 seconds.
- 2** Place inhaler in the back of the spacer
- 3** Gently place the mask of the spacer over the child's nose and mouth. Make a good seal, but do not press down tightly on the child's face.
- 4** Press the canister once
- 5** Watch the child take 4 breaths in and out.
- 6** Remove mask from your child's face and give lots of praise.



Most inhalers need to be primed. Priming is a way to mix the medication in the inhaler so the dose your child receives is correct.



# Tackling Asthma

## and its Social Determinants



### Module 4: Outline

2019



## Asthma Action Plan (AAP)

Objectives	Presentation/Outline Content	Activities and Materials
<ul style="list-style-type: none"> <li>Reinforce with students and families the important role the asthma action plan plays and having an updated copy available at school</li> <li>Apply knowledge of the asthma action plan to help determine which zone the student is in on presentation to school nurse.</li> <li>Teach students, peers, and families how the asthma action plan can help manage asthma.</li> </ul>	<ul style="list-style-type: none"> <li>Key point <b>slide 3</b>: AAP should have a list of patient's known triggers.</li> <li>Pre-treatment before exercise with albuterol dosage should be listed on plan if applicable.</li> <li>3 important points on the plan: What daily medication a student takes to control asthma, early recognition of warning signs, and when it is an asthma emergency and what to do.</li> <li><b>Slides 3-5</b> discuss what information is in each zone of the plan</li> </ul>	<ul style="list-style-type: none"> <li><b>Slide 3-5</b>: Use the teach-back method to gage understanding of each zone. Ask two participants to volunteer. One can pretend to be the school nurse and the other can be the student. It should be assumed that the student had an AAP in the past and has knowledge of the zones. This role play is more about helping the school nurse use the teach back method in the real world setting.</li> </ul>






# Tackling Asthma



## Module 4 . Asthma Action Plan

In addition to the action plan zones, the plan should include documentation of the students' triggers and pre-treatment prior to exercise, if ordered

Triggers: pollen, dust mites, dog dander (for example) \*Triggers differ for everyone

<p> <b>Green Zone</b></p> <p>You have all of these:</p> <ul style="list-style-type: none"> <li>• Breathing is good</li> <li>• No cough or wheeze</li> <li>• Can work/play</li> <li>• Sleeps all night</li> </ul>	<p><b>You are feeling well!</b></p> <p>Inhaled Medication Fluticasone (Flovent) HFA 110mcg</p> <p><b>Other Instructions:</b> Rinse mouth with water after taking your controller medicine to prevent oral thrush.</p>	<p><b>Do these things EVERYDAY</b></p> <table border="1"> <thead> <tr> <th>How much to take</th> <th>When to take it</th> </tr> </thead> <tbody> <tr> <td>2 Puffs</td> <td>Two Times a Day</td> </tr> </tbody> </table>		How much to take	When to take it	2 Puffs	Two Times a Day
How much to take	When to take it						
2 Puffs	Two Times a Day						
<p> <b>Yellow Zone</b></p> <p>You have any of these:</p> <ul style="list-style-type: none"> <li>• Cough</li> <li>• Wheeze</li> <li>• Tight chest</li> <li>• Coughing at night</li> </ul>	<p><b>You have Symptoms! (Continue Green Zone)</b></p> <p>Inhaled Medication Albuterol HFA 90mcg</p> <p><b>Other Instructions:</b> Give rescue medication every 4 hours for 1 to 2 days if symptoms are getting better.</p> <p>If rescue medication is needed more then 2 days, CALL your health care provider.</p> <p>If your child's symptoms are NOT BETTER or GET WORSE, go to the RED Zone.</p>	<p><b>ADD RESCUE Medication (Continue Green Zone)</b></p> <table border="1"> <thead> <tr> <th>How much to take</th> <th>When to take it</th> </tr> </thead> <tbody> <tr> <td>4 Puffs</td> <td>Every 4 hours as needed</td> </tr> </tbody> </table>		How much to take	When to take it	4 Puffs	Every 4 hours as needed
How much to take	When to take it						
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<p> <b>Red Zone</b></p> <p>You have any of these:</p> <ul style="list-style-type: none"> <li>• Medicine is not helping</li> <li>• Breathing is hard and fast</li> <li>• Nose opens wide</li> <li>• Can't walk or talk well</li> <li>• Ribs show</li> </ul>	<p><b>Danger!</b></p> <p>Inhaled Medication Albuterol HFA 90mcg</p> <p><b>Other Instructions:</b> If symptoms are NOT BETTER, call 911 or GO TO THE EMERGENCY ROOM!</p>	<p><b>Get Help Now!</b></p> <table border="1"> <thead> <tr> <th>How much to take</th> <th>When to take it</th> </tr> </thead> <tbody> <tr> <td>4 Puffs</td> <td>Every 20 minutes for up to 3 doses</td> </tr> </tbody> </table>		How much to take	When to take it	4 Puffs	Every 20 minutes for up to 3 doses
How much to take	When to take it						
4 Puffs	Every 20 minutes for up to 3 doses						



# Tackling Asthma



## Module 4: Asthma Action Plan **Green Zone**

**Triggers: pollen, dust mites, dog dander (for example) \*triggers differ for everyone**

😊 Green Zone	You are feeling well!	Do these things EVERYDAY	
You have all of these: <ul style="list-style-type: none"> <li>Breathing is good</li> <li>No cough or wheeze</li> <li>Can work/play</li> <li>Sleeps all night</li> </ul>	<b>Inhaled Medication</b> Fluticasone (Flovent) HFA 110mcg  <b>Other Instructions:</b> Rinse mouth with water after taking your controller medicine to prevent oral	<b>How much to take</b> 2 Puffs	<b>When to take it</b> Two Times a Day

- Triggers should be listed somewhere on the patient's plan. Generally at the top of the page.
- This is the zone we want students to live in everyday; they are at baseline and symptom free.
- Controller medications for daily use are listed in the green zone.
- A reminder to rinse mouth after controller medication to prevent thrush
- Any pre-treating with albuterol before exercise is included here
  - Arkansas Children's uses an age based guideline:
    - <5 years of age = 2 puffs albuterol 15 to 20 minutes before exercise
    - >5 years of age = 4 puffs albuterol 15 to 20 minutes before exercise





# Tackling Asthma



## Module 4: Asthma Action Plan **Yellow Zone**

**Triggers: pollen, dust mites, dog dander (for example) triggers differ for everyone**

😊 Green Zone			
<b>You are feeling well!</b> You have all of these: <ul style="list-style-type: none"> <li>Breathing is good</li> <li>No cough or wheeze</li> <li>Can work/play</li> <li>Sleeps all night</li> </ul>	<b>Do these things EVERYDAY</b> Inhaled Medication Fluticasone (Flovent) HFA 110mcg	How much to take	When to take it
		2 Puffs	Two Times a Day
<b>Other Instructions:</b> Rinse mouth with water after taking your controller medicine to prevent oral thrush.			
😬 Yellow Zone			
<b>You have Symptoms!</b> You have any of these: <ul style="list-style-type: none"> <li>Cough</li> <li>Wheeze</li> <li>Tight chest</li> <li>Coughing at night</li> </ul>	<b>ADD RESCUE Medication (Continue Green Zone)</b> Inhaled Medication Albuterol HFA 90mcg	How much to take	When to take it
		4 Puffs	Every 4 hours as needed
<b>Other Instructions:</b> Give rescue medication every 4 hours for 1 to 2 days if symptoms are getting better.  If rescue medication is needed more than 2 days, CALL your health care provider.  If your child's symptoms are NOT BETTER or GET WORSE, go to the RED Zone.			

- Early symptom recognition is key to avoiding an emergency room or inpatient encounter
- Treat early and aggressively with short acting bronchodilator (SABA)
- The provider has the discretion to order the number of puffs for each zone
- Arkansas Children's providers suggest 4 puffs in the yellow zone






# Tackling Asthma



## Module 4: Asthma Action Plan **Red Zone**

**Triggers: pollen, dust mites, dog dander (for example) triggers differ for everyone**

 <b>Green Zone</b> You have all of these: <ul style="list-style-type: none"> <li>Breathing is good</li> <li>No cough or wheeze</li> <li>Can work/play</li> <li>Sleeps all night</li> </ul>	<b>You are feeling well!</b> Inhaled Medication Fluticasone (Flovent) HFA 110mcg  <b>Other Instructions:</b> Rinse mouth with water after taking your controller medicine to prevent oral thrush.	<b>Do these things EVERYDAY</b>	
 <b>Yellow Zone</b> You have any of these: <ul style="list-style-type: none"> <li>Cough</li> <li>Wheeze</li> <li>Tight chest</li> <li>Coughing at night</li> </ul>	<b>You have Symptoms! (Continue Green Zone)</b> Inhaled Medication Albuterol HFA 90mcg  <b>Other Instructions:</b> Give rescue medication every 4 hours for 1 to 2 days if symptoms are getting better.  If rescue medication is needed more then 2 days, CALL your health care provider.  If your child's symptoms are NOT BETTER or GET WORSE, go to the RED Zone.	<b>ADD RESCUE Medication (Continue Green Zone)</b> How much to take 4 Puffs	When to take it Every 4 hours as needed
 <b>Red Zone</b> You have any of these: <ul style="list-style-type: none"> <li>Medicine is not helping</li> <li>Breathing is hard and fast</li> <li>Nose opens wide</li> <li>Can't walk or talk well</li> <li>Ribs show</li> </ul>	<b>Danger!</b> Inhaled Medication Albuterol HFA 90mcg  <b>Other Instructions:</b> If symptoms are NOT BETTER, call 911 or GO TO THE EMERGENCY ROOM!	<b>Get Help Now!</b> How much to take 4 Puffs	When to take it Every 20 minutes for up to 3 doses

- Patient is showing signs of distressed breathing
- This is an emergency. Don't delay treatment
- Look closely at the patient, remain calm
- Arkansas Children's uses weight based guidelines for the Red Zone:
  - $\leq 20\text{kg}$  = 4 puffs albuterol;  $>20\text{kg}$  =6 puffs albuterol



# Tackling Asthma

## and its Social Determinants



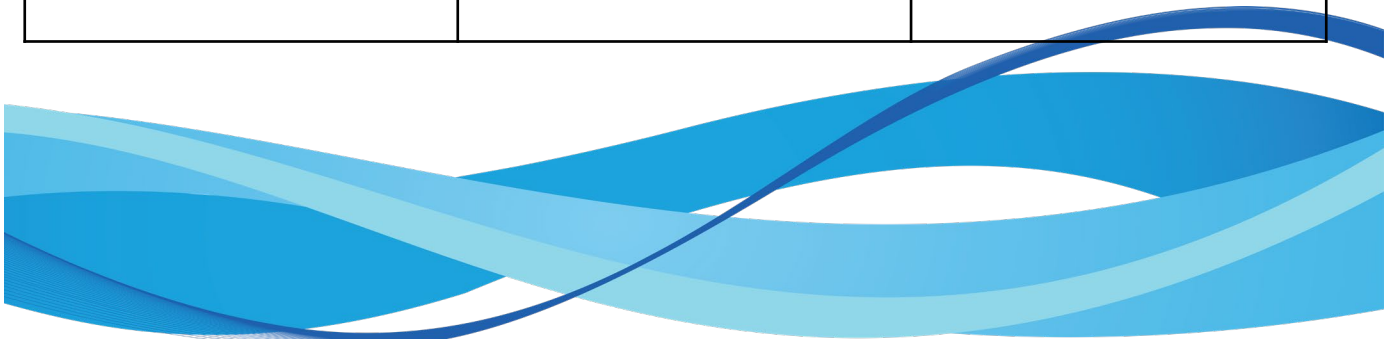
### Module 5: Outline

2019



## Asthma Flare Up Simulations

Objectives	Presentation/Outline Content	Activities and Materials
<ul style="list-style-type: none"> <li>Recognize early and late signs of an asthma flare-up.</li> <li>Distinguish between bilateral breath sounds and their role in assessment for asthma.</li> <li>Apply knowledge from this simulation in the school setting</li> <li>Build confidence in clinical skills</li> </ul>	<ul style="list-style-type: none"> <li>Key point <b>slide 3</b>: AAP should have a list of patient's known triggers.</li> <li>Pre-treatment before exercise with albuterol dosage should be listed on plan if applicable.</li> <li>3 important points on the plan: What daily medication a student takes to control asthma, early recognition of warning signs, and when it is an asthma emergency and what to do.</li> <li><b>Slides 3-5</b> discuss what information is in each zone of the plan</li> </ul>	<ul style="list-style-type: none"> <li>Have a participant or a teaching partner role play as your student "Jessica"</li> <li>The above is not a deal breaker, but adds to the simulation.</li> <li>Will need internet accessibility</li> <li>Have website: <a href="https://www.practicalclinicalskills.com/breath-sounds-reference-guide">https://www.practicalclinicalskills.com/breath-sounds-reference-guide</a> open in a separate window. Play these audios at each section of the simulations               <ol style="list-style-type: none"> <li>Initial BBS: <b>Vesicular Diminished</b></li> <li>After Jessica's 1st treatment <b>Polyphonic Wheezes</b></li> <li>After Jessica's 2<sup>nd</sup> treatment <b>Wheezes- Expiratory</b></li> <li>After Jessica's 3<sup>rd</sup> treatment <b>Vesicular-Normal</b></li> </ol> </li> </ul>



# Tackling Asthma



## Module 5: Asthma Simulation

Jessica is your student today. She is 12 years old and in the 6<sup>th</sup> grade. Her teachers describe her as a delightful young lady who strives to make good grades. She is very social and active during P.E.

Jessica is known to you as having mild persistent asthma. Her asthma action plan indicates that exercise, dust mites, and viral illness can trigger her asthma. She pre-treats before P.E. with 4 puffs of albuterol. She used to come to your office to pre-treat, but now that she is 12, Jessica and mom insisted she be able to carry her inhaler and pre-treat independently.

Today, she played soccer during P.E. Afterward, her teacher noticed that she was coughing, and seemed upset. Jessica expressed in words the following “I don’t know what’s happening. My chest feels funny like I can’t get enough air. I think I need my inhaler and Mom.”

Look at Jessica and make note of what you see. What did you hear? Jessica is able to talk in full sentences, no audible wheezes from where you are standing. You do hear anxiousness in her voice. At this point, you reassure Jessica you are here to help and have her sit in a chair to obtain vital signs and administer her rescue inhaler.



# Tackling Asthma



## Module 5: Asthma Simulation



### Vital Signs before 1<sup>st</sup> Albuterol MDI Treatment:

**Heart Rate:** 124

**Respiratory Rate:** 24

**Bilateral Breath Sounds:** Diminished Air Flow

**Retractions:** None

**Dyspnea:** Speaks in Complete Sentences

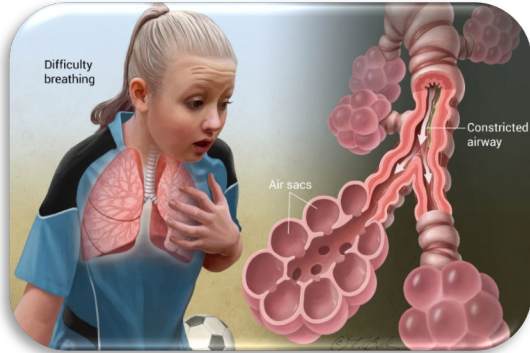
Asthma Severity	Normal	Mild	Moderate	Severe
<b>Resp. Rate</b> 2-3 years 4-5 years 6-12 years >12 years	18-26 16-24 14-20 12-18	27-34 25-30 21-26 19-23	35-39 31-35 27-30 24-27	≥ 40 ≥ 36 ≥ 31 ≥ 28
<b>Auscultation</b>	Normal Breath Sounds with good aeration throughout	End expiratory wheezing only	Expiratory Wheezing	Inspiratory and Expiratory Wheezing to diminished breath sounds
<b>Retractions</b>	None	Intercostal	Intercostal & Subcostal	Intercostal substernal and supraclavicular
<b>Dyspnea</b>	Speaks in complete sentences	Speaks in short sentences	Speaks in partial sentences, short cry	Speaks in single words. Short phrases/grunting



# Tackling Asthma



## Module 5: Asthma Simulation



### Triggers: pollen, dust mites, dog dander, exercise

<b>😊 Green Zone</b> You are feeling well! Do these things EVERYDAY			
You have all of these:	Inhaled Medication	How much to take	When to take it
<ul style="list-style-type: none"> <li>Breathing is good</li> <li>No cough or wheeze</li> <li>Can work/play</li> <li>Sleeps all night</li> </ul>	Fluticasone (Flovent) HFA 110mcg	2 Puffs	Two Times a Day
<b>Other Instructions:</b> Rinse mouth with water after taking your controller medicine to prevent oral thrush.  <b>4 puffs albuterol prior to exercise</b>			
<b>☹️ Yellow Zone</b> You have Symptoms! ADD RESCUE Medication (Continue Green Zone)			
You have any of these:	Inhaled Medication	How much to take	When to take it
<ul style="list-style-type: none"> <li>Cough</li> <li>Wheeze</li> <li>Tight chest</li> <li>Coughing at night</li> </ul>	Albuterol HFA 90mcg	4 Puffs	Every 4 hours as needed
<b>Other Instructions:</b> Give rescue medication every 4 hours for 1 to 2 days if symptoms are getting better.  If rescue medication is needed more then 2 days, CALL your health care provider.  If your child's symptoms are NOT BETTER or GET WORSE, go to the RED Zone.			
<b>☹️ Red Zone</b> Danger! Get Help Now!			
You have any of these:	Inhaled Medication	How much to take	When to take it
<ul style="list-style-type: none"> <li>Medicine is not helping</li> <li>Breathing is hard and fast</li> <li>Nose opens wide</li> <li>Can't walk or talk well</li> <li>Ribs show</li> </ul>	Albuterol HFA 90mcg	6 puffs	Every 20 minutes for up to 3 doses
<b>Other Instructions:</b> If symptoms are NOT BETTER, call 911 or GO TO THE EMERGENCY ROOM!			

## Administration of 1<sup>st</sup> MDI treatment

Jessica has her albuterol inhaler, but does not have a valved holding chamber. Jessica explained, "Now that I am older, my mom said I didn't need to use that part of the inhaler anymore." How will you explain to Jessica and her mom the need to always use a chamber?

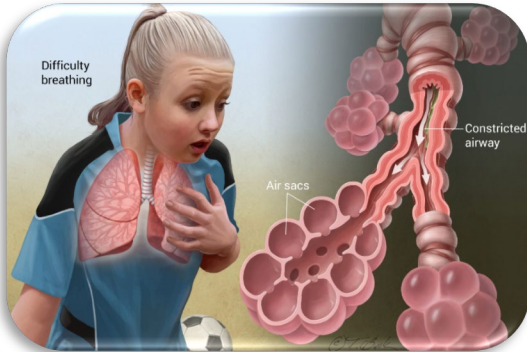


# Tackling Asthma



## Module 5: Asthma Simulation

Jessica completed her 1<sup>st</sup> treatment and has rested for 20 minutes. Reassessment findings are the following: HR 128, RR 22. BBS loud inspiratory and expiratory wheezes. No retractions or dyspnea. She seems less anxious. Her mom was notified of her condition during the wait. She is going to call back in 30 minutes. If Jessica is not better, she will pick her up. Jessica confides in you that she is skipping some of her Flovent doses at home. She thought she was growing out of her asthma. How will you explain to Jessica and her mom that asthma is a chronic disease?



### Vital Signs after 1st Treatment:

**Heart Rate:** 128

**Respiratory Rate:** 22

**Bilateral Breath Sounds:** Inspiratory and expiratory wheezes

**Retractions:** None

**Dyspnea:** Speaks in complete sentences

Asthma Severity	Normal	Mild	Moderate	Severe
<b>Resp. Rate</b>	18-26	27-34	35-39	≥ 40
<b>2-3 years</b>	16-24	25-30	31-35	≥ 36
<b>4-5 years</b>	14-20	21-26	27-30	≥ 31
<b>6-12 years</b>	12-18	19-23	24-27	≥ 28
<b>Auscultation</b>	Normal Breath Sounds with good aeration throughout	End expiratory wheezing only	Expiratory Wheezing	Inspiratory and Expiratory Wheezing to diminished breath sounds
<b>Retractions</b>	None	Intercostal	Intercostal & Subcostal	Intercostal substernal and supraclavicular
<b>Dyspnea</b>	Speaks in complete sentences	Speaks in short sentences	Speaks in partial sentences, short cry	Speaks in single words. Short phrases/grunting



# Tackling Asthma



## 20 minutes after 2<sup>nd</sup> MDI Treatment

Jessica completed her 2<sup>nd</sup> treatment and has rested for 20 minutes. Reassessment findings are the following: HR 118, RR 18. BBS end expiratory wheezes. No retractions or dyspnea.



### Vital Signs after 2nd Treatment:

**Heart Rate:** 118

**Respiratory Rate:** 18

**Bilateral Breath Sounds:** End expiratory wheezing only

**Retractions:** None

**Dyspnea:** Speaks in complete sentences

Asthma Severity	Normal	Mild	Moderate	Severe
<b>Resp. Rate</b>	18-26	27-34	35-39	≥ 40
<b>2-3 years</b>	16-24	25-30	31-35	≥ 36
<b>4-5 years</b>	14-20	21-26	27-30	≥ 31
<b>6-12 years</b>	12-18	19-23	24-27	≥ 28
<b>Auscultation</b>	Normal Breath Sounds with good aeration throughout	End expiratory wheezing only	Expiratory Wheezing	Inspiratory and Expiratory Wheezing to diminished breath sounds
<b>Retractions</b>	None	Intercostal	Intercostal & Subcostal	Intercostal substernal and supraclavicular
<b>Dyspnea</b>	Speaks in complete sentences	Speaks in short sentences	Speaks in partial sentences, short cry	Speaks in single words. Short phrases/grunting

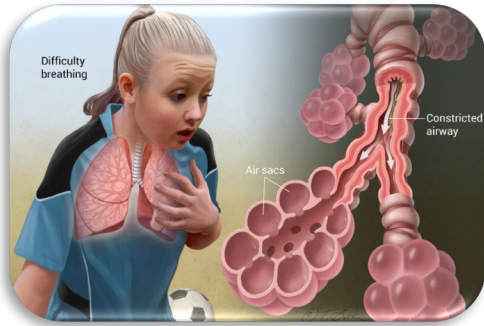




# Tackling Asthma



## Module 5: Asthma Simulation



**Triggers: pollen, dust mites, dog dander, exercise**

😊 Green Zone	You are feeling well!	Do these things EVERYDAY	
You have all of these:	Inhaled Medication	How much to take	When to take it
	Fluticasone (Flovent) HFA 110mcg	2 Puffs	Two Times a Day
<ul style="list-style-type: none"> <li>Breathing is good</li> <li>No cough or wheeze</li> <li>Can work/play</li> <li>Sleeps all night</li> </ul>		<b>Other Instructions:</b> Rinse mouth with water after taking your controller medicine to prevent oral thrush. 4 puffs albuterol prior to exercise	

😞 Yellow Zone	You have Symptoms! (Zone)	ADD RESCUE Medication (Continue Green Zone)	
You have any of these:	Inhaled Medication	How much to take	When to take it
	Albuterol HFA 90mcg	4 Puffs	Every 4 hours as needed
<ul style="list-style-type: none"> <li>Cough</li> <li>Wheeze</li> <li>Tight chest</li> <li>Coughing at night</li> </ul>		<b>Other Instructions:</b> Give rescue medication every 4 hours for 1 to 2 days if symptoms are getting better.  If rescue medication is needed more than 2 days, CALL your health care provider.  If your child's symptoms are NOT BETTER or GET WORSE, go to the RED Zone.	

😱 Red Zone	Danger!	Get Help Now!	
You have any of these:	Inhaled Medication	How much to take	When to take it
	Albuterol HFA 90mcg	6 puffs	Every 20 minutes for up to 3 doses
<ul style="list-style-type: none"> <li>Medicine is not helping</li> <li>Breathing is hard and fast</li> <li>Nose opens wide</li> <li>Can't walk or talk well</li> <li>Ribs show</li> </ul>		<b>Other Instructions:</b> If symptoms are NOT BETTER, call 911 or GO TO THE EMERGENCY ROOM!	

## Administration of 3<sup>rd</sup> MDI treatment

Jessica completed her 3<sup>rd</sup> treatment and has rested for 20 minutes. Reassessment findings is as follows: HR 124, RR 16. BBS Normal/Good air movement. No retractions or dyspnea.



# Tackling Asthma



## 20 minutes after 3<sup>rd</sup> MDI Treatment

Jessica completed her 2<sup>nd</sup> treatment and has rested for 20 minutes. You reassess her and find the following: HR 118, RR 18. BBS Normal with good air movement. No Retractions or Dyspnea. She is smiling and wants to get back to class so she doesn't miss Math which is the last class of the day. Her Mom called back and you updated her. She picks Jessica up by car after school and trust your judgement if you think she is okay to stay for her last class. What do you think?



### Vital Signs Treatment:

**Heart Rate:** 118

**Respiratory Rate:** 18

**Bilateral Breath Sounds:** Normal with Good Aeration

**Retractions:** None

**Dyspnea:** Speaks in Complete Sentence

Asthma Severity	Normal	Mild	Moderate	Severe
<b>Resp. Rate</b>	18-26	27-34	35-39	≥ 40
<b>2-3 years</b>	16-24	25-30	31-35	≥ 36
<b>4-5 years</b>	14-20	21-26	27-30	≥ 31
<b>6-12 years</b>	12-18	19-23	24-27	≥ 28
<b>Auscultation</b>	Normal Breath Sounds with good aeration throughout	End expiratory wheezing only	Expiratory Wheezing	Inspiratory and Expiratory Wheezing to diminished breath sounds
<b>Retractions</b>	None	Intercostal	Intercostal & Subcostal	Intercostal substernal and supraclavicular
<b>Dyspnea</b>	Speaks in complete sentences	Speaks in short sentences	Speaks in partial sentences, short cry	Speaks in single words. Short phrases/grunting



# Tackling Asthma

## and its Social Determinants



### Module 6: Outline

2019



## Social Determinants of Health

Objectives	Presentation/Outline Content	Activities and Materials
<ul style="list-style-type: none"> <li>Summarize the definition of Social Determinants of Health</li> <li>Recognize Social Determinants of Health that most impact asthma outcomes</li> <li>Prioritize students that may benefit more from dust mite covers than others</li> <li>Collaborate with students, families, and providers when barriers to asthma management are identified</li> </ul>	<ul style="list-style-type: none"> <li>Key point <b>slide 15</b>: Access to health care is a big barrier</li> <li>Key point <b>slide 16</b>: Discussion of how poverty effects health outcomes</li> <li>Key point <b>slide 17</b>: School as a positive place</li> <li>Key point <b>slide 18</b>: focus on dust mite covers and when to distribute them</li> </ul>	<ul style="list-style-type: none"> <li>Have participants write on a sticky note with contact information: "I need more information on _____"</li> <li>Wrap up and final questions</li> </ul>



# Tackling Asthma



## Module 6: Social Determinants of Health

**Social Determinants of Health** are defined as the conditions in the environments in which people are born, live, learn, work, and play. More than 80% of factors that affect health outcomes are outside of the clinical setting. A trusting relationship with a provider is key. Patients and families may not confide their real barriers to adhering to a treatment plan if the trust is not there. Sometimes it comes down to a lack of understanding regarding asthma as a chronic condition, or it can be limited access to care such as an asthma specialist. The following are some examples of factors that may impact asthma outcomes:



- Safe Housing
- Access to and Quality of Education
- Exposure to Crime
- Availability of community-based resources in support of community living and opportunities for recreational and leisure-time activities
- Public Safety
- Language/Literacy
- Cultural and Social Norms
- Socioeconomic Conditions and the stressful conditions that poverty creates
- Access to mass media and emerging technologies
- **ACCESS TO HEALTH CARE**



# Tackling Asthma



## Module 6: Social Determinants of Health

### Home indoor environment (trigger identification/avoidance)

Rodent/mold infestations

Higher rates of tobacco smoke exposure

Tenant laws: landlord > tenant

Family Pets

Dust mites

- **Higher psychological stress**

Lack of reliable transportation

Food insecurity

Poor living conditions

Violence

**1 out of 4 children live below the poverty line in Arkansas**



# Tackling Asthma



## Module 6: Social Determinants of Health

- **Schools**
  - Often viewed as a positive environment
  - Strong advocates for trigger avoidance
  - School nurses are uniquely positioned to:
    - Provide direct care
    - Adherence counseling
    - Education
    - Be an important link to community-based care
- **School Nurses should be recognized as an essential part of the health care team**



# Tackling Asthma



Dust mites are the most common indoor asthma trigger in Arkansas

They love to live in areas of high humidity and temperature levels



Dust mites can be found in pillows, mattresses, upholstered furniture, stuffed animals, and carpet

## Steps to minimize dust mites in the home

1. Cover the child's mattress, box springs, and pillow with an allergen-free cover
2. Wash child's sheets weekly in **hot water** of at least 130 °F
3. Vacuum carpet and area rugs weekly with a HEPA or small particle filter
4. Wipe down all room surfaces with a damp cloth weekly
5. Keep stuffed animals off of the bed. Keep books and knickknacks to a minimum
6. Items that cannot be washed such as stuffed animals, can be put in a plastic bag and placed in the freezer for 48 hours to kill dust mites
7. Keep indoor humidity less than 50%. A **hygrometer** will show your home's humidity level in a percentage
8. Place or replace a HEPA filter in your central heat/air conditioning



**Doing multiple steps will help reduce the most dust mites in the home**

# Tackling Asthma



## Resources

Francisco B, Rood T, Nevel R, Foreman P, Homan S. Teaming Up for Asthma Control: EPR-3 Compliant School Program in Missouri Is Effective and Cost-Efficient. *Prev Chronic Dis* 2017;14:170003. DOI: <http://dx.doi.org/10.5888/pcd14.170003>

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Hossny, E., Rosario, N., Lee, B. W., Singh, M., El-Ghoneimy, D., Soh, J. Y., & Le Souef, P. (2016). The use of inhaled corticosteroids in pediatric asthma: update. *The World Allergy Organization journal*, 9, 26. doi:10.1186/s40413-016-0117-0

Lemanske, Jr RF, Kakumanu S, Shanovich K, Antos N, Cloutier MM, Mazyck D, et al. [Creation and implementation of SAMPRO™: A school-based asthma management program](#). *J Allergy Clin Immunol* 2016 [In Press]. doi: 10.1016/j.jaci.2016.06.015.

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Woods ER, Bhaumik U, Sommer SJ, et al. Community Asthma Initiative to Improve Health Outcomes and Reduce Disparities Among Children with Asthma . *MMWR Suppl* 2016;65place\_holder\_For\_Early\_Release:11–20. DOI: <http://dx.doi.org/10.15585/mmwr.su6501a4>

