

# School-Based Asthma Care ...WALKING the (guide)LINE..

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*“Who else wants to read their essay, ‘What I Did Over The Summer That Didn’t Require My Inhaler?’”*



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“See, son? Daddy’s company makes inhalers to help people with asthma.”



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- More than 22 people in the US have asthma,

- More than 22 million people in the US have asthma,



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- More than 22 million people in the US have asthma,
- including 8 million children under the age of 18

*(CDC and National Health Interview Survey)*



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- Each year pediatric asthma causes about 14 million days lost from school
- Kids home sick = Parents home from work



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# Expert Panel Report (EPR-3)

- Full report in 2007 provides new guidance for selecting treatment based on a patient's *individual needs*



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- We'll get to the.....
- Nebulizers, Inhalers, Spacers, Pills, Steroids...



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# BUT FIRST A WORD FROM OUR SPONSOR



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# OUCH



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# INFLAMMATION



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# INFLAMMATION



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# Not all inflammation is bad...

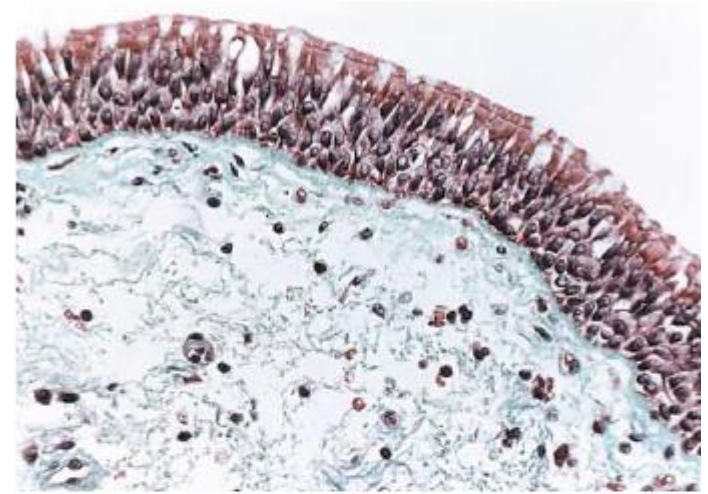
- Sore throat
- Fever
- Sprained ankle
- Etc.



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# Inflammatory Basis of Childhood Asthma:

- Histopathology



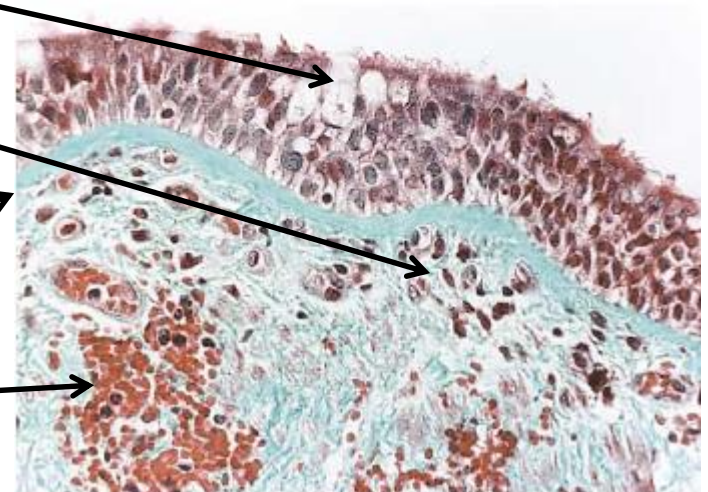
A

Focal epithelial loss

Inflammatory cell infiltration

Thickened basement membrane

Smooth muscle hypertrophy



# Common asthma symptoms

- wheezing
- shortness of breath
- chest tightness
- coughing

Young inner-city children with **asthma** have the highest emergency department (ED) visit rates. Relying on the emergency department for **asthma** care can be a dangerous sign of poorly controlled **asthma**



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# Wheeze

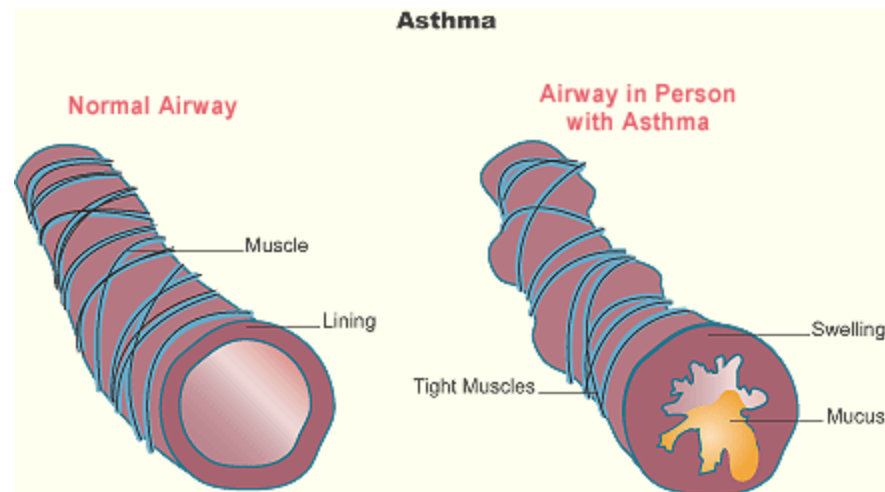
- Whistling or rattling sound of air moving thru obstructed airways



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# Wheeze

- Whistling or rattling sound of air moving thru obstructed airways



# Causes of “wheeze”

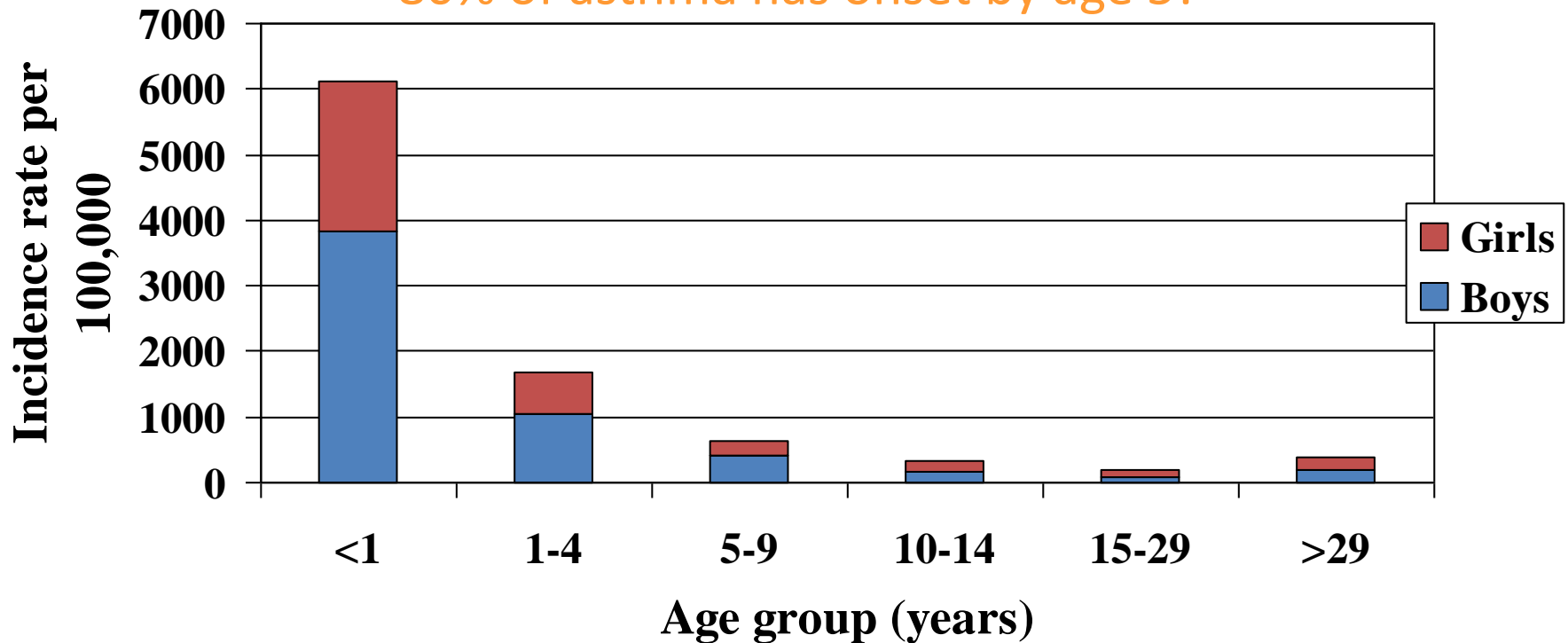
- Infection, bacterial
  - Bronchitis
  - Pneumonia
- Reactive Airways Disease
  - Viral
  - GERD
- Bronchiectasis
- Asthma
- Aspiration event
- Anatomic abnormalities
- Inherited disorders
- Bronchopulmonary Dysplasia
- Interstitial Lung Disease
- Extrinsic compression
- Allergies



# When Does Asthma Begin?

## Asthma Incidence in Rochester MN by Age and Gender

80% of asthma has onset by age 5!



# Initial Assessment of Asthma

- Key points
- Identify precipitating factors (evidence A)
- Identify comorbidities that may aggravate asthma (evidence B)
- Classify asthma severity, using measures in both the impairment (evidence B) and risk domains (evidence C)
- Measures of lung function using spirometry. Low FEV1 indicates current obstruction and risk for future exacerbation (evidence C).
- FEV1 is a useful measure of risk for exacerbations (evidence C)



# Measures of Asthma Assessment and Monitoring

- Assessment of impairment
  - Use of questionnaires Asthma Control Test (ACT), Asthma Therapy Assessment Questionnaire (ATAQ)
  - Spirometry may identify degree of airflow obstruction
- Determine Risk



# Education For A Partnership In Asthma Care

- Asthma self-management education is essential to provide patients with the skills necessary to control asthma and improve outcomes (evidence A)
- Asthma self-management education should be integrated into all aspects of asthma care, and it requires repetition and reinforcement.



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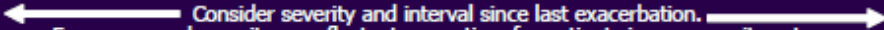
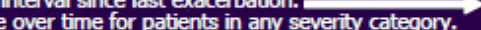
# Education For A Partnership In Asthma Care

- Asthma self-management education is essential to provide patients with the skills necessary to control asthma and improve outcomes (evidence A)
- Asthma self-management education should be integrated into all aspects of asthma care, and it requires repetition and reinforcement.



**FIGURE 4-2b. CLASSIFYING ASTHMA SEVERITY AND INITIATING TREATMENT IN CHILDREN 5-11 YEARS OF AGE**

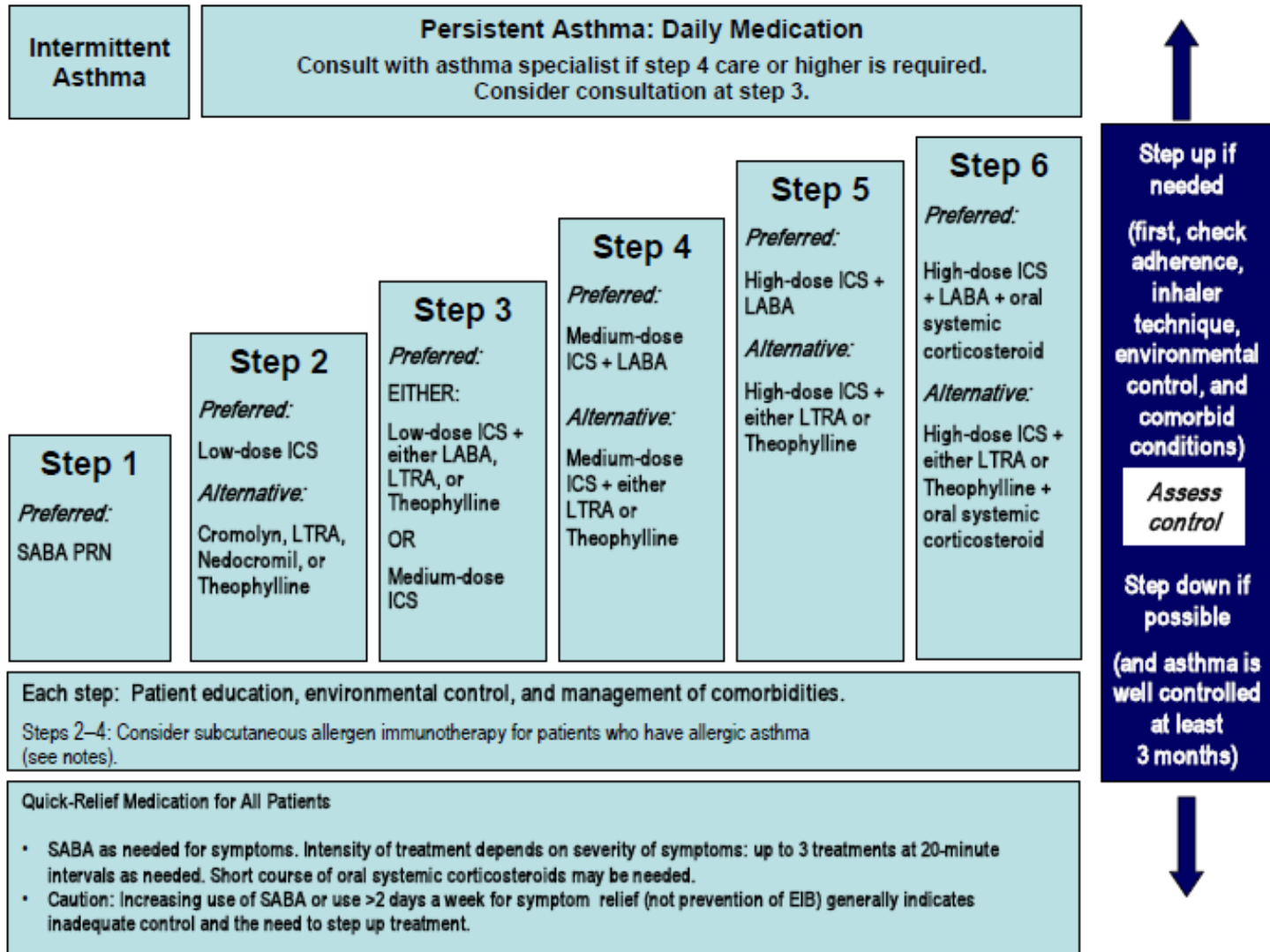
Assessing severity and initiating therapy in children who are not currently taking long-term control medication

Components of Severity		Classification of Asthma Severity (5-11 years of age)			
		Intermittent	Persistent		
			Mild	Moderate	Severe
Impairment	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤2x/month	3-4x/month	>1x/week but not nightly	Often 7x/week
	Short-acting beta <sub>2</sub> -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not daily	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
	Lung function	<ul style="list-style-type: none"> <li>• Normal FEV<sub>1</sub> between exacerbations</li> <li>• FEV<sub>1</sub> &gt;80% predicted</li> <li>• FEV<sub>1</sub>/FVC &gt;85%</li> </ul>	<ul style="list-style-type: none"> <li>• FEV<sub>1</sub> = &gt;80% predicted</li> <li>• FEV<sub>1</sub>/FVC &gt;80%</li> </ul>	<ul style="list-style-type: none"> <li>• FEV<sub>1</sub> = 60-80% predicted</li> <li>• FEV<sub>1</sub>/FVC = 75-80%</li> </ul>	<ul style="list-style-type: none"> <li>• FEV<sub>1</sub> &lt;60% predicted</li> <li>• FEV<sub>1</sub>/FVC &lt;75%</li> </ul>
Risk	Exacerbations requiring oral systemic corticosteroids	0-1/year (see note)	≥2/year (see note)   Consider severity and interval since last exacerbation.  Frequency and severity may fluctuate over time for patients in any severity category. Relative annual risk of exacerbations may be related to FEV <sub>1</sub> .		
Recommended Step for Initiating Therapy (See figure 4-1b for treatment steps.)		Step 1	Step 2	Step 3, medium-dose ICS option and consider short course of oral systemic corticosteroids	Step 3, medium-dose ICS option, or step 4
In 2-6 weeks, evaluate level of asthma control that is achieved, and adjust therapy accordingly.					



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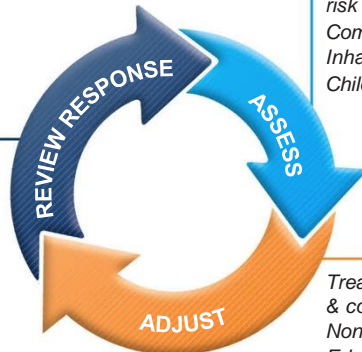
**FIGURE 4-1b. STEPWISE APPROACH FOR MANAGING ASTHMA IN CHILDREN 5-11 YEARS OF AGE**





Box 3-5B  
**Children 6-11 years**

**Personalized asthma management:**  
 Assess, Adjust, Review response



Confirmation of diagnosis if necessary  
 Symptom control & modifiable risk factors (including lung function)  
 Comorbidities  
 Inhaler technique & adherence  
 Child and parent goals

Symptoms  
 Exacerbations  
 Side-effects  
 Lung function  
 Child and parent satisfaction

Treatment of modifiable risk factors & comorbidities  
 Non-pharmacological strategies  
 Education & skills training  
 Asthma medications

**Asthma medication options:**  
 Adjust treatment up and down for individual child's needs

**PREFERRED CONTROLLER**

to prevent exacerbations and control symptoms

Other controller options

**RELIEVER**

	<b>STEP 1</b>	<b>STEP 2</b>	<b>STEP 3</b>	<b>STEP 4</b>	<b>STEP 5</b>
	Daily low dose inhaled corticosteroid (ICS)	Daily low dose inhaled corticosteroid (ICS) (see table of ICS dose ranges for children)	Low dose ICS-LABA, or medium dose ICS	Medium dose ICS-LABA Refer for expert advice	Refer for phenotypic assessment ± add-on therapy, e.g. anti-IgE
	Low dose ICS taken whenever SABA taken*; or daily low dose ICS	Leukotriene receptor antagonist (LTRA), or low dose ICS taken whenever SABA taken*	Low dose ICS+LTRA	High dose ICS-LABA, or add-on tiotropium, or add-on LTRA	Add-on anti-IL5, or add-on low dose OCS, but consider side-effects
	As-needed short-acting $\beta_2$ -agonist (SABA)				

\* Off-label; separate ICS and SABA inhalers; only one study in children



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# Changes:::Children 6-11 years

- Step 4
  - Medium dose ICS-LABA, but refer for expert advice
- Step 3
  - Low dose ICS-LABA and medium dose ICS are ‘preferred’ controller treatments
  - No safety signal with ICS-LABA in children 4-11 years *(Stempel, NEJMed 2017)*
- Step 2
  - Preferred controller is daily low dose ICS
  - Other controller options include as-needed low dose ICS taken whenever SABA is taken, but only one study in children *(Martinez, Lancet 2011)*
  - Studies of as-needed ICS-formoterol are needed; maintenance and reliever therapy with low dose budesonide-formoterol in children 4-11 years reduced exacerbations by 70-79% compared with ICS and ICS-LABA *(Bisgaard, Chest 2006)*
- Step 1
  - Low dose ICS whenever SABA taken (indirect evidence), or daily low dose ICS



# Other changes in GINA 2019

- Updated strategies for ‘yellow zone’ of action plans, with new evidence
  - 4x increase in ICS dose decreased severe exacerbations in pragmatic study in adults (*McKeever, NEJMed 2018*)
  - 5x increase in ICS dose did not decrease severe exacerbations in children with good symptom control and high adherence (*Jackson, NEJMed 2018*)
- Pre-school asthma
  - Additional suggestions for investigating history of wheezing episodes
  - Early referral recommended if child fails to respond to controller treatment
  - For exacerbations, OCS not generally recommended except in ED setting
  - Follow-up after ED or hospital: within 1-2 working days and 3-4 weeks later
  - Pocket guide on management of asthma in children 5 years and younger will be updated in 2019

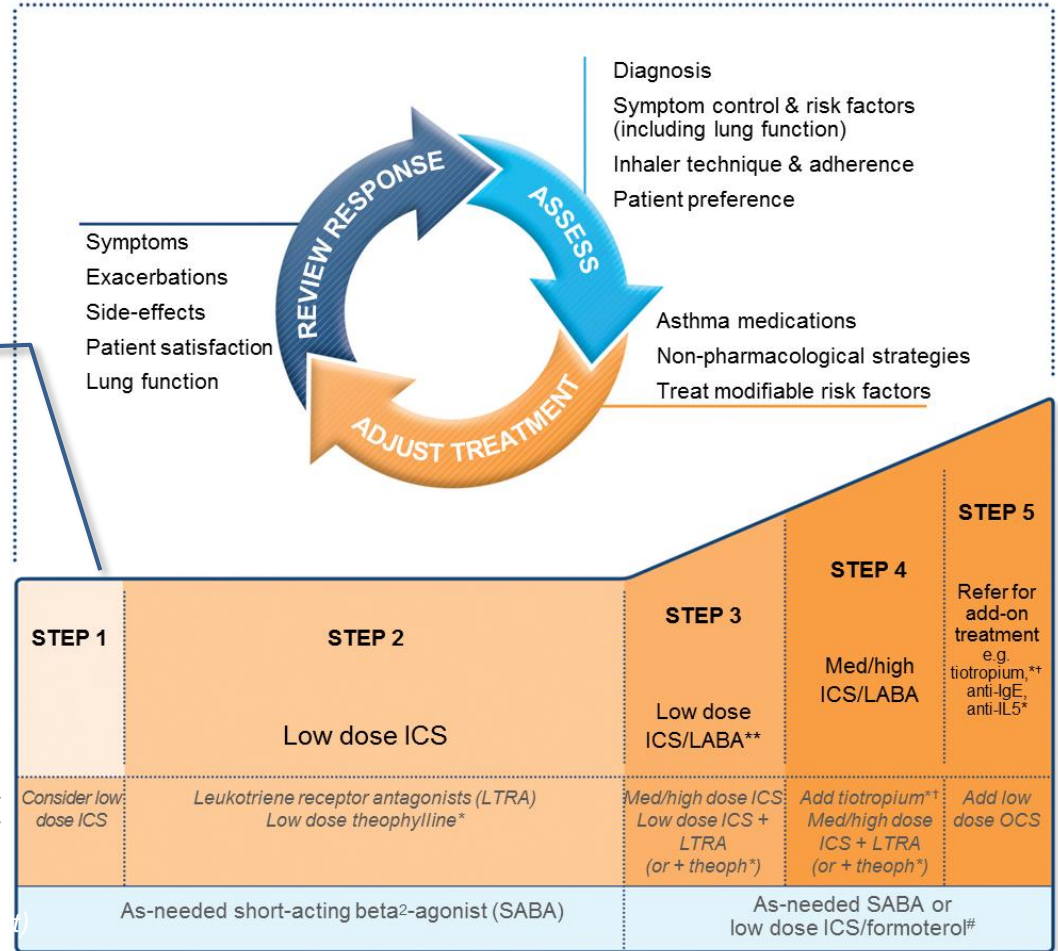


# GINA 2018 – main treatment figure



Step 1 treatment is for patients with symptoms <twice/month and no risk factors for exacerbations

Previously, no controller was recommended for Step 1, i.e. SABA-only treatment was 'preferred'



\*Not for children <12 years  
 \*\*For children 6-11 years, the preferred Step 3 treatment is medium dose ICS  
 #For patients prescribed BDP/formoterol or BUD/formoterol maintenance and reliever therapy  
 † Tiotropium by mist inhaler is an add-on treatment for patients ≥12 years with a history of exacerbations

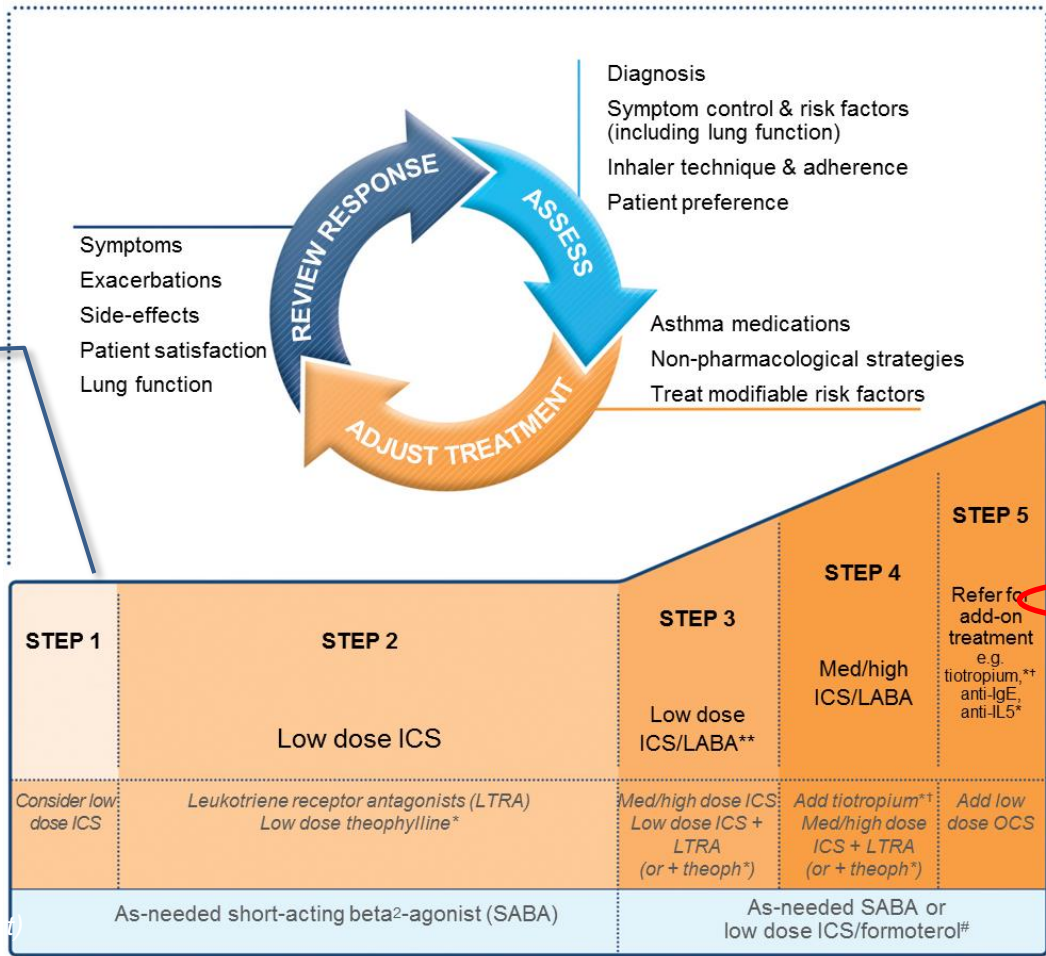


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# Risk for death

**FIGURE 5–2a. RISK FACTORS FOR DEATH FROM ASTHMA**

## **Asthma history**

Previous severe exacerbation (e.g., intubation or ICU admission for asthma)  
Two or more hospitalizations for asthma in the past year  
Three or more ED visits for asthma in the past year  
Hospitalization or ED visit for asthma in the past month  
Using >2 canisters of SABA per month  
Difficulty perceiving asthma symptoms or severity of exacerbations  
Other risk factors: lack of a written asthma action plan, sensitivity to *Alternaria*

## **Social history**

Low socioeconomic status or inner-city residence  
Illicit drug use  
Major psychosocial problems

## **Comorbidities**

Cardiovascular disease  
Other chronic lung disease  
Chronic psychiatric disease



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# What's your trigger?

- Upper respiratory infections, such as colds
- Inhaled irritants, such as secondhand smoke
- Certain weather conditions, such as cold air
- Allergies (outdoor or indoor)
- Physical expressions of emotion, such as crying, laughing, or yelling
- Exercise



# Whack-a-mole



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# Whack-a-mole



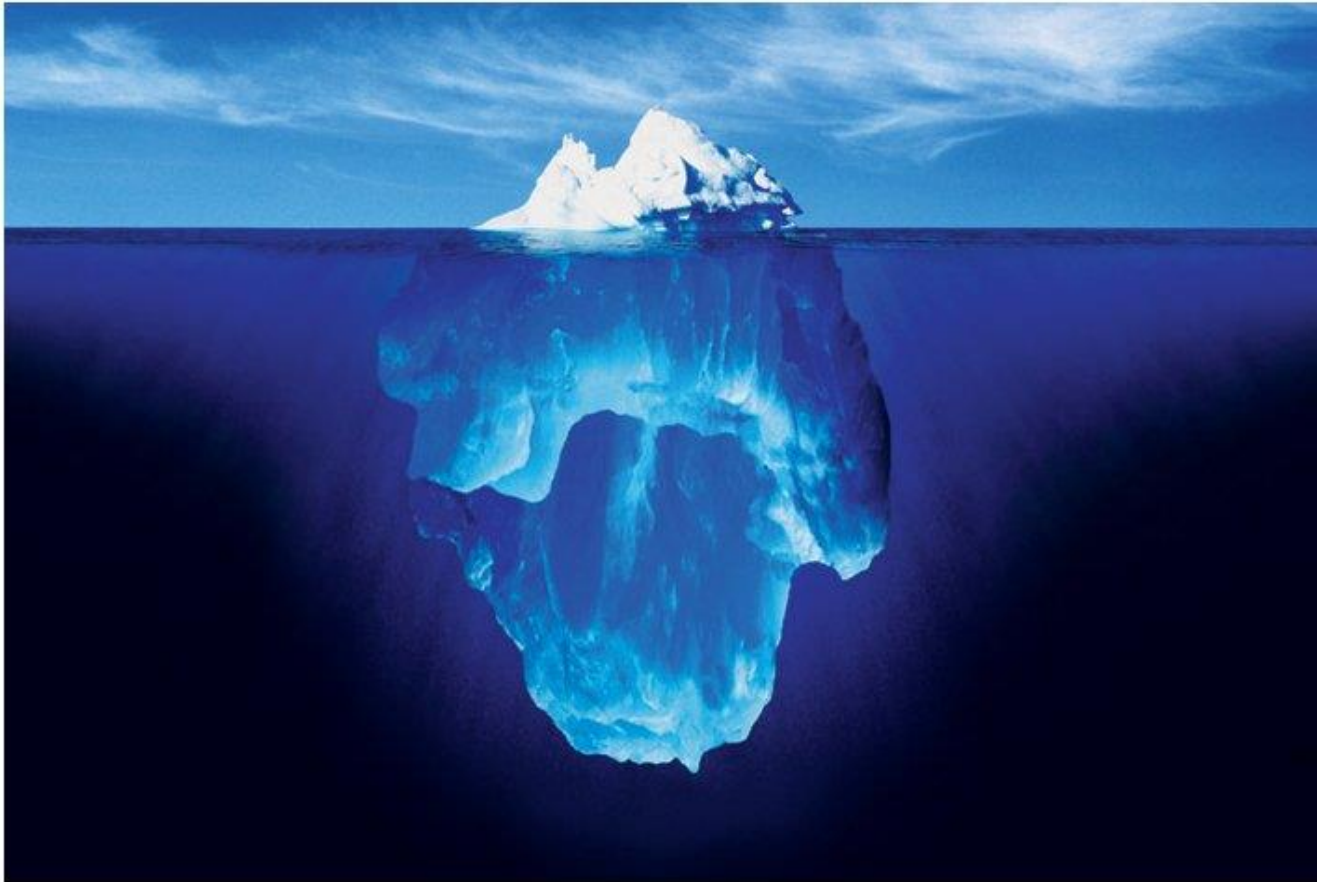
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# More than meets the eye

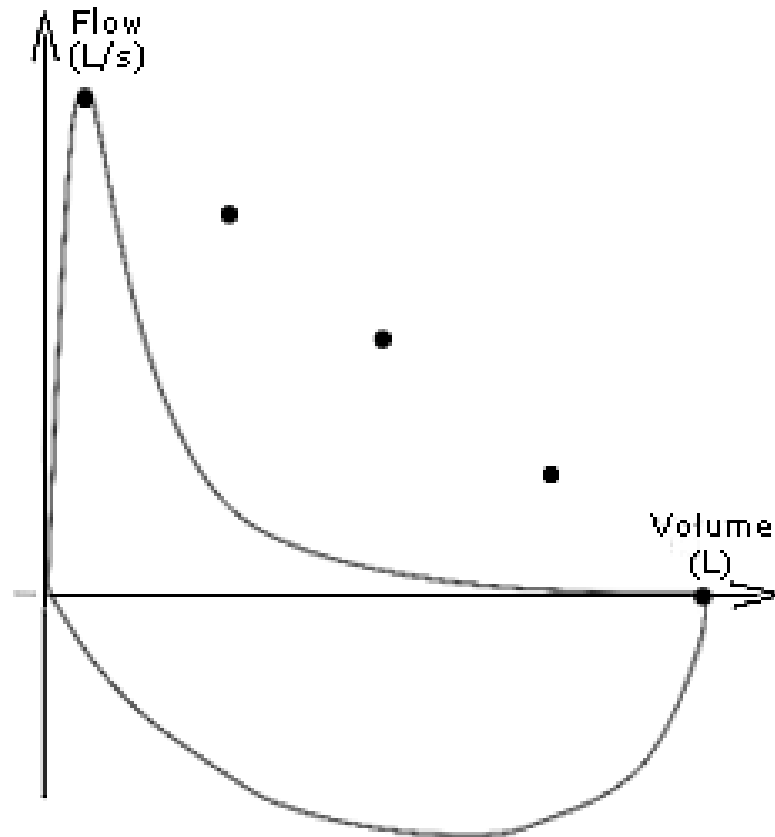


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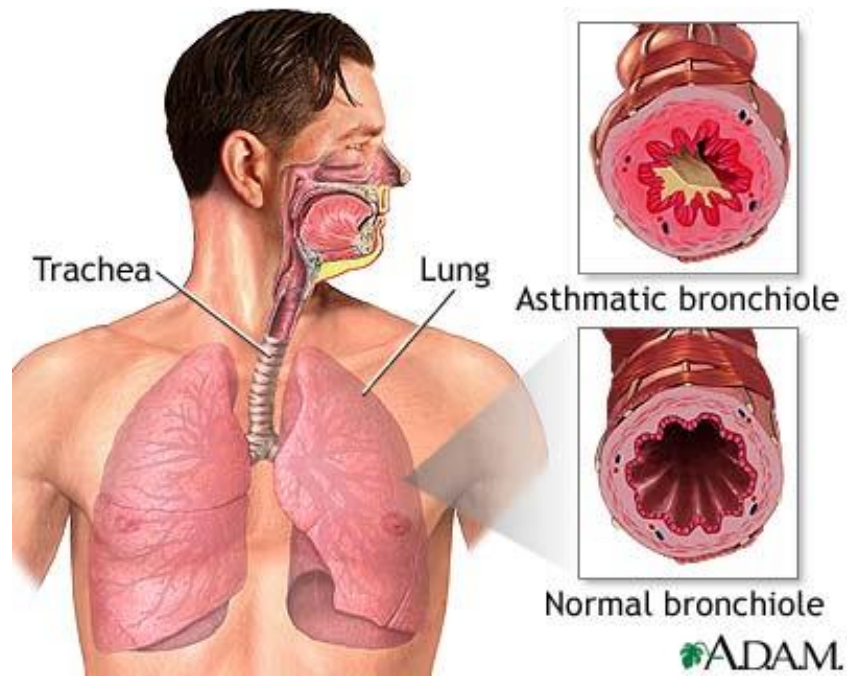
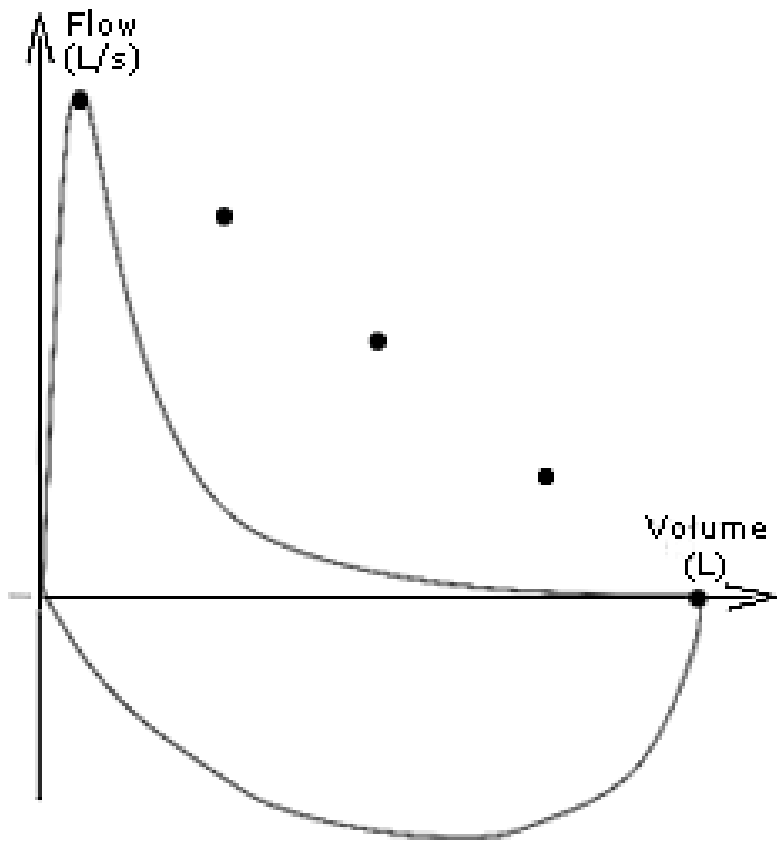
# More than meets the eye



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# treatment

- RESCUE vs CONTROLLER



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# Not all medication is the same

## RESCUE

- Albuterol
  - Proair
  - Ventolin
  - Proventil
- Xopenex

## CONTROLLER

- Pulmicort
- Flovent
- Qvar
- Asmanex
- Advair
- Symbicort
- Dulera



# Other treatments

## Allergy medications

- Zyrtec
- Claritin
- Allegra
- Singulair

## Oral steroids

- Prednisone
- Prednisolone (orapred)
- Solumedrol



# Let's try to avoid:



# Valved Holding Chambers...vs The Nebulizer



Devices shown are not actual size



# Valved Holding Chambers...vs The Nebulizer

- In children > 1 year of age with acute asthma comparing initial therapy with nebulizer versus MDI/chamber there is no difference in:
  - hospital admission rate
  - time to recovery
  - repeat visits



# Asthma Treatment Plan – Student

(This asthma action plan meets NJ Law N.J.S.A. 18A:40-12.8) (Physician's Orders)



(Please Print)

Name	Date of Birth	Effective Date
Doctor	Parent/Guardian (if applicable)	Emergency Contact
Phone	Phone	Phone

## HEALTHY (Green Zone) |||||



You have **all** of these:

- Breathing is good
- No cough or wheeze
- Sleep through the night
- Can work, exercise, and play

And/or Peak flow above \_\_\_\_\_

**Take daily control medicine(s). Some inhalers may be more effective with a "spacer" – use if directed.**

MEDICINE	HOW MUCH to take and HOW OFTEN to take it
<input type="checkbox"/> Advair <sup>®</sup> HFA <input type="checkbox"/> 45, <input type="checkbox"/> 115, <input type="checkbox"/> 230	2 puffs twice a day
<input type="checkbox"/> Aerospan <sup>™</sup>	<input type="checkbox"/> 1, <input type="checkbox"/> 2 puffs twice a day
<input type="checkbox"/> Alvesco <sup>®</sup> <input type="checkbox"/> 80, <input type="checkbox"/> 160	<input type="checkbox"/> 1, <input type="checkbox"/> 2 puffs twice a day
<input type="checkbox"/> Dulera <sup>®</sup> <input type="checkbox"/> 100, <input type="checkbox"/> 200	2 puffs twice a day
<input type="checkbox"/> Flovent <sup>®</sup> <input type="checkbox"/> 44, <input type="checkbox"/> 110, <input type="checkbox"/> 220	2 puffs twice a day
<input type="checkbox"/> Qvar <sup>®</sup> <input type="checkbox"/> 40, <input type="checkbox"/> 80	<input type="checkbox"/> 1, <input type="checkbox"/> 2 puffs twice a day
<input type="checkbox"/> Symbicort <sup>®</sup> <input type="checkbox"/> 80, <input type="checkbox"/> 160	<input type="checkbox"/> 1, <input type="checkbox"/> 2 puffs twice a day
<input type="checkbox"/> Advair Diskus <sup>®</sup> <input type="checkbox"/> 100, <input type="checkbox"/> 250, <input type="checkbox"/> 500	1 inhalation twice a day
<input type="checkbox"/> Asmanex <sup>®</sup> Twisthaler <sup>®</sup> <input type="checkbox"/> 110, <input type="checkbox"/> 220	<input type="checkbox"/> 1, <input type="checkbox"/> 2 inhalations <input type="checkbox"/> once or <input type="checkbox"/> twice a day
<input type="checkbox"/> Flovent <sup>®</sup> Diskus <sup>®</sup> <input type="checkbox"/> 50 <input type="checkbox"/> 100 <input type="checkbox"/> 250	1 inhalation twice a day
<input type="checkbox"/> Pulmicort Flexhaler <sup>®</sup> <input type="checkbox"/> 90, <input type="checkbox"/> 180	<input type="checkbox"/> 1, <input type="checkbox"/> 2 inhalations <input type="checkbox"/> once or <input type="checkbox"/> twice a day
<input type="checkbox"/> Pulmicort Respules <sup>®</sup> (Budesonide) <input type="checkbox"/> 0.25, <input type="checkbox"/> 0.5, <input type="checkbox"/> 1.0	1 unit nebulized <input type="checkbox"/> once or <input type="checkbox"/> twice a day
<input type="checkbox"/> Singulair <sup>®</sup> (Montelukast) <input type="checkbox"/> 4, <input type="checkbox"/> 5, <input type="checkbox"/> 10 mg	1 tablet daily
<input type="checkbox"/> Other	
<input type="checkbox"/> None	

Remember to rinse your mouth after taking inhaled medicine.

If exercise triggers your asthma, take this medicine \_\_\_\_\_ minutes before exercise.

## CAUTION (Yellow Zone) |||||



You have **any** of these:

- Cough
- Mild wheeze
- Tight chest
- Coughing at night
- Other: \_\_\_\_\_

If quick-relief medicine does not help within 15-20 minutes or has been used more than 2 times and symptoms persist, call your doctor or go to the emergency room.

And/or Peak flow from \_\_\_\_\_ to \_\_\_\_\_

**Continue daily control medicine(s) and ADD quick-relief medicine(s).**

MEDICINE	HOW MUCH to take and HOW OFTEN to take it
<input type="checkbox"/> Albuterol MDI (Pro-air <sup>®</sup> or Proventil <sup>®</sup> or Ventolin <sup>®</sup> )	2 puffs every 4 hours as needed
<input type="checkbox"/> Xopenex <sup>®</sup>	2 puffs every 4 hours as needed
<input type="checkbox"/> Albuterol <input type="checkbox"/> 1.25, <input type="checkbox"/> 2.5 mg	1 unit nebulized every 4 hours as needed
<input type="checkbox"/> Duoneb <sup>®</sup>	1 unit nebulized every 4 hours as needed
<input type="checkbox"/> Xopenex <sup>®</sup> (Levalbuterol) <input type="checkbox"/> 0.31, <input type="checkbox"/> 0.63, <input type="checkbox"/> 1.25 mg	1 unit nebulized every 4 hours as needed
<input type="checkbox"/> Combivent Respimat <sup>®</sup>	1 inhalation 4 times a day
<input type="checkbox"/> Increase the dose of, or add:	
<input type="checkbox"/> Other	

**• If quick-relief medicine is needed more than 2 times a week, except before exercise, then call your doctor.**

## EMERGENCY (Red Zone) |||||



Your asthma is **getting worse fast**:

- Quick-relief medicine did not help within 15-20 minutes
- Breathing is hard or fast
- Nose opens wide
- Ribs show
- Trouble walking and talking
- Lips blue
- Fingernails blue
- Other: \_\_\_\_\_

And/or Peak flow below \_\_\_\_\_

**Take these medicines NOW and CALL 911. Asthma can be a life-threatening illness. Do not wait!**

MEDICINE	HOW MUCH to take and HOW OFTEN to take it
<input type="checkbox"/> Albuterol MDI (Pro-air <sup>®</sup> or Proventil <sup>®</sup> or Ventolin <sup>®</sup> )	4 puffs every 20 minutes
<input type="checkbox"/> Xopenex <sup>®</sup>	4 puffs every 20 minutes
<input type="checkbox"/> Albuterol <input type="checkbox"/> 1.25, <input type="checkbox"/> 2.5 mg	1 unit nebulized every 20 minutes
<input type="checkbox"/> Duoneb <sup>®</sup>	1 unit nebulized every 20 minutes
<input type="checkbox"/> Xopenex <sup>®</sup> (Levalbuterol) <input type="checkbox"/> 0.31, <input type="checkbox"/> 0.63, <input type="checkbox"/> 1.25 mg	1 unit nebulized every 20 minutes
<input type="checkbox"/> Combivent Respimat <sup>®</sup>	1 inhalation 4 times a day
<input type="checkbox"/> Other	

## Triggers

Check all items that trigger patient's asthma:

- Colds/flu
- Exercise
- Allergens
  - Dust Mites, dust, stuffed animals, carpet
  - Pollen - trees, grass, weeds
  - Mold
  - Pets - animal dander
  - Pests - rodents, cockroaches
- Odors (Irritants)
  - Cigarette smoke & second hand smoke
  - Perfumes, cleaning products, scented products
  - Smoke from burning wood, inside or outside
- Weather
  - Sudden temperature change
  - Extreme weather - hot and cold
  - Ozone alert days
- Foods:
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
- Other:
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_

This asthma treatment plan is meant to assist, not replace, the clinical decision-making required to meet individual patient needs.

### Permission to Self-administer Medication:

- This student is capable and has been instructed in the proper method of self-administering of the non-nebulized inhaled medications named above in accordance with NJ Law.
- This student is **not** approved to self-medicate.

PHYSICIAN/AP/NP/PA SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

PARENT/GUARDIAN SIGNATURE \_\_\_\_\_

PHYSICIAN STAMP \_\_\_\_\_



# Asthma – 100 years of Pharmacotherapy





# E-Cigarettes (aka Vaping, JUULing)



# E-Cigarettes (aka Vaping, JUULing)

Chemicals in E-Cigarettes include:

Acetaldehyde

Acrolein

Formaldehyde

Propylene Glycol

Vegetable Glycerin

(Some) with Vitamin E Oil (recent data)

**NICOTINE**

<https://www.hackensackmeridianhealth.org/take-vape-away>



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# E-Cigarettes (aka Vaping, JUULing)

We Need Your Help!

<https://www.hackensackmeridianhealth.org/take-vape-away>



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# Resources

- National Asthma Education and Prevention Program
  - <http://www.nhlbi.nih.gov/about/naepp/>
- Asthma and Allergy Foundation of America
  - <http://www.aafa.org>
- American Lung Association
  - <http://www.lungusa.org>
- American Academy of Allergy, Asthma, and Immunology
  - <http://www.aaaai.org>
- Allergy and Asthma Network/Mothers of Asthmatics, Inc.
  - <http://www.aanma.org>



# Resources

- American College of Allergy, Asthma, and Immunology
  - <http://www.acaai.org>
- American College of Chest Physicians
  - <http://www.chestnet.org>
- American Thoracic Society
  - <http://www.thoracic.org>
- The Centers for Disease Control and Prevention
  - <http://www.cdc.gov/asthma>



# Contact us!

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