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# Update on Asthma Guidelines

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# Disclosures

I have nothing to disclose

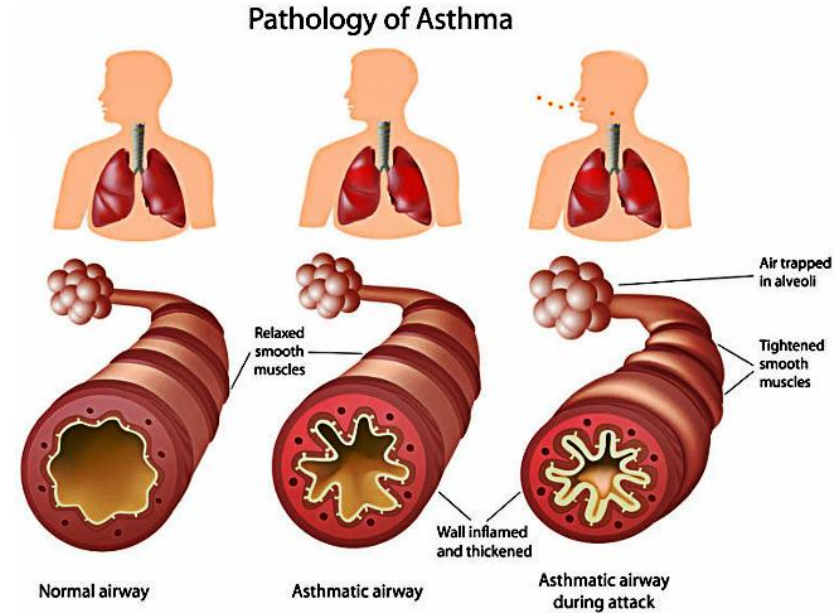
# Goals

1. Review how to diagnose asthma in pediatrics.
2. Be familiar with and know the similarities and difference in the step therapies presented in Global Initiative for Asthma 2023 and National heart lung and blood institute 2020 guidelines for each age group.
3. Be able to explain what single maintenance and reliever therapy is and when and why to use for patients.
4. Learn which controller inhaler that contain inhaled corticosteroids can be used as an as needed medication and when to use these for mild intermittent asthmatics



# Defining asthma

- A history of respiratory symptoms that vary over time AND variable expiratory limitations
- Symptoms are triggered by infections, exercise, laughter, allergens, cold air, certain medications, etc
- Chronic airway inflammation



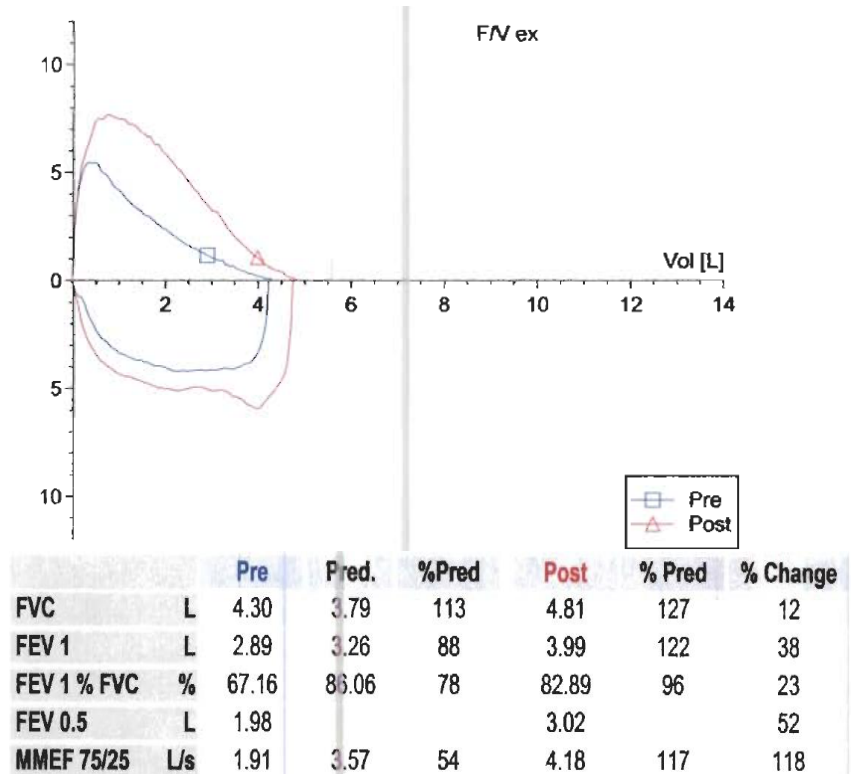
<http://www.medifree.com/blog/wp-content/uploads/2015/02/asthma.png>



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# Pulmonary Function Testing

- Obtaining accurate and reliable PFTs is difficult and requires training
- FEV1/FVC <85% of predicted in children
- Significant bronchodilator response: FEV1 increases from baseline by >12% of the predicted after beta agonist (may be absent if in severe exacerbation)
- Increase FEV1 by >12% from baseline after 4 wks of ICS
- Average daily diurnal PEF variability is >10%
- Methacholine, exercise, and/or cold air challenge



But is it asthma?

# Differential Diagnosis

- Chronic upper airway cough syndrome (postnasal drip)
- Vocal Cord Dysfunction
- Habit Cough
- Gastroesophageal reflux
- Persistent Bacterial Bronchitis
- Primary ciliary dyskinesia
- Interstitial lung disease
- Anatomical abnormalities (vascular compression, subglottic hemangioma, laryngeal web, laryngeal papilloma, etc.)
- Panic attack
- BPD/CLD
- Cystic fibrosis
- Congenital heart disease
- Immunodeficiency
- Connective tissue d/o
- Cystic fibrosis
- Foreign body
- Mediastinal mass
- Recurrent aspiration
- Tracheobronchomalacia
- Congenital heart disease

# Modified Asthma Predictive Index (mAPI)

$\geq 4$  Wheezing illnesses *and*

$\geq 1$  Major criteria

- Parental asthma
- Atopic dermatitis (MD diagnosed)
- Aeroallergen sensitization

OR

$\geq 2$  Minor criteria

- Food sensitization
- Peripheral blood eosinophils  $\geq 4\%$
- Wheezing apart from colds



# Asthma management

Global Strategy for Asthma Management and Prevention (2024 update)

2020 Focused Updates to the Asthma Management Guidelines: A Report from the National Asthma Education and Prevention Program Coordinating Committee Expert Panel Working Group.

Guidelines for the Diagnosis and Management of Asthma 2007 (EPR-3)



## SHORT-ACTING BETA<sub>2</sub>-AGONIST BRONCHODILATORS

relax tight muscles in airways and offer quick relief of symptoms such as coughing, wheezing and shortness of breath for 3-6 hours

<b>Albuterol Sulfate Inhalation Solution</b> 0.63, 1.5, 2.5 mg; 3 mL G N	<b>ProAir Digihaler</b> 90 mcg albuterol sulfate inhalation powder DIN A	<b>ProAir RespiClick</b> 90 mcg albuterol sulfate inhalation powder DIN A	<b>Proventil HFA</b> 90 mcg albuterol sulfate DIN A G	<b>Ventolin HFA</b> 90 mcg albuterol sulfate DIN A G	<b>Xopenex HFA</b> 0.31, 0.63, 1.25 mg; 3 mL levalbuterol hydrochloride inhalation solution A G N	<b>Xopenex HFA</b> 45 mcg levalbuterol tartrate DIN A G
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## LONG-ACTING BETA<sub>2</sub>-AGONIST BRONCHODILATORS

relax tight muscles in airways and offer lasting relief of symptoms such as coughing, wheezing and shortness of breath for at least 12 hours

<b>Brovana</b> 15 mg; 2 mL arformoterol tartrate inhalation solution G N	<b>Perforomist</b> 20 mcg; 2 mL formoterol fumarate inhalation solution G N	<b>Serevent Diskus</b> 50 mcg salmeterol xinafoate inhalation powder DIN A G	<b>Striverdi Respimat</b> 2.5 mcg olodaterol hydrochloride DIN A G
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## INHALED CORTICOSTEROIDS

reduce and prevent swelling of airway tissue; they do not relieve sudden symptoms of coughing, wheezing or shortness of breath

<b>Alvesco HFA</b> 80, 160 mcg ciclesonide DIN A	<b>ArmonAir Digihaler</b> 55, 113, 232 mcg fluticasone propionate inhalation powder DIN A	<b>Arnuity Ellipta</b> 50, 100, 200 mcg fluticasone furoate inhalation powder DIN A	<b>Asmanex HFA</b> 50, 100, 200 mcg mometasone furoate DIN A	<b>Asmanex Twisthaler</b> 110, 220 mcg mometasone furoate inhalation powder DIN A	<b>Fluticasone Propionate Diskus Inhalation Powder</b> 50, 100, 250 mcg Approved generic of Fluticasone HFA DIN A	<b>Fluticasone Propionate HFA</b> 44, 110, 220 mcg Approved generic of Fluticasone HFA DIN A	<b>Pulmicort Flexhaler</b> 90, 180 mcg budesonide inhalation powder DIN A	<b>Pulmicort Respules</b> 0.25, 0.50, 1.0 mg; 2 mL DIN A G N	<b>QVAR Redihaler</b> 40, 80 mcg budesonide propionate DIN A
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## MUSCARINIC ANTAGONISTS (ANTICHOLINERGIC)

relieve cough, sputum production, wheeze and chest tightness associated with chronic lung diseases

<b>Atrovent HFA</b> 17 mcg ipratropium bromide DIN A G	<b>Increase Ellipta</b> 42.5 mcg umecidinium inhalation powder DIN A G	<b>Ipratropium Bromide Inhalation Solution</b> 0.5, 2.5 mg; 3.5 mL G G N	<b>Spiriva Handihaler</b> 18 mg tiotropium bromide inhalation powder G	<b>Spiriva Respimat</b> 1.25, 2.5 mcg tiotropium bromide DIN A G	<b>Tudorza Pressair</b> 400 mcg acclidinium bromide inhalation powder DIN A G	<b>Yupelit</b> 1.75 mg; 3 mL roflumetast inhalation solution G N
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## PDE4 INHIBITORS

target lung inflammation and reduce exacerbations

<b>Daliresp</b> 250, 500 mcg roflumilast G
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## COMBINATION MEDICATIONS

contain both inhaled corticosteroid and long-acting beta<sub>2</sub>-agonist (LABA)

<b>Advair Diskus</b> 100/50, 250/50, 500/50 mcg Fluticasone propionate and salmeterol inhalation powder DIN A G G	<b>Advair HFA</b> 45/21, 115/21, 232/21 mcg Fluticasone propionate and salmeterol inhalation powder DIN A G G	<b>AirDuo Digihaler</b> 55/14, 113/14, 232/14 mcg Fluticasone propionate and salmeterol inhalation powder DIN A	<b>AirDuo RespiClick</b> 55/14, 113/14, 232/14 mcg Fluticasone propionate and salmeterol inhalation powder DIN A G	<b>Breo Ellipta</b> 50/25, 100/25, 200/25 mcg Budesonide and formoterol fumarate inhalation powder DIN A G G	<b>Breyna</b> 80/4.5, 160/4.5 mcg Budesonide and formoterol fumarate dihydrate (approved generic of Brevo) inhalation powder DIN A G G	<b>Dulera</b> 50/5, 100/5, 200/5 mcg Mometasone furoate and formoterol fumarate dihydrate inhalation powder DIN A	<b>Symbicort</b> 80/4.5, 160/4.5 mcg Budesonide and formoterol fumarate dihydrate inhalation powder DIN A G G	<b>Wixela Inhub</b> 100/50, 250/50, 500/50 mcg Fluticasone propionate and salmeterol inhalate (approved generic of Advair Diskus) inhalation powder DIN A G
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contain both long-acting beta<sub>2</sub>-agonist (LABA) and long-acting muscarinic antagonist (LAMA)

<b>Anoro Ellipta</b> 62.5/25 mcg umecidinium and vilanterol inhalation powder DIN A G	<b>Bevespi Aerosphere</b> 9/4.8 mcg glycopyrrate and formoterol fumarate DIN A	<b>Duakir Pressair</b> 40/8, 12 mcg acclidinium bromide and formoterol fumarate DIN A G	<b>Sioflo Respimat</b> 2.5/2.5 mcg tiotropium bromide and formoterol fumarate DIN A G
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contain inhaled corticosteroid, long-acting beta<sub>2</sub>-agonist (LABA) and long-acting muscarinic antagonist (LAMA)

<b>Trelegy Ellipta</b> 200/62.5/25 mcg 100/62.5/25 mcg Budesonide, glycopyrrate and formoterol fumarate inhalation powder DIN A G G	<b>Breztri Aerosphere</b> 160/9/4.8 mcg Budesonide, glycopyrrate and formoterol fumarate inhalation powder DIN A G
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contain both short-acting beta<sub>2</sub>-agonist and short-acting muscarinic antagonist

<b>Combivent Respimat</b> 20/100 mcg Ipratropium bromide and albuterol DIN A G	<b>Ipratropium Bromide and Albuterol Sulfate Inhalation Solution</b> 2.5 mg; 3 mL G G	<b>AirSupra</b> 90, 90 mcg albuterol and albuterol DIN A
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## BIOLOGICS

target cells and pathways that cause airway inflammation; delivered by injection or IV

<b>Cinqualir</b> 62.5/25 mcg reslizumab A	<b>Dupixent</b> 100, 200, 300 mg dupilumab A	<b>Fasenra</b> 30 mg benralizumab A	<b>Nucala</b> 100 mg mepolizumab A	<b>Tezspire</b> 210 mg trypsinogen-like activity A	<b>Xolair</b> 75 to 375 mg omalizumab A
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## LEUKOTRIENE MODIFIERS

block chemicals called leukotrienes that cause airway inflammation; available as tablet or granules

<b>Singulair</b> 5, 10 mg montelukast A	<b>Zafirlukast</b> 10, 20 mg zafirlukast A	<b>Zyflo CR</b> 400 mg zileuton A
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<https://allergyasthmanetwork.org/wp-content/uploads/2021/10/Respiratory-Treatments-2024.jpg>

# Medication Delivery

- Devices for delivery: Nebulizer or MDI (HFA, Breath actuated inhalers, respiClick, respimat, redihalers, dry powder inhalers)
- HFA needs a spacers
  - With mouthpiece or mask
- NO CHILD IS TOO YOUNG FOR AN INHALER AND SPACER
- EVERY ASTHMATIC SHOULD HAVE AN ALBUTEROL MDI AND SPACER



# Step Therapy

- When changing meds recheck asthma control in 2-3 months
- If well controlled for 3 months step down
- Step up if symptoms are uncontrolled for 2-3 months despite good adherence and technique and lack of modifiable risk factors
- Consider step up for 1-2 week if trigger like allergies or virus is present

	Step 1	Step 2	Step 3	Step 4	Step 5
Controller	Low dose of ICS-formoterol if needed	Daily low dose of ICS or low dose of ICS-formoterol if needed	Low dose of ICS-LABA	Low dose of ICS-LABA	High dose of ICS-LABA
Alternative controller	Low dose of ICS-formoterol if needed	Daily low dose of ICS or low dose of ICS-formoterol if needed	Low dose of ICS-LABA	Low dose of ICS-LABA	High dose of ICS-LABA
Reliever	Low dose of ICS-formoterol if needed	Low dose of ICS-formoterol if needed	Low dose of ICS-formoterol if needed	Low dose of ICS-formoterol if needed	Low dose of ICS-formoterol if needed
Alternative reliever	Low dose of ICS-formoterol if needed	Low dose of ICS-formoterol if needed	Low dose of ICS-formoterol if needed	Low dose of ICS-formoterol if needed	Low dose of ICS-formoterol if needed
	As-needed SABA				



# Asthma Control

- Rule of 2s
- Asthma control test
- Childhood asthma control test

## Childhood Asthma Control Test for children 4 to 11 years.

### How to take the Childhood Asthma Control Test

- ▶ **Step 1** Let your child respond to the first four questions (1 to 4). If your child needs help reading or understanding the question, you may help, but let your child select the response. Complete the remaining three questions (5 to 7) on your own and without letting your child's response influence your answers. There are no right or wrong answers.
- ▶ **Step 2** Write the number of each answer in the score box provided.
- ▶ **Step 3** Add up each score box for the total.
- ▶ **Step 4** Take the test to the doctor to talk about your child's total score.

### Have your child complete these questions.

1. How is your asthma today?

1 Very bad	2 Bad	3 Good	4 Very good	SCORE
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2. How much of a problem is your asthma when you run, exercise or play sports?

1 It's a big problem. I can't do what I want to do.	2 It's a problem and I don't like it.	3 It's a little problem but it's okay.	4 It's not a problem.	
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3. Do you cough because of your asthma?

1 Yes, all of the time.	2 Yes, most of the time.	3 Yes, some of the time.	4 No, none of the time.	
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4. Do you wake up during the night because of your asthma?

1 Yes, all of the time.	2 Yes, most of the time.	3 Yes, some of the time.	4 No, none of the time.	
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Please complete the following questions on your own.

5. During the past 4 weeks, how many days did your child have any daytime asthma symptoms?

1 Not at all	2 1-3 days	3 4-10 days	4 11-18 days	5 19-24 days	6 Everyday	
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6. During the past 4 weeks, how many days did your child wheeze during the day because of asthma?

1 Not at all	2 1-3 days	3 4-10 days	4 11-18 days	5 19-24 days	6 Everyday	
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7. During the past 4 weeks, how many days did your child wake up during the night because of asthma?

1 Not at all	2 1-3 days	3 4-10 days	4 11-18 days	5 19-24 days	6 Everyday	
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<https://www.tomwademd.net/wp-content/uploads/2013/11/ChildAsthmaControl.jpg>

## Asthma Control Test

Ages 12+

1	In the <u>past 4 weeks</u> , how much of your time did your asthma keep you from getting as much done at work, school, or at home?	All of the time 1	Most of the time 2	Some of the time 3	A little of the time 4	None of the time 5	score
2	During the <u>past 4 weeks</u> , how often have you had shortness of breath?	More than once per day 1	Once per day 2	3-6 times per week 3	Once or twice per week 4	Not at all 5	score
3	During the <u>past 4 weeks</u> , how often did your asthma symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?	4 or more times per day 1	1 or 2 times per day 2	2 or 3 times per week 3	Once per week or less 4	Not at all 5	score
4	During the <u>past 4 weeks</u> , how often have you used your rescue inhaler or nebulizer medication (such as albuterol)?	3 or more times per day 1	1 or 2 times per day 2	2 or 3 times per week 3	Once a week or less 4	Not at all 5	score
5	How would you rate your asthma control during the <u>past 4 weeks</u> ?	Not controlled at all 1	Poorly controlled 2	Somewhat controlled 3	Well controlled 4	Completely controlled 5	score
							total

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<https://i0.wp.com/post.healthline.com/wp-content/uploads/2023/05/HL-2936112-asthma-control-test-1296-2-1296x2060.jpg?w=1155&h=4330>



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# Single Maintenance And Reliever Therapy SMART Anti-Inflammatory Reliever therapy AIR

- AIR: GINA guidelines use AIR for any asthmatic over the age 12
- SMART: ICS-formoterol recommended for children over the age of 5 with moderate asthma
  - NOT SALMETEROL (ADVAIR or Airduo)
  - Max dose < 12 years of age is 8 puffs per day
  - Max dose children 12 or older is 12 puffs per day
- Reduced exacerbations
- Improved asthma control
- Issues
  - Not FDA approved
  - Inhaler supply





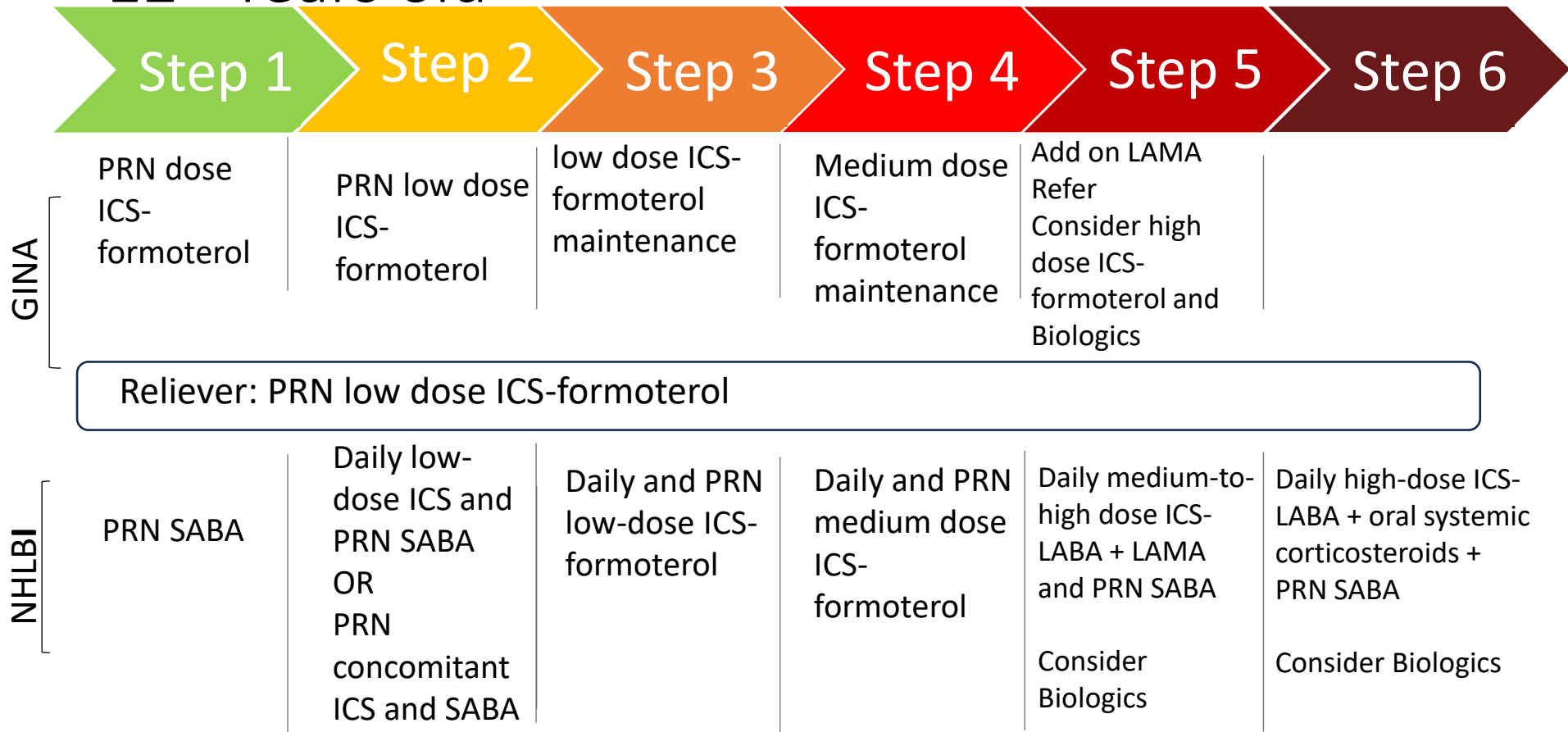
# Long-acting Muscarinic antagonist

- Patients 12 years and older with uncontrolled persistent asthma, recommends against adding LAMA to ICS compared to adding LABA to ICS.
- Patient over 12 who cannot take a LABA, recommends adding LAMA to ICS controller therapy compared to continuing the same dose of ICS alone
- If a LABA cannot be used adding a LAMA is an acceptable alternative



# 12+ Years old

ICS= inhaled corticosteroid  
LAMA= long-acting muscarinic antagonist  
SABA=short acting beta agonist





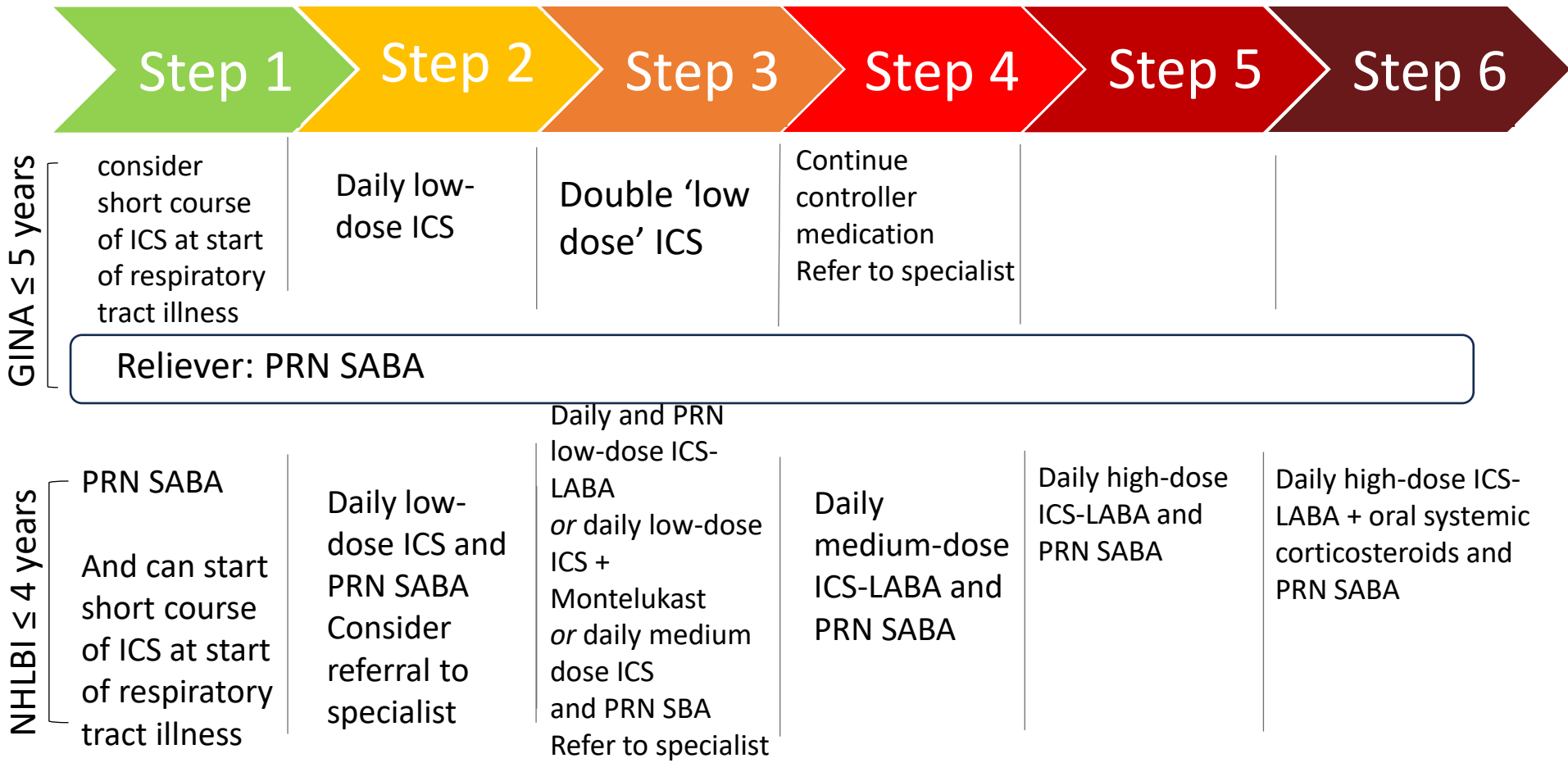
# School age

ICS= inhaled corticosteroid  
LAMA= long-acting muscarinic antagonist  
SABA=short acting beta agonist

	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6
GINA 6-11 year	Low dose ICS taken with SABA PRN	Daily low-dose ICS	Low-dose ICS-LABA OR medium dose ICS OR low dose ICS-formoterol MART	Medium-dose ICS-LABA or low dose ICS-formoterol MART Refer to specialist	High-dose ICS-LABA Biologics Refer to specialist	
	Reliever: PRN SABA (or ICS-formoterol reliever therapy in steps 3 and 4)					
NHLBI 5-11 years	PRN SABA	Daily low-dose ICS and PRN SABA	Daily and PRN low-dose ICS-formoterol	Daily and PRN medium-dose ICS-formoterol	Daily high-dose ICS-LABA and PRN SABA  Consider Omalizumab	Daily high-dose ICS-LABA + oral systemic corticosteroids and PRN SABA  Consider Biologics

# Pre-school age

ICS= inhaled corticosteroid  
LAMA= long-acting muscarinic antagonist  
SABA=short acting beta agonist



# Fractional Exhaled Nitric Oxide

- Only for children 5 years or older
- May be a useful adjunct to the evaluation when asthma diagnosis is uncertain
- May be used as part of ongoing asthma monitoring and management
- Do NOT use FeNO in isolation for assessing asthma control, predicting future exacerbation and assessing exacerbation severity
- Do NOT use FeNO to predict development of asthma in children 0-4 y/o with recurrent wheezing



# Nonpharmacological treatments

- Bottle/sippy cup in bed
- Is asthma an accurate diagnosis
- Are there asthma comorbidities
- Adherence and technique
- Asthma triggers and mitigation techniques
  - Allergy mitigation only a multicomponent is sensitized and symptomatic
  - Integrated pest management symptomatic or sensitized
  - Avoid tobacco exposure and vaping
- Regular activity/exercise
- Pulmonary rehabilitation/Breathing exercises
- Weight reduction
- Avoid environmental pollutants
- Check to see about other medications: Aspirin, NSAID, b-adrenergic blockers or angiotensin converting enzyme inhibitors
- Don't live in a bubble
- Asthma action plans
- Keep vaccinations up to date



# Asthma comorbidities

- Anxiety and depression
- GERD
- Obstructive sleep apnea
- Rhinosinusitis
- Vocal cord dysfunction
- Hormonal influence: menses, menopause, thyroid
- Obesity



Thank you  
Questions?