CLINICAL PATHWAY:
Inpatient Asthma

THIS PATHWAY SERVES AS A GUIDE AND DOES NOT REPLACE CLINICAL JUDGMENT.

Inclusion Criteria: ≥1 yrs old; inadequate response to ED asthma treatment (see ED Asthma Pathway); patients who were given epinephrine in the ambulance or at an outlying hospital; patients with history of prior ICU admissions who present more than once to the Emergency Department during an exacerbation
Exclude Criteria: <1yr old; primary diagnosis of bronchiolitis or pneumonia (see Bronchiolitis Clinical Pathway, Community Acquired Pneumonia Clinical Pathway); active cardiac disease

The following tests and treatments are **NOT** routinely indicated for the treatment of asthma:
- Ipratropium bromide should not be administered after 24 hours of hospitalization
- Chest x-rays (features typically associated with positive chest x-ray findings include fever, no family history of asthma, and localized lung findings on physical exam)
- Antibiotics (unless diagnosed with a bacterial infection)

Admit to Medical/Surgical Unit
- **Oxygen**: Titrate per order
- **Oral Systemic Steroid:**
  - **Prednisone** or **Prednisolone** 1mg/kg/dose q12hr
    - Max doses: <12 yr old: max 60 mg/day, ≥12 y/o: max 80 mg/day
    - Start 24 hr after dexamethasone. Total steroid course: 5 days
  - OR give additional dose of **Dexamethasone** 0.6 mg/kg (max 16mg) PO/IM prior to discharge
- Determine initial MPIS
- Use asthma-specific H&P to document asthma severity and control (Appendix A)
- If poor PO, place PIV and administer **IVF with potassium**
- If symptomatic or concern for COVID-19 infection, send COVID-19 testing per COVID-19 ED and Inpatient Clinical Pathway
- Consider ordering medications for bedside delivery at admission

Special Considerations for High Risk Populations:

Admission recommended for the following patients, regardless of their current MPIS score:
- Patients who were given epinephrine in the ambulance or at an outlying hospital
- Patients with a history of prior ICU admissions who present more than once to the ED during an exacerbation

Admission Location:
- Current MPIS ≤12: MS floors
- Current MPIS ≥13: PICU

Management:
- Steroids should be started regardless of current MPIS
- Bronchodilator therapy per pathway recommendations

MPIS ≥11

Initiate Phase 1:
- **Albuterol via continuous neb:**
  - <20kg: 10 mg/hr
  - ≥20kg: 20 mg/hr
- Initiate Albuterol Wean Protocol*
  - *Option*: If improving on 20 mg/hr, may wean to 10 mg/hr prior to going to q2hr
- *If not tolerating oral steroid:* **Methylprednisolone** 1 mg/kg/dose IV q6hr (max 30 mg/dose)
- Place PIV, if not already done
- CR monitor with continuous pulse oximetry
- Vital signs q4hr, MPIS q2hr
- Initiate asthma education

Improvement? (MPIS ≤10 x 2)
- No → **MPIS ≥13 x 1**
  - Increase Albuterol to 20 mg/hr if on 10 mg/hr
  - Notify attending
  - Obtain PICU consult
  - Consider **Magnesium Sulfate** 50 mg/kg (max 2 g) over 20 minutes

  Improvement?
  - Yes → Continue on pathway as MPIS dictates
  - No → Consider transfer to PICU
- Yes → Initiate Phase 2 and follow pathway

MPIS 7-10

Initiate Phase 2:
- **Albuterol MDI w/ spacer** 8 puffs q2hr
  - Nebulizer can be used if patient sleeping or unable to perform proper MDI technique
- Initiate Albuterol Wean Protocol*
- Assess severity and treatment recommendations, start **Inhaled Corticosteroids** (Appendix A, Appendix B)
- Initiate asthma education and complete home treatment plan
- Discontinue CR monitor
- Vital signs q4hr, MPIS q2hr
- Discontinue oxygen when RA sat ≥90%
- Intermittent pulse oximetry if no hypoxemia

Improvement? (MPIS ≤6 x 2)
- No → Continue on pathway as MPIS dictates
- Yes → **Initiate Phase 3**
  - **Albuterol MDI w/ spacer** 8 puffs q4hr (nebulizer can be used if pt sleeping or unable to perform proper MDI technique)
  - Continue **Inhaled Corticosteroids** (Appendix A, Appendix B), and consider ordering home prescriptions for bedside delivery if not done
  - Supply nebulizer or spacer, if needed
  - Discontinue oxygen when RA sat ≥90%
  - Intermittent pulse oximetry if no hypoxemia
  - Vital signs q4hr, MPIS q4hr
  - Complete asthma education

Discharge Criteria:
No further need for supplemental oxygen, MPIS ≤5 on q4hr albuterol, hydrated without need for IVFs, asthma home treatment plan completed and family given copy, asthma education completed, appropriate follow up in place

Discharge Medications (to be outlined in Asthma Home Treatment Plan)
- **Albuterol** MDI with spacer: 4 puffs (or 2.5mg via neb) q4hr while awake
- **Oral Systemic Steroid** x3-5 day total steroid course (prednisone/prednisolone or 2nd dose of dexamethasone)
- **Controller Therapy**, based on chronic severity (Appendix A, Appendix B)
- Screen for Influenza vaccine (Oct-March); administer if indicated

*** ALBUTEROL WEAN PROTOCOL:**
- Respiratory Therapists (RTs) wean Albuterol according to this MPIS-driven protocol
- Wean when two consecutive scores are in appropriate range
- RTs inform MD/APRN/PA of ALL changes in Albuterol dosing
- Any escalation in care requires an exam by MD/APRN/PA at bedside
- MD/APRN/PA can authorize variance from protocol

O_2 Saturation (RA)	Score	Accessory Muscle Use	Score	I:E Ratio	Score	Wheezing	Score	Heart Rate <3 yr old	Heart Rate >3 yr old	Score	Respiratory Rate <6 yr old	Respiratory Rate >6 yr old	Score
>95%	0	None	0	2:1	0	None: Good aeration	0	<120	<100	0	<30	<20	0
93-95%	1	Mild	1	1:1	1	End expiratory	1	121-140	101-120	1	31-45	21-35	1
90-92%	2	Moderate	2	1:2	2	Insp/Exp: Good aeration	2	141-160	121-140	2	46-60	36-50	2
<90%	3	Severe	3	1:3	3	Insp/Exp: Decreased aeration	3	>160	>140	3	>60	>50	3

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CLINICAL PATHWAY:
Inpatient Asthma
Appendix A: Simplified Controller Flowchart

THIS PATHWAY SERVES AS A GUIDE AND DOES NOT REPLACE CLINICAL JUDGMENT.

Assessing Asthma Severity and Treatment Recommendations: Ages 4 and Up

1 Assess and DOCUMENT Asthma Control for 2 Weeks Prior to Exacerbation

Determine severity if new diagnosis of asthma

Symptom frequency	≤ 2 days/week	> 2 days/week but NOT daily	Daily	Throughout the day
Night time awakenings	≤ 2x/month	≤ 3-4x/month	>1x/week	Every night
Albuterol for symptom control	≤ 2 days/week	>2 days/week	Daily	Several times per day
Interfere with normal activity	None	Minor limitation	Some limitation	Extremely limited
Exacerbations requiring systemic steroids	0-1/year	≥2/year with more frequent or intense events = greater severity		

If on meds, taking appropriately*?
- NO → If currently on medication & well controlled, continue current treatment
- YES → Increase Step by 1 UNLESS well controlled (all green answers above)

2 Classify Asthma Severity

Worst symptom documented above determines severity → Intermittent | Mild Persistent | Moderate Persistent | Severe Persistent

3 Treatment Recommendation (NHLBI STEP CORRELARY)

	Intermittent	Mild Persistent	Moderate Persistent	Severe Persistent
4-11 Years Old	**STEP 1** Albuterol PRN	**STEP 2** 2 Puffs Fluticasone 44 BID	**STEP 3** Budesonide/ Formoterol 80/4.5 SMART Therapy (2 puffs daily and 1-2 puffs PRN q 5-10 min; max 8 puffs/day)	**STEP 4** Budesonide/ Formoterol 160/4.5 SMART Therapy (2 puffs daily and 1-2 puffs PRN q 5-10 min; max 8 puffs/day)
12+ Years Old	**STEP 1** Albuterol PRN	**STEP 2** 2 Puffs Fluticasone 44 BID	**STEP 3** Budesonide/ Formoterol 80/4.5 SMART Therapy (2 puffs daily and 1-2 puffs PRN q 5-10 min; max 12 puffs/day)	**STEP 4** Budesonide/ Formoterol 160/4.5 SMART Therapy (2 puffs daily and 1-2 puffs PRN q 5-10 min; max 12 puffs/day)

Concepts for prescribing SMART Therapy: Prescribe "X" puffs daily and then 1-2 puffs as needed every 5-10 minutes for up to "Y" additional puffs (max of 8/12 total puffs per day). Please prescribe 1 inhaler for home and a second for school.

4 Consult (PRN)

Consult Pulmonology If: Patient Requires Step 5 Treatment, or as needed

***Taking Controller Medications Appropriately:**
- Taking medications as prescribed >80% of the time (self report, pharmacy refills)
- Using correct technique (using a spacer correctly)

If insurance does not cover the recommended medication, see below for equivalent doses of inhaled steroids

Dosing Conversion Chart

Fluticasone (Flovent)	Beclomethasone (Qvar)
44 mcg	40 mcg
110 mcg	80 mcg

Budesonide/ Formoterol (Symbicort)	Mometasone/ Formoterol (Dulera)
80/4.5 mcg	100/5 mcg
160/4.5 mcg	200/5 mcg

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2020 FOCUSED UPDATES TO THE Asthma Management Guidelines

AT-A-GLANCE GUIDE

This At-A-Glance Guide describes a treatment management approach based on recommendations from the *2020 Focused Updates to the Asthma Management Guidelines: A Report from the National Asthma Education and Prevention Program Coordinating Committee Expert Panel Working Group*.[1] Step diagrams from the 2007 Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma (EPR-3) were updated with the new recommendations. The diagrams are intended to help clinicians integrate the new recommendations into clinical care, and are meant to assist, and not replace, clinical judgment or decision-making for individual patient management, with input from individuals with asthma about their preferences.

AGES 0–4 YEARS: STEPWISE APPROACH FOR MANAGEMENT OF ASTHMA

	Intermittent Asthma	Management of Persistent Asthma in Individuals Ages 0–4 Years				
Treatment	**STEP 1**	**STEP 2**	**STEP 3**	**STEP 4**	**STEP 5**	**STEP 6**
Preferred	PRN SABA and At the start of RTI: Add short course daily ICS▲	Daily low-dose ICS and PRN SABA	Daily medium-dose ICS and PRN SABA	Daily medium-dose ICS-LABA and PRN SABA	Daily high-dose ICS-LABA and PRN SABA	Daily high-dose ICS-LABA + oral systemic corticosteroid and PRN SABA
Alternative		Daily montelukast* or Cromolyn,* and PRN SABA		Daily medium-dose ICS + montelukast* and PRN SABA	Daily high-dose ICS + montelukast* and PRN SABA	Daily high-dose ICS + montelukast*+ oral systemic corticosteroid and PRN SABA
			For children age 4 years only, see Step 3 and Step 4 on Management of Persistent Asthma in Individuals Ages 5–11 Years diagram.			

Assess Control

- First check adherence, inhaler technique, environmental factors,▲ and comorbid conditions.
- **Step up** if needed; reassess in 4–6 weeks
- **Step down** if possible (if asthma is well controlled for at least 3 consecutive months)

Consult with asthma specialist if Step 3 or higher is required. Consider consultation at Step 2.

Control assessment is a key element of asthma care. This involves both impairment and risk. Use of objective measures, self-reported control, and health care utilization are complementary and should be employed on an ongoing basis, depending on the individual's clinical situation.

Abbreviations: ICS, inhaled corticosteroid; LABA, long-acting beta$_2$-agonist; SABA, inhaled short-acting beta$_2$-agonist; RTI, respiratory tract infection; PRN, as needed

▲ Updated based on the 2020 guidelines.

* Cromolyn and montelukast were not considered for this update and/or have limited availability for use in the United States. The FDA issued a Boxed Warning for montelukast in March 2020.

[1]The full-length report, *2020 Focused Updates to the Asthma Management Guidelines: A Report from the National Asthma Education and Prevention Program Coordinating Committee Expert Panel Working Group*, can be accessed at **nhlbi.nih.gov/asthmaguidelines**.

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NOTES FOR INDIVIDUALS AGES 0–4 YEARS DIAGRAM

Quick-relief medications	• Use SABA as needed for symptoms. The intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed. • **Caution:** Increasing use of SABA or use >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and may require a step up in treatment. • Consider short course of oral systemic corticosteroid if exacerbation is severe or individual has history of previous severe exacerbations.
Each step: Assess environmental factors, provide patient education, and manage comorbidities▲	• In individuals with sensitization (or symptoms) related to exposure to pests‡: conditionally recommend integrated pest management as a single or multicomponent allergen-specific mitigation intervention.▲ • In individuals with sensitization (or symptoms) related to exposure to identified indoor allergens, conditionally recommend a multi-component allergen-specific mitigation strategy.▲ • In individuals with sensitization (or symptoms) related to exposure to dust mites, conditionally recommend impermeable pillow/mattress covers only as part of a multicomponent allergen-specific mitigation intervention, but not as a single component intervention.▲
Notes	• If clear benefit is not observed within 4–6 weeks and the medication technique and adherence are satisfactory, the clinician should consider adjusting therapy or alternative diagnoses.
Abbreviations	EIB, exercise-induced bronchoconstriction; SABA, inhaled short-acting beta$_2$-agonist. ▲Updated based on the 2020 guidelines. ‡ Refers to mice and cockroaches, which were specifically examined in the Agency for Healthcare Research and Quality systematic review.

WHAT'S NEW (AGES 0–4 YEARS)

- **Step 1:** In children ages 0–4 years with recurrent wheezing, a short (7–10 day) course of daily ICS with as-needed SABA for quick-relief therapy is recommended starting at the onset of a respiratory tract infection.
  - ✓ Recurrent wheezing is defined as at least three episodes of wheezing triggered by apparent infection in their lifetime, or two episodes in the past year, and no symptoms between infections.
  - ✓ One regimen, used in two reviewed studies, is budesonide inhalation suspension, 1 mg twice daily for 7 days at the first sign of respiratory tract infection-associated symptoms.
  - ✓ The main benefit during respiratory tract infections is a reduction in exacerbations requiring systemic corticosteroids.
  - ✓ Caregivers can initiate intermittent ICS treatment at home without a visit to a health care provider when they have clear instructions.
  - ✓ This treatment could affect growth. Carefully monitor growth in children who use this treatment.
- **Steps 3 and 4:** For children age 4 years only with persistent asthma, see Steps 3 and 4 on Management of Persistent Asthma in Individuals Ages 5–11 Years.
- **Each step:**
  - ✓ Consider the severity of an individual's asthma, the small potential benefit, and the extent of previous symptoms and exacerbations when recommending allergen mitigation interventions.

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LAST UPDATED: 08.22.23

2020 FOCUSED UPDATES TO THE Asthma Management Guidelines | **AT-A-GLANCE** GUIDE

AGES 5–11 YEARS: STEPWISE APPROACH FOR MANAGEMENT OF ASTHMA

	Intermittent Asthma	Management of Persistent Asthma in Individuals Ages 5–11 Years				
Treatment	**STEP 1**	**STEP 2**	**STEP 3**	**STEP 4**	**STEP 5**	**STEP 6**
Preferred	PRN SABA	Daily low-dose ICS and PRN SABA	Daily and PRN combination low-dose ICS-formoterol▲	Daily and PRN combination medium-dose ICS-formoterol▲	Daily high-dose ICS-LABA and PRN SABA	Daily high-dose ICS-LABA + oral systemic corticosteroid and PRN SABA
Alternative		Daily LTRA,* or Cromolyn,* or Nedocromil,* or Theophylline,* and PRN SABA	Daily medium-dose ICS and PRN SABA or Daily low-dose ICS-LABA, or daily low-dose ICS + LTRA,* or daily low-dose ICS +Theophylline,* and PRN SABA	Daily medium-dose ICS-LABA and PRN SABA or Daily medium-dose ICS + LTRA* or daily medium-dose ICS + Theophylline,* and PRN SABA	Daily high-dose ICS + LTRA* or daily high-dose ICS + Theophylline,* and PRN SABA	Daily high-dose ICS + LTRA* + oral systemic corticosteroid or daily high-dose ICS + Theophylline* + oral systemic corticosteroid, and PRN SABA
		Steps 2–4: Conditionally recommend the use of subcutaneous immunotherapy as an adjunct treatment to standard pharmacotherapy in individuals ≥ 5 years of age whose asthma is controlled at the initiation, build up, and maintenance phases of immunotherapy▲			Consider Omalizumab**▲	

Assess Control

- First check adherence, inhaler technique, environmental factors,▲ and comorbid conditions.
- **Step up** if needed; reassess in 2–6 weeks
- **Step down** if possible (if asthma is well controlled for at least 3 consecutive months)

Consult with asthma specialist if Step 4 or higher is required. Consider consultation at Step 3.

Control assessment is a key element of asthma care. This involves both impairment and risk. Use of objective measures, self-reported control, and health care utilization are complementary and should be employed on an ongoing basis, depending on the individual's clinical situation.

Abbreviations: ICS, inhaled corticosteroid; LABA, long-acting $beta_2$-agonist; LTRA, leukotriene receptor antagonist; SABA, inhaled short-acting $beta_2$-agonist

▲ Updated based on the 2020 guidelines.
* Cromolyn, Nedocromil, LTRAs including montelukast, and Theophylline were not considered in this update and/or have limited availability for use in the United States, and/or have an increased risk of adverse consequences and need for monitoring that make their use less desirable. The FDA issued a Boxed Warning for montelukast in March 2020.
** Omalizumab is the only asthma biologic currently FDA-approved for this age range.

National Heart, Lung, and Blood Institute

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NOTES FOR INDIVIDUALS AGES 5–11 YEARS DIAGRAM

Quick-relief medications	• Use SABA as needed for symptoms. The intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed. • In Steps 3 and 4, the preferred option includes the use of ICS-formoterol 1 to 2 puffs as needed up to a maximum total daily maintenance and rescue dose of 8 puffs (36 mcg).▲ • **Caution:** Increasing use of SABA or use >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and may require a step up in treatment.
Each step: Assess environmental factors, provide patient education, and manage comorbidities▲	• In individuals with sensitization (or symptoms) related to exposure to pests‡: conditionally recommend integrated pest management as a single or multicomponent allergen-specific mitigation intervention.▲ • In individuals with sensitization (or symptoms) related to exposure to identified indoor allergens, conditionally recommend a multi-component allergen-specific mitigation strategy.▲ • In individuals with sensitization (or symptoms) related to exposure to dust mites, conditionally recommend impermeable pillow/mattress covers only as part of a multicomponent allergen-specific mitigation intervention, but not as a single component intervention.▲
Notes	• The terms ICS-LABA and ICS-formoterol indicate combination therapy with both an ICS and a LABA, usually and preferably in a single inhaler. • Where formoterol is specified in the steps, it is because the evidence is based on studies specific to formoterol. • In individuals ages 5–11 years with persistent allergic asthma in which there is uncertainty in choosing, monitoring, or adjusting anti-inflammatory therapies based on history, clinical findings, and spirometry, FeNO measurement is conditionally recommended as part of an ongoing asthma monitoring and management strategy that includes frequent assessment.
Abbreviations	EIB (exercise-induced bronchoconstriction); FeNO (fractional exhaled nitric oxide); ICS (inhaled corticosteroid); LABA (long-acting beta$_2$-agonist); SABA (inhaled short-acting beta$_2$-agonist). ▲Updated based on the 2020 guidelines. ‡ Refers to mice and cockroaches, which were specifically examined in the Agency for Healthcare Research and Quality systematic review.

WHAT'S NEW (AGES 5–11 YEARS)

- For individuals with mild to moderate persistent asthma who are taking daily ICS treatment (likely adherent with prescribed daily ICS) as a controller, increasing the regular daily ICS dose for short periods is not recommended when symptoms increase or peak flow decreases.
- **Steps 2–4:** Subcutaneous immunotherapy (SCIT) is recommended as an adjunct treatment for individuals who have demonstrated allergic sensitization and evidence of worsening asthma symptoms after exposure to the relevant antigen or antigens.
  - ✓ Do not initiate, increase, or administer maintenance SCIT doses while individuals have asthma symptoms.
  - ✓ Do not administer SCIT in individuals with severe asthma.
- **Steps 3 and 4:** For individuals with moderate to severe persistent asthma already taking low- or medium-dose ICS, the preferred treatment is a single inhaler with ICS-formoterol (referred to as single maintenance and reliever therapy, or "SMART") used both daily and as needed.
  - ✓ Individuals with a severe exacerbation in the prior year are particularly good candidates for SMART to reduce exacerbations.
  - ✓ Do not use ICS-formoterol as reliever therapy in individuals taking ICS-salmeterol as maintenance therapy.
  - ✓ Individuals whose asthma is uncontrolled on maintenance ICS-LABA with SABA as quick-relief therapy should receive the preferred SMART if possible before moving to a higher step of therapy.
  - ✓ In children ages 4–11 years, there may be a lower risk of growth suppression among those taking SMART versus daily higher-dose ICS treatment.
- **Steps 5 and 6:** Consider Omalizumab, the only FDA-approved asthma biologic for this age group.
- **Each step:**
  - ✓ Consider the severity of an individual's asthma, the small potential benefit, and the extent of previous symptoms and exacerbations when recommending allergen mitigation interventions.

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LAST UPDATED: 08.22.23

2020 FOCUSED UPDATES TO THE Asthma Management Guidelines

AT-A-GLANCE GUIDE

AGES 12+ YEARS: STEPWISE APPROACH FOR MANAGEMENT OF ASTHMA

	Intermittent Asthma	Management of Persistent Asthma in Individuals Ages 12+ Years				
Treatment	**STEP 1**	**STEP 2**	**STEP 3**	**STEP 4**	**STEP 5**	**STEP 6**■
Preferred	PRN SABA	Daily low-dose ICS and PRN SABA or PRN concomitant ICS and SABA▲	Daily and PRN combination low-dose ICS-formoterol▲	Daily and PRN combination medium-dose ICS-formoterol▲	Daily medium-high dose ICS-LABA + LAMA and PRN SABA▲	Daily high-dose ICS-LABA + oral systemic corticosteroids + PRN SABA
Alternative		Daily LTRA* and PRN SABA or Cromolyn,* or Nedocromil,* or Zileuton,* or Theophylline,* and PRN SABA	Daily medium-dose ICS and PRN SABA or Daily low-dose ICS-LABA, or daily low-dose ICS + LAMA,▲ or daily low-dose ICS + LTRA,* and PRN SABA or Daily low-dose ICS + Theophylline* or Zileuton,* and PRN SABA	Daily medium-dose ICS-LABA or daily medium-dose ICS + LAMA, and PRN SABA▲ or Daily medium-dose ICS + LTRA,* or daily medium-dose ICS + Theophylline,* or daily medium-dose ICS + Zileuton,* and PRN SABA	Daily medium-high dose ICS-LABA or daily high-dose ICS + LTRA,* and PRN SABA	
		Steps 2–4: Conditionally recommend the use of subcutaneous immunotherapy as an adjunct treatment to standard pharmacotherapy in individuals ≥ 5 years of age whose asthma is controlled at the initiation, build up, and maintenance phases of immunotherapy▲			Consider adding Asthma Biologics (e.g., anti-IgE, anti-IL5, anti-IL5R, anti-IL4/IL13)**	

Assess Control

- First check adherence, inhaler technique, environmental factors,▲ and comorbid conditions.
- **Step up** if needed; reassess in 2–6 weeks
- **Step down** if possible (if asthma is well controlled for at least 3 consecutive months)

Consult with asthma specialist if Step 4 or higher is required. Consider consultation at Step 3.

Control assessment is a key element of asthma care. This involves both impairment and risk. Use of objective measures, self-reported control, and health care utilization are complementary and should be employed on an ongoing basis, depending on the individual's clinical situation.

Abbreviations: ICS, inhaled corticosteroid; LABA, long-acting beta$_2$-agonist; LAMA, long-acting muscarinic antagonist; LTRA, leukotriene receptor antagonist; SABA, inhaled short-acting beta$_2$-agonist

▲ Updated based on the 2020 guidelines.
* Cromolyn, Nedocromil, LTRAs including Zileuton and montelukast, and Theophylline were not considered for this update, and/or have limited availability for use in the United States, and/or have an increased risk of adverse consequences and need for monitoring that make their use less desirable. The FDA issued a Boxed Warning for montelukast in March 2020.
** The AHRQ systematic reviews that informed this report did not include studies that examined the role of asthma biologics (e.g. anti-IgE, anti-IL5, anti-IL5R, anti-IL4/IL13). Thus, this report does not contain specific recommendations for the use of biologics in asthma in Steps 5 and 6.
■ Data on the use of LAMA therapy in individuals with severe persistent asthma (Step 6) were not included in the AHRQ systematic review and thus no recommendation is made.

National Heart, Lung, and Blood Institute

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Connecticut Children's

CLINICAL PATHWAY:
Inpatient Asthma
Appendix B: NHLBI Asthma Classification

THIS PATHWAY SERVES AS A GUIDE AND DOES NOT REPLACE CLINICAL JUDGMENT.

2020 FOCUSED UPDATES TO THE Asthma Management Guidelines | **AT-A-GLANCE** GUIDE

NOTES FOR INDIVIDUALS AGES 12+ YEARS DIAGRAM

Quick-relief medications	• Use SABA as needed for symptoms. The intensity of treatment depends on the severity of symptoms: up to 3 treatments at 20-minute intervals as needed. • In steps 3 and 4, the preferred option includes the use of ICS-formoterol 1 to 2 puffs as needed up to a maximum total daily maintenance and rescue dose of 12 puffs (54 mcg).▲ • **Caution:** Increasing use of SABA or use >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and may require a step up in treatment.
Each step: Assess environmental factors, provide patient education, and manage comorbidities▲	• In individuals with sensitization (or symptoms) related to exposure to pests‡: conditionally recommend integrated pest management as a single or multicomponent allergen-specific mitigation intervention.▲ • In individuals with sensitization (or symptoms) related to exposure to identified indoor allergens, conditionally recommend a multi-component allergen-specific mitigation strategy.▲ • In individuals with sensitization (or symptoms) related to exposure to dust mites, conditionally recommend impermeable pillow/mattress covers only as part of a multicomponent allergen-specific mitigation intervention, but not as a single component intervention.▲
Notes	• The terms ICS-LABA and ICS-formoterol indicate combination therapy with both an ICS and a LABA, usually and preferably in a single inhaler. • Where formoterol is specified in the steps, it is because the evidence is based on studies specific to formoterol. • In individuals ages 12 years and older with persistent allergic asthma in which there is uncertainty in choosing, monitoring, or adjusting anti-inflammatory therapies based on history, clinical findings, and spirometry, FeNO measurement is conditionally recommended as part of an ongoing asthma monitoring and management strategy that includes frequent assessment. • Bronchial thermoplasty was evaluated in Step 6. The outcome was a conditional recommendation against the therapy.
Abbreviations	EIB, exercise-induced bronchoconstriction; FeNO, fractional exhaled nitric oxide; ICS, inhaled corticosteroid; LABA, long-acting beta$_2$-agonist; SABA, inhaled short-acting beta$_2$-agonist. ▲Updated based on the 2020 guidelines. ‡ Refers to mice and cockroaches, which were specifically examined in the Agency for Healthcare Research and Quality systematic review.

WHAT'S NEW (AGES 12+ YEARS)

- For individuals with mild to moderate persistent asthma who are taking daily ICS treatment (likely adherent with prescribed daily ICS) as a controller, increasing the regular daily ICS dose for short periods is not recommended when symptoms increase or peak flow decreases.
- **Step 2:** For individuals with mild persistent asthma, either of the following two treatments are recommended as part of Step 2 therapy: 1) a daily low-dose ICS and as-needed SABA for quick-relief therapy, or 2) intermittent as-needed SABA and ICS used one after the other for worsening asthma.
  - ✓ One approach to intermittent therapy is two to four puffs of albuterol followed by 80–250 mcg of beclomethasone equivalent every 4 hours as needed for asthma symptoms.
  - ✓ Intermittent therapy can be initiated at home with regular provider follow-up to ensure that the intermittent regimen is still appropriate.
  - ✓ Individuals with either low or high perception of symptoms may not be good candidates for as-needed ICS therapy. Daily low-dose ICS with as-needed SABA may be preferred.
- **Steps 2–4:** Subcutaneous immunotherapy (SCIT) is recommended as an adjunct treatment for individuals who have demonstrated allergic sensitization and evidence of worsening asthma symptoms after exposure to the relevant antigen or antigens.
  - ✓ Do not initiate, increase, or administer maintenance SCIT doses while individuals have asthma symptoms.
  - ✓ Do not administer SCIT in individuals with severe asthma.
- **Steps 3 and 4:** For individuals with moderate to severe persistent asthma already taking low- or medium-dose ICS, the preferred treatment is a single inhaler with ICS-formoterol (referred to as single maintenance and reliever therapy, or "SMART") used both daily and as needed.
  - ✓ Individuals with a severe exacerbation in the prior year are particularly good candidates for SMART to reduce exacerbations.
  - ✓ Do not use ICS-formoterol as reliever therapy in individuals taking ICS-salmeterol as maintenance therapy.
  - ✓ Individuals whose asthma is uncontrolled on maintenance ICS-LABA with SABA as quick-relief therapy should receive the preferred SMART if possible before moving to a higher step of therapy.
- **Each step:**
  - ✓ Consider the severity of an individual's asthma, the small benefit, and the extent of previous symptoms and exacerbations when recommending allergen mitigation interventions.

RETURN TO THE BEGINNING

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