

## Asthma Care Guideline

### Inclusion Criteria:

- Primary diagnosis of status asthmaticus, asthma exacerbation
- Failure to respond to outpatient therapy or ED treatment

### Exclusion Criteria:

- PICU status (see criteria)
- 1<sup>st</sup> episode of wheezing
- Hx of cardiac or neuromuscular disease, MRCP, Cystic Fibrosis, Chronic Lung Disease (BPD)

### Criteria for PICU status

- Need for q 1 hr or continuous albuterol
- Need for terbutaline drip
- If heliox administered in ED
- If **repeated** doses of parenteral epinephrine or magnesium sulfate given in ED
- An inappropriate PCO<sub>2</sub> by ABG or CBG
- SaO<sub>2</sub> < 90% on supplemental O<sub>2</sub>
- Requires non-rebreather mask for O<sub>2</sub>
- S&S of impending respiratory failure
- Presence of pulsus paradoxus
- Presence of mental status changes

### Assessment:

- Respiratory status, O<sub>2</sub> saturation w/ vital signs, vital signs, immunization status
- Peak flows to be done pre/post aerosols min. BID (age ≥ 5 & able to cooperate)
- Continuous pulse oximetry **ONLY** if on supplemental O<sub>2</sub> or in distress

### Interventions:

- Oxygen for respiratory distress or to keep O<sub>2</sub> saturations ≥ 93%
- Albuterol inhalation therapy – routine q 4 hr and q 2 hr PRN; **MDI is preferred delivery method**
- Continue or start an inhaled corticosteroid (ICS) for persistent mild, moderate, or severe asthma.
- IV fluids only if clinically indicated (i.e. dehydration, poor oral intake, respiratory distress precluding orals)
- Systemic corticosteroids: prednisolone or prednisone at 2 mg/kg/day, divided q 12-24 hr PO or **OR** IV Solumedrol 0.5 – 1 mg/kg/dose q 6hrs IV (Max: 240mg/24 hrs). If dexamethasone given in ED, consider second dose oral as inpatient.
- Adjust home controller medications as appropriate for asthma severity
- Begin asthma education / teaching
- Ambulate as tolerated

### Recommendations/Considerations

- There is evidence for single dose IM dexamethasone being sufficient but consider continuing corticosteroids if patient is hospitalized (Gordon, S, et al – see references)
- CXR is **NOT** indicated according to NHLBI guidelines. Consider **ONLY** if fever > 39, chest pain, severe distress or severe hypoxia
- Avoid initiation of long acting beta<sub>2</sub> agonists, or leukotriene inhibitors as monotherapy.
- Levalbuterol (Xopenex): use as alternative to Albuterol in patients with adverse reaction to Albuterol or strong parent preference
- Ipratropium (Atrovent): consider 500 mcg nebulized q 6 hr in conjunction with Albuterol for patients with severe respiratory distress
- May increase steroid dosage and/or frequency for severe or failure to respond to therapy
- Use of an H<sub>2</sub> blocker (IV Famotidine or po Ranitidine) for all patients on high dose steroids or if not taking POs well
- Call RRT if patient shows rapid deterioration, increasing distress, cyanosis, mental status change, pulsus paradoxus, respiratory tiring, sense of doom, or impending failure.

### Continued Care Considerations

- Wean oxygen to keep O<sub>2</sub> sats ≥ 90%, when free of respiratory distress
- Wean Albuterol to q 2-4 hr PRN
- Establish peak flow-based or symptom based Asthma Action Plan and review/teach patient/family
- Saline lock IV once tolerating oral fluids
- Transition to oral corticosteroids at 2mg/kg/day (Max: 120 mg/day) daily or bid dosing
- Initiate or continue preventative / controller medications appropriate to asthma severity

### Discharge Considerations

- Prescribe discharge medication:
  - Long term controller including an inhaled corticosteroid
  - Quick relief medication (Albuterol)
    - Oral steroids (2mg/kg/day) BID dosing should be prescribed to complete a 4-7 day course. A taper may be needed for longer courses
    - Rx for Oral corticosteroid for future exacerbations
- Utilize aerochamber/MDI if developmentally able
- Re-label all meds for home use
- Asthma Action Plan to be provided for home(s), school, and PCP
- Follow up w/ PCP within 1 week of discharge
- Refer to Asthma Specialist if: patient has had a life-threatening asthma exacerbation, is refractory to therapy, is non-compliant with therapy, > 2 bursts oral steroids in 1 yr, other conditions that complicate asthma or it's dx (sinusitis, nasal polyps, aspergillosis, severe rhinitis, vocal cord dysfunction, GERD, CLD), or has moderate to severe persistent disease
- An alternative to Asthma Specialist is the CHOC Breathmobile

### Discharge Criteria

- Off supplemental oxygen
- Albuterol treatments not needed more frequently than q 4 hr
- Tolerating oral fluids and medications
- FEV<sub>1</sub> or peak flow ≥ 70% of personal best or predicted (if developmentally able)
- Discharge education completed

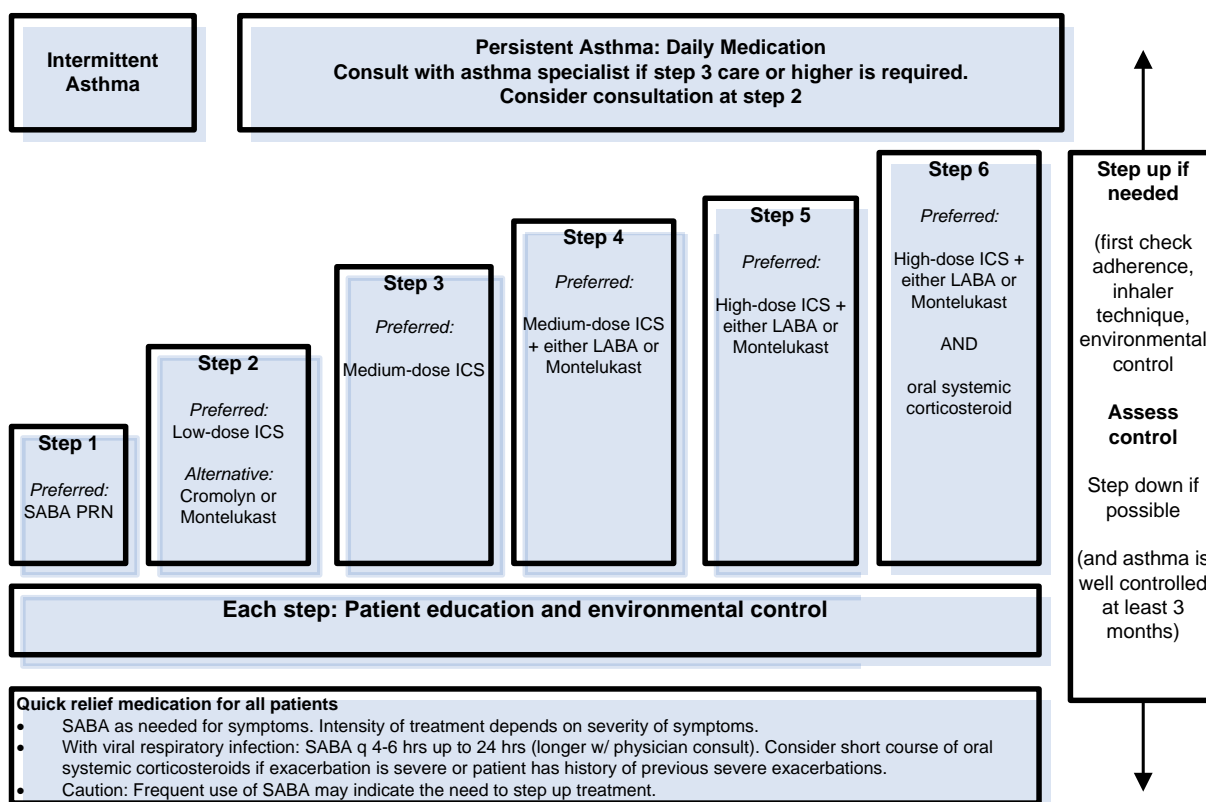
### Patient/Family Education

- Asthma action plan
- Asthma education should include but not be limited to: asthma disease process, medications, MDI and spacers, nebulizer (if applicable), peak flow (5 y/o & older), asthma triggers, asthma video/education booklet.
- Patients at high risk for non-compliance: refer to "Understanding Childhood Asthma Class"

**CLASSIFYING ASTHMA SEVERITY AND INITIATING TREATMENT IN CHILDREN 0 – 4 YEARS OF AGE**

Components of Severity		Classification of Asthma Severity			
		Intermittent	Persistent		
			Mild	Moderate	Severe
<b>Impairment</b>	Symptoms	≤ 2 days/week	2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	0	1-2x/month	3-4x/month	> 1x/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 w/ normal activity	None	Minor limitation	Some limitation	Extremely limited
<b>Risk</b>	Exacerbations requiring oral systemic corticosteroids	0-1/yr (see note)	≥ 2 exacerbations in 6 months requiring oral systemic corticosteroids, or ≥ 4 wheezing episodes / 1 year lasting > 1 day AND risk factors for persistent asthma		
		Consider severity and interval since last exacerbation. Frequency and severity may fluctuate over time. Exacerbations of any severity may occur in patients in any severity category.			
<b>Recommended Step for Initiating Therapy</b>		Step 1	Step 2	Step 3 and consider short course of oral systemic corticosteroids	
		In 2-6 weeks, depending on severity, evaluate the level of asthma control that is achieved. If no clear benefit is observed in 4-6 weeks, consider adjusting therapy or alternative Diagnoses.			

**STEPWISE APPROACH FOR MANAGING ASTHMA IN CHILDREN 0 - 4 YEARS OF AGE**



**Key:** EIB: exercise-induced bronchospasm; FEV<sub>1</sub>: forced expiratory volume in 1 sec; FVC: forced vital capacity; ICS: inhaled corticosteroid; LABA: inhaled long-acting beta<sub>2</sub>-agonist; SABA: inhaled short-acting beta<sub>2</sub>-agonist

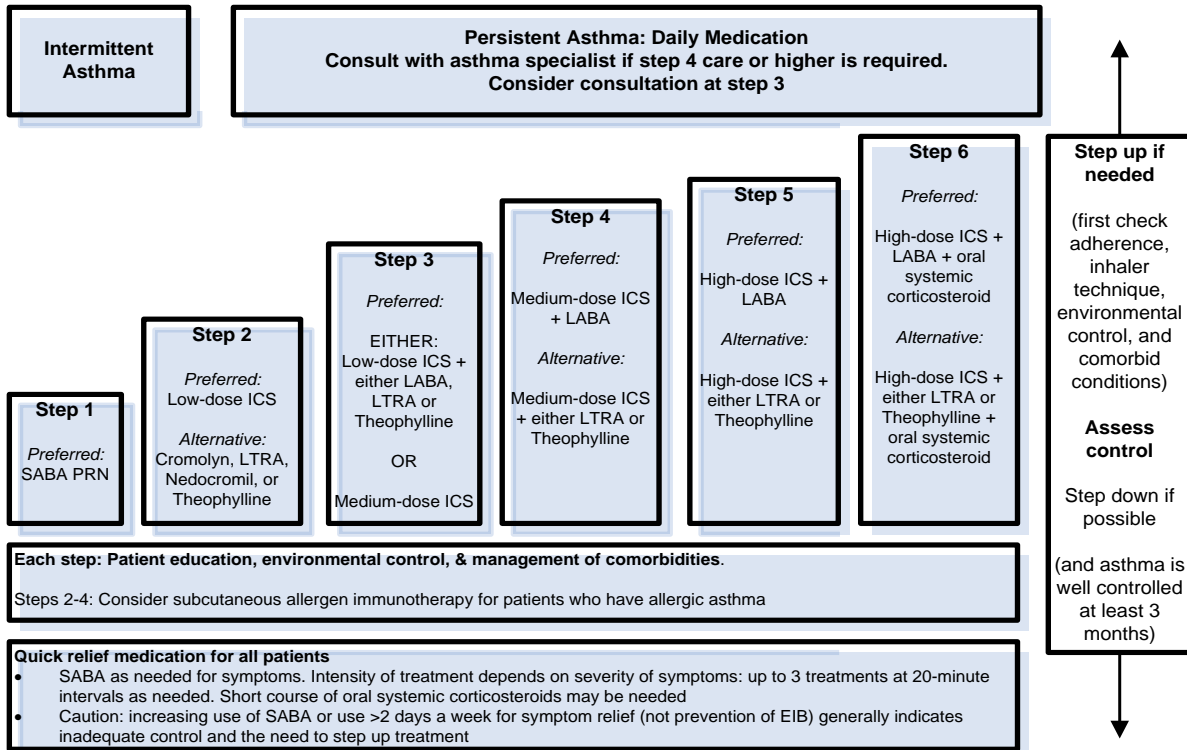
**Notes:**

- Level of severity is determined by both impairment and risk;
- Assess impairment by caregiver's recall of the previous 2-4 weeks;
- Assign severity to the most severe category in which any feature occurs;
- If alternative treatment is used and response is inadequate, discontinue it and use the preferred treatment before stepping up.
- If clear benefit is not observed within 4-6 wks & patient/family medication technique & adherence are satisfactory, consider adjusting therapy or alternative diagnosis.

**CLASSIFYING ASTHMA SEVERITY AND INITIATING TREATMENT IN CHILDREN 5 – 11 YEARS OF AGE**

Components of Severity		Classification of Asthma Severity			
		Intermittent	Persistent		
			Mild	Moderate	Severe
<b>Impairment</b>	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 w/ normal activity	None	Minor limitation	Some limitation	Extremely limited
	Lung function	• Normal FEV <sub>1</sub> between exacerbations • FEV <sub>1</sub> >80% predicted • FEV <sub>1</sub> /FVC >85%	• FEV <sub>1</sub> ≥80% predicted • FEV <sub>1</sub> /FVC >80%	• FEV <sub>1</sub> = 60-80% predicted • FEV <sub>1</sub> /FVC = 75-80%	• FEV <sub>1</sub> <60% predicted • FEV <sub>1</sub> /FVC <75%
<b>Risk</b>	Exacerbations requiring oral systemic corticosteroids	0-1/yr (see notes)	≥ 2/year (see notes)		
		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>2</sub> .			
<b>Recommended Step for Initiating Therapy</b>		Step 1	Step 2	Step 3, medium dose ICS option	Step 3, medium dose ICS option, or step 4
		and consider short course of oral systemic corticosteroids			
		In 2-6 weeks, evaluate the level of asthma control that is achieved, and adjust therapy accordingly.			

**STEPWISE APPROACH FOR MANAGING ASTHMA IN CHILDREN 5 - 11 YEARS OF AGE**



**Key:** EIB: exercise-induced bronchospasm; FEV<sub>1</sub>: forced expiratory volume in 1 sec; FVC: forced vital capacity; ICS: inhaled corticosteroid; LABA: inhaled long-acting beta<sub>2</sub>-agonist; LTRA: leukotriene receptor antagonist; SABA: inhaled short-acting beta<sub>2</sub>-agonist

**Notes:** level of severity is determined by both impairment and risk; assess impairment by patient's/caregiver's recall of the previous 2-4 weeks & spirometry; assign severity to the most severe category in which any feature occurs; In general, more frequent and intense exacerbations (e.g. requiring urgent, unscheduled care, hospitalization, or ICU admission) indicate greater underlying disease severity; for treatment purposes, patients who had > 2 exacerbations requiring oral systemic corticosteroids in the past year may be considered the same as patients who have persistent asthma, even in the absence of impairment levels consistent with persistent asthma.

## Estimated Daily Inhaled Corticosteroid Dosages for Children

Drug	Low Daily Dose			Medium Daily Dose			High Daily Dose		
	Child 0-4	Child 5-11	≥ 12 yrs	Child 0-4	Child 5-11	≥ 12 yrs	Child 0-4	Child 5-11	≥ 12 yrs
Beclomethasone HFA (QVAR) 40 or 80 mcg/puff	NA	80-160 mcg	80-240 mcg	NA	>160-320 mcg	>240-480 mcg	NA	>320 mcg	>480 mcg
Budesonide DPI (Pulmicort) Flexhaler 90 or 180 mcg/inhalation	NA	180-400 mcg	180-600 mcg	NA	>400-800 mcg	>600-1200 mcg	NA	>800 mcg	>1200 mcg
Budesonide inhaled suspension for nebulization (Pulmicort Respules) 0.25, 0.5, 1 mg	0.25-0.5 mg	0.5 mg	NA	>0.5 – 1 mg	1 mg	NA	> 1 mg	2 mg	NA
Fluticasone HFA/MDI (Flovent) 44, 110, or 220 mcg	88 mcg	88-176 mcg	88-264 mcg	>176-352 mcg	>176-352 mcg	264-440 mcg	>352 mcg	>352 mcg	>440mcg
Mometasone DPI (Asmanex) Twisthaler 110 or 220 mcg/inhalation	NA	110mcg	220mcg	NA	220mcg	440 mcg	NA	440mcg	>440 mcg

ICS/LABA*	Child 0-4 yrs	Child 5-11yrs	≥ 12 yrs
Fluticasone/Salmeterol DPI (Advair Diskus) 100 mcg/50 mcg, 250 mcg/50 mcg, 500 mcg/50 mcg	Safety and efficacy not established	1 inhalation BID <sup>+</sup>	1 inhalation BID <sup>+</sup>
Fluticasone/Salmeterol HFA/MDI (Advair HFA) 45 mcg/21 mcg, 115 mcg/21 mcg, 230 mcg/21 mcg	Safety and efficacy not established	Safety and efficacy not established	2 inhalations BID <sup>+</sup>
Budesonide/Formoterol HFA/ MDI (Symbicort) 80 mcg/4.5 mcg, 160 mcg/4.5 mcg	Safety and efficacy not established	2 inhalations BID <sup>x</sup>	2 inhalations BID <sup>x</sup>

\* Dose depends on severity of Asthma

<sup>+</sup>Start with Advair 100mcg/50mcg w/o prior ICS use, Adjust accordingly if on ICS

<sup>x</sup> Use Symbicort 80mcg/4.5mcg if on low-med ICS, use Symbicort 160/4.5 is on med-high ICS

Key: LABA: Long acting beta<sub>2</sub>-agonist; ICS: Inhaled corticosteroid

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## References

### Asthma Care Guideline

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