Consensus Guidelines for Inpatient Management of Asthma:
Northern California Pediatric Hospital Medicine Consortium

Executive summary

Objectives

- Standardize and improve the quality of care of pediatric patients with acute asthma exacerbation being evaluated and treated in the acute care, ER, and inpatient settings
- Reduce utilization of maintenance IV fluids
- Use best available evidence to guide selection and monitoring of appropriate maintenance IV fluids with consideration for patient-specific factors

Recommendations

- Discontinue use of continuous pulse oximetry monitoring in hospitalized patients who are clinically stable and not requiring supplemental oxygen
- Prescribe inhaled corticosteroid (ICS) for all patient discharged from inpatient setting with diagnosis of asthma (including those with first-time wheeze)
- All patients who are seen as an outpatient by Pulmonology, Allergy, or other asthma specialist should have a follow up appointment with that specialist within 30 days of discharge after hospitalization for asthma.

Methods

This guideline was developed through local consensus based on published evidence and expert opinion as part of the UCSF Northern California Pediatric Hospital Medicine Consortium.

Metrics Plan

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DISCLAIMER: The following recommendations are intended for use in otherwise healthy children without chronic lung disease, immunodeficiency, or congenital anomaly.

Evaluation of acute exacerbation

Lab Testing & Imaging

- **LABS:** NO routine lab studies recommended for most patients with acute exacerbation
    - Viral testing:
        - Consider testing for influenza if high degree of suspicion for influenza
        - Consider RSV or viral panel testing if there is potential alternate diagnosis of bronchiolitis or other viral respiratory syndrome
        - Default testing is NOT helpful for management or isolation purposes
    - Blood gas (ABG/VBG/CBG): in patients with severe distress, hypoventilation, or inadequate response to initial treatment
    - CBC + Blood Culture: not recommended for otherwise healthy children
    - Metabolic panel: not recommended for initial assessment
- **CXR**: Not recommended for routine assessment of acute exacerbation
    - *NOTE:* bacterial super-infection is rare; apparent infiltrates are often atelectasis
    - Appropriate indications for CXR:
        - Focal exam
        - Concern for foreign body
        - Failure to improve with typical treatments
- ***NOTE on first-time wheeze****:* children presenting with first-time wheeze and history suggestive of alternative diagnosis, or who do not demonstrate improvement with albuterol, should have an expanded differential considered and further work-up

ER/Acute Care Management

- Early treatment of acute exacerbation is best strategy for management
- See APPENDIX 1: Acute Asthma Algorithm
- **Severity Assessment:**
    - See APPENDIX 2: Asthma Severity Scoring Tool
    - Use objective measures to categorize exacerbation as mild, moderate, severe, or impending respiratory failure based on RR, prolonged expiration, auscultation, retractions, dyspnea
- **Initial Treatment:**
    - See APPENDIX 3 for recommended medication dosing
    - **Oxygen**: Humidified oxygen to keep O2 sats >90% on RA
    - **Bronchodilators**:
        - MILD: Albuterol single neb treatment
        - MODERATE: Albuterol/Atrovent neb (Duoneb) back-to-back x 3 or continuous Albuterol 10-15mg/hr x 1hr
        - SEVERE: Albuterol/Atrovent neb x 3 until respiratory therapist starts continuous Albuterol 20mg/hr
    - **Systemic Corticosteroids**:

        - Indication: MODERATE-SEVERE exacerbation
        - Timing: should be administered within 1hr of presentation
        - Choice of medication:
            - Dexamethasone PO/IM
                - PO route is preferred but may be administered IM if unable to tolerate PO
            - Prednisolone PO
            - Methylprednisolone IV
                - Consider for SEVERE exacerbation or in children who cannot tolerate PO
            - *NOTE:* Ensure patient receives adequate steroid dose (e.g. consider repeating dose if emesis <30min after PO steroid)
- **Reassessment:**
    - **MILD**: reevaluate after bronchodilator therapy
    - **MODERATE**: reevaluate midway through back-to-back bronchodilator therapies (or within first 1hr of continuous treatment) and after bronchodilators x 3 complete (or after 1hr of continuous treatment)
    - **SEVERE**: reevaluate q15min or more frequently based on clinical status
    - **IMPENDING RESPIRATORY FAILURE**: continuous evaluation
- **Respiratory Support:**
    - Maximize noninvasive respiratory support for children with SEVERE asthma exacerbation or IMPENDING RESPIRATORY FAILURE
    - Pursue PICU consultation prior to intubation of any patient with asthma exacerbation
- **Observation & Disposition from ER:**
    - Disposition based on asthma exacerbation category following therapies
        - MILD: discharge
        - MODERATE: consider admission
        - SEVERE: admission; consider PICU
    - *NOTE:* Consider observation of MODERATE asthmatics x 2hrs after systemic corticosteroid administration to determine disposition

Inpatient admission

Admission Criteria

- Hypoxia (SpO2 < 90% on room air)
- Need for bronchodilator more frequently than q4hr
- Significant increased work of breathing (MODERATE/SEVERE scoring)
- Inability to tolerate PO intake
- Social concerns:
    - Inability to administer medications or concerns regarding medication compliance at home
    - Teaching needs

Monitoring

- **Pulse Oximetry**:
  - Indications for continuous pulse oximetry monitoring:
    - First 2-4 hours of any asthma admission
    - Supplemental oxygen requirement + 2-4hrs following discontinuation of supplemental oxygen
    - SEVERE asthma exacerbations
    - Patients requiring continuous Albuterol
  - Intermittent oxygen saturation checks q4hrs with vital signs for all other cases
- **Labs**:
  - Consider metabolic studies if patient is on prolonged high-dose continuous albuterol or NPO on prolonged IV fluids as inpatient (>24hrs)
  - Consider blood gas (ABG/VBG/CBG) if significant worsening of clinical status

Supportive care

- **Supplemental Oxygen**:
  - Criteria for starting supplemental O2: SpO2 <90%
  - Criteria for discontinuing supplemental O2: SpO2 consistently >90%, no or minimal respiratory distress
- **IV fluids**:
  - Consider for patients with SEVERE asthma exacerbation requiring high dose or prolonged continuous albuterol, those unable to tolerate PO, or those who are NPO due to respiratory compromise
- **Chest physiotherapy**:
  - Not helpful

Additional assessment

- **Peak flow**:
  - Not helpful for inpatient assessment / acute management
  - May be considered for patient/family education and discharge planning *if* patient will be discharged with peak flow meter
- **Spirometry**:
  - Not helpful for inpatient assessment / acute management
  - May be considered for patient/family education and outpatient follow-up purposes in children >5yrs who are approaching discharge
- **Allergy testing**:
  - Not indicated in the inpatient setting
  - Consider referral for outpatient RAST testing if strong/clear history of allergic triggers (pulmonology or asthma clinic)
- **Pulmonology consultation**:
  - Goal: facilitate transition to outpatient care and follow-up
  - Indications for inpatient consult (*if* available onsite):
    - Severe asthma exacerbation requiring PICU admission
    - Patients with >2 asthma-related ED/urgent care visits that require systemic

corticosteroids or >3 unscheduled asthma-related visits within the past 1 year
        - Patients with >2 asthma-related admissions within the past 5 years
- **Indications for outpatient referral to pulmonology (or asthma clinic)**:
    - Severe asthma exacerbation:
        - Patients requiring inpatient pulmonology consultation
        - Patients with PICU admission
        - Patients with prolonged hospitalization (>72hrs)
    - Poorly controlled asthma:
        - Patients with >2 asthma-related ED/urgent care visits that require systemic corticosteroids or >3 unscheduled asthma-related visits within the past 1 year
        - Patients with >2 asthma-related admissions in the past 5 years
        - Patients unresponsive to therapy (e.g. not meeting goals of asthma therapy after 3-6 months of treatment) or those requiring advanced medication regimens
    - Need for further education: Patients with poor medication adherence or those needing reinforcement of asthma education, guidance on complications of therapy, or allergen avoidance
    - Complicated diagnoses:
        - Presence of other medical conditions which complicate asthma diagnosis
    - Atypical signs/symptoms or need for diagnostic clarification

Treatment

- See APPENDIX 3 for recommended medication dosing
- **Bronchodilators**:
    - Albuterol Neb vs. MDI:
        - Nebs: Use nebs for MODERATE-SEVERE exacerbation and for patients requiring supplemental oxygen
        - MDI: Start MDI once nebulized Albuterol is weaned to q3hrs (4 puffs q3hrs)
    - Indications for consideration of use of Levalbuterol:
        - Usage at home
        - Underlying cardiac disease
        - Severe, symptomatic tachycardia
        - *NOTE:* availability of Levalbuterol may be institution dependent
- **Systemic corticosteroids**:
    - *NOTE:* Evidence for benefit is comparable for all forms of systemic corticosteroids; dexamethasone and prednisone have equivalent efficacy in outpatient management of MODERATE asthma exacerbation but there is limited data comparing corticosteroids in inpatient settings
    - Dexamethasone
        - *BENEFITS (vs. Prednisolone or Prednisone):* improved PO tolerance when IV formulation given orally (4mg/mL concentration), shorter duration of therapy, ability to give IM if not tolerated PO

        - Consider for MILD-MODERATE asthma exacerbation requiring hospital admission if there is concern for poor PO tolerance or family medication adherence
        - Regimen: see APPENDIX 3
        - *NOTE:* may consider 3rd dose spaced q24hrs to extend steroid course; not evidence-based
    - Prednisone / Prednisolone
        - *BENEFITS (vs. Dexamethasone):* longer duration of therapy, greater experience/body of evidence to support use particularly in inpatient setting
        - Consider for MODERATE asthma exacerbation
        - Regimen: see APPENDIX 3
        - *NOTE:* Use prednisolone preferentially over prednisone due to smaller volume dosing (more concentrated solution = 3 mg/ml versus 1 mg/ml) and possible better PO tolerance / taste
        - *NOTE:* Children who receive Dexamethasone in outpatient/ER setting may be transitioned to Prednisolone to complete a 5-day steroid course (beginning 24hrs after Dexamethasone dose) for inpatient setting
    - Methylprednisolone
        - Consider using for children with:
            - SEVERE asthma exacerbation requiring high dose or prolonged continuous albuterol
            - Patients unable to tolerate PO
            - Patients who are NPO due to respiratory compromise
        - Regimen: see APPENDIX 3
        - *NOTE:* Transition to oral steroids should be considered when the patient's respiratory status improves and child is able to tolerate PO intake
    - Timing to initiate inpatient systemic corticosteroid dosing after initial dose given as outpatient:
        - Dexamethasone – within 24 hours
        - Prednisone / Prednisolone – within 12 hours
        - Methylprednisolone – within 6 – 12 hours
    - *NOTE:* taper recommended if steroid course >7 days
- **Inhaled corticosteroids (ICS)**:
    - See APPENDIX 4 for ICS dosing specifics
    - Indication: Initiate / continue / escalate ICS for all patients with asthma exacerbation requiring admission for >12hrs *<u>including</u>* patients with first time wheeze
        - *NOTE:* Start ICS as inpatient at least 24hrs prior to discharge in order to perform asthma education for family
    - Choice of ICS:
        - Initial choice of ICS should take into account safety profile, available dosing recommendations for age, insurance coverage and provider preference
        - A good initial choice for all ages is fluticasone (Flovent MDI), which has a favorable safety profile (least growth suppression among currently available steroid formulations) and recommended dosing for all age groups

        - Another ICS may be chosen based on response to fluticasone, provider preference, insurance coverage, concern for growth suppression, or other considerations (see APPENDIX 4 and consult pulmonology for additional recommendations)
        - For children under 6 years of age, beclomethasone HFA (QVAR) is preferred.
        - Use a nebulized steroid (budesonide) only if a hand-held administration device (e.g. MDI/spacer) cannot be used
    - *NOTE:* use 2 puffs of lower dose ICS MDI preferentially over 1 puff of higher dose ICS for improved drug delivery and ease of weaning as outpatient
    - See "discharge medications" section below for details re: discharge planning for ICS
- **Other / adjunct pharmacologic therapies**:
    - Intramuscular Epinephrine
        - Use in ER, PICU, ward, or urgent care setting for SEVERE acute exacerbation or impending respiratory arrest
    - Magnesium Sulfate
        - Use for SEVERE acute exacerbation or SEVERE exacerbation resistant to initial albuterol and systemic corticosteroid therapy
        - *NOTE:* May be administered in ER, pediatric ward, or PICU setting; availability of protocols for administration on pediatric ward may vary between institutions. Requires close BP monitoring for hypotension during infusion.
        - *NOTE:* May consider repeat dosing spaced *at least* 12 hours apart in SEVERE / resistant exacerbation, after consultation with PICU; not evidence-based
    - Terbutaline
        - Use for SEVERE acute exacerbation or SEVERE exacerbation resistant to initial albuterol, systemic corticosteroid, and magnesium therapy
        - *NOTE:* may be administered in ER or PICU setting, or while awaiting transport to higher level of care
    - Mucolytics – not recommended
    - Ipratropium – not recommended

PICU Consultation / Transfer Considerations

- Need for escalation of respiratory support (e.g. HFNC)
- Failure to respond to high-dose continuous albuterol therapy; consider for any child requiring ongoing high-dose continuous albuterol for >8 hours
- Failure to improve following escalation of therapy (e.g. magnesium administration or 20 mg/hr continuous Albuterol)
- *NOTE:* Initiate transfer to PICU by most rapid means possible for the following conditions:
    - Impending respiratory failure (e.g. hypercarbia on blood gas)
    - Requirement for epinephrine or terbutaline

Hospital Discharge

Discharge Criteria

- No oxygen requirement (SpO2 >90% on room air)
- Normal work of breathing
- Transitioned to albuterol MDI
- Asthma education performed (see "Discharge Planning" below)
- Requiring bronchodilators ≥ every 4 hours

Discharge Planning

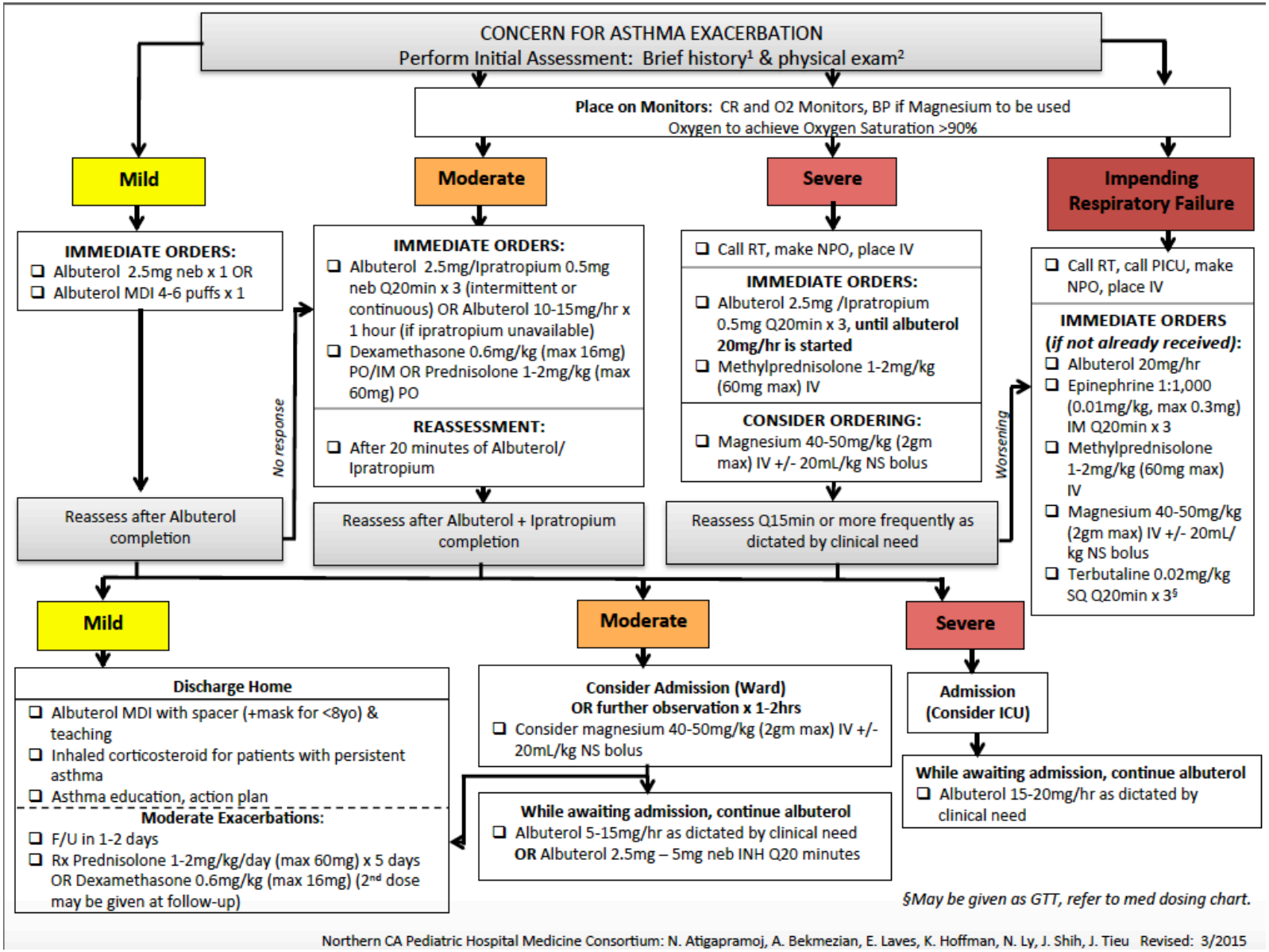
- Start discharge planning and family education early in the hospitalization
- All patients who are seen as an outpatient by Pulmonology, Allergy, or other asthma specialist should have a follow up appointment with that specialist within 30 days of discharge after hospitalization for asthma.
- **Asthma education**: Give to all patients with a diagnosis of asthma or wheeze responsive to bronchodilators
    - Asthma Action Plan (AAP):
        - Give written copy of AAP prior to discharge
        - Give verbal explanation of AAP, including detailed instructions on the difference between control and rescue medications (if applicable)
    - MDI and spacer teaching: Do verbal teaching with nursing or respiratory therapists, and have child/family demonstrate use prior to discharge
    - Nebulizer teaching (if applicable)
    - Peak flow teaching (if applicable)
- **Discharge Medications**:
    - Albuterol**:** Discharge patients home on albuterol 2-4 puffs q4hrs with a plan for spacing albuterol treatments at home
        - Example of appropriate spacing plan: 2 puffs q4hrs ATC x 48 hours, then q6hrs ATC x 24 hours, then q4hrs PRN; administer treatments at night only if symptomatic
    - Inhaled Corticosteroids (ICS): Prescribe for all admitted patients with asthma exacerbations requiring >12 hour stay *including* patients with first time wheeze.
        - Educate patients regarding use of ICS medications (see above)
        - Patients to continue ICS until next appointment (PMD or pulmonology)
        - *NOTE* re: appropriate dosing of ICS for discharge:
            - For patients with known asthma who are not currently on an inhaled corticosteroid → start a moderate daily dose ICS prior to discharge
            - For patients without known asthma under 6 years of age who are not currently on an inhaled corticosteroid, start low dose beclomethasone (QVAR) 40 mcg 1-2 puff bid for 6 weeks after hospitalization; advise PMD that patient may benefit from intermittent ICS (initiated at the time of early symptoms) for preventing future exacerbations

- For patients with known asthma who are already on a moderate daily dose ICS (with good compliance) → modify/escalate medication regimen
    - The details of up-titration from moderate daily dose ICS is beyond the scope of this guideline; consult EPR3 guidelines and/or pulmonologist for specific recommendations or complex cases

Discharge Follow-Up

- Schedule evaluation by PMD within 2-3 days of discharge
    - Consider earlier follow-up for patients/families in need of more aggressive asthma education or those with questionable medication compliance
- Follow-Up Goals:
    - Ensure continued clinical improvement and adjust bronchodilator spacing plan as needed
    - Reinforce asthma education – confirm understanding of medications and spacer/MDI usage
    - Answer questions regarding diagnosis, long-term plan for asthma management, and follow-up
- **Specialist Referral**:
    - Indications for pulmonology or asthma clinic referral:
        - See referral criteria in "pulmonology consultation" section above
    - Indications for Allergy Referral:
        - Consider for patients with suspected allergic triggers or need for RAST testing

APPENDIX 1: PEM Acute Asthma Algorithm



1. Brief focused asthma history should include:
    - Time of onset of current exacerbation
    - Current medications and allergies
    - Recent use of $beta_2$-agonists, response to medications
    - Risk factors for severe, uncontrolled disease (e.g. frequent ED visits, admissions to the hospital or ICU, prior intubations)
    - Other potentially complicating illnesses (e.g. pulmonary or cardiac disease) or diseases that may be aggravated by systemic corticosteroid therapy (e.g. diabetes, peptic ulcer)
2. Physical Exam
    - These physical exam findings should be evaluated on ALL patients presenting with suspected asthma exacerbation.
    - **Asthma severity classification should be based on the highest severity parameter**
    - Other elements to consider in exam include, but are not limited to, ability to speak in sentences, SpO2, and mental status.

APPENDIX 2: Asthma Severity Scoring Tool*

	Mild	Moderate	Severe	Impending Resp Arrest
RR	<3mo: <56 3-6mo: <50 6-12mo: <44 1-4yr: <38 5-8yr: <31 >9yr: <25	<3mo: 56-68 3-6mo: 51-60 6-12mo: 45-53 1-4yr: 39-45 5-8yr: 32-38 >9yr: 26-30	<3mo: > 69 3-6mo: >61 6-12mo: >54 1-4yr: >53 5-8yr: >39 >9yr: >31	Normal and/or slowing due to inability to maintain work of breathing
Prolonged Expiration	Normal to Min Prolonged	Prolonged	Prolonged	Variable
Auscultation	None or end expiratory wheezes only	Throughout exhalation	Inspiratory/ expiratory wheeze OR absent due to poor air exchange	Diminished/Absent due to poor air exchange
Retractions	None or minimal intercostal retractions	Intercostal & substernal retractions +/- nasal flaring	Grunting OR Tripoding OR intercostal, substernal & supraclavicular retractions	Tiring, inability to maintain work of breathing
Dyspnea	With activity or agitation	While at rest *Infants*: soft or shorter cry, difficulty feeding	While at rest *Infants*: Stops feeding	While at rest

* Asthma severity classification based on the HIGHEST severity parameter

APPENDIX 3: Asthma Medications

	MEDICATION	TYPICAL DOSING / RANGE	MAX DOSE	NOTES
Bronchodilators				
	Albuterol	*Continuous Nebulization* 5 – 20mg/hr	*Continuous* 20mg/hr	- Not age-based - Not weight-based
		Nebulization 2.5mg	*Nebulization* 5mg	
		MDI 2 – 8 puffs (4-6 puffs = 2.5mg neb)	*MDI* 8 puffs	
	Levalbuterol	*Nebulization* 1.25mg (1.25mg Levalbuterol = 2.5mg Albuterol)	*Nebulization* 2.5mg	- Not age-based - Not weight-based - Cannot be given as continuous neb - Levalbuterol administered in ½ the mg dose of albuterol provides comparable efficacy and safety
	Albuterol + Ipratropium Duoneb = 2.5mg albuterol + 0.5mg ipratropium	2.5mg Albuterol + 0.25-0.5mg Ipratropium	5mg Albuterol + 0.5mg Ipratropium	- Not age-based - Not weight-based
Systemic Corticosteroids				
	Dexamethasone	0.6mg/kg **PO**/IM Q24hr x 2 doses (PO preferred)	16mg/dose (based on ©Δ)	- Use IV formulation (4mg/mL concentration) preferentially for oral administration - Duration of effect: up to 72hr
	Prednisone/Prednisolone	1-2mg/kg/day PO daily or divided BID	60mg/day	- 5 day steroid course for moderate exacerbation - If >7 days of steroids → taper recommended
	Methylprednisolone	0.5-1mg/kg IV Q6 – 12hr	60mg/dose Q6hr	- Consider loading dose 1-2 mg/kg IV x1 (max 60mg/dose) - If >7 days of steroid → taper recommended

	MEDICATION	TYPICAL DOSING / RANGE	MAX DOSE	NOTES
Adjunctive Medications				
	Magnesium Sulfate	40-50mg/kg IV infused over 20-30min	2gm	- Repeat doses not supported by literature, but may be considered for critically ill patients Q12-24hr (recommend PICU consultation)
	Terbutaline	*GTT* IV Load: 10**MCG**/kg over 10 minutes, then 0.3**MCG**/kg/min IV continuous infusion, may increase Q30min to max of 3**MCG**/kg/min	*GTT* 3**MCG**/kg/min	- Minimal literature available regarding use and dosing (recommend PICU consultation)
		SQ 0.02**MG**/kg Q20min x 3	*SQ* 0.25**MG**/dose	
	Epinephrine 1:1,000	0.01mg/kg **IM** Q20min x 3	0.3mg/dose	
Inhaled Corticosteroids				
	Refer to separate chart for ICS dosing			

©*Keeney GE, Gray MP, Morrison AK, Levas MN, Kessler EA, Hill GD, Gorelick MH, Jackson JL. Dexamethasone for acute asthma exacerbations in children: a meta-analysis. Pediatrics. 2014 Mar;133(3):493-9.*

Δ *Taketomo CK, Hodding JH, Kraus DM. Pediatric & Neonatal Dosage Handbook: A Universal Resource for Clinicians Treating Pediatric and Neonatal Patients. Hudson, OH: Lexi-Comp, 2014.*

Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma, Clinical Practice Guidelines. National Asthma Education and Prevention Program, Third Expert Panel on the Diagnosis and Management of Asthma, National Heart, Lunch, and Blood Institute; 2007.

APPENDIX 4: ICS Dosing Table

Medication	Low Daily Dose (mcg)			Moderate Daily Dose (mcg)			High Daily Dose (mcg)		
	Ages 0-4	Ages 5-11	Age >12	Ages 0-4	Ages 5-11	Age >12	Ages 0-4	Ages 5-11	Age >12
Fluticasone HFA (Flovent) *44, 110, 220mcg/puff*	88-176	88-176	88-264	176-352	176-352	264-440	>352	>352	>440
44mcg	1-2p BID	1-2p BID	1-3p BID	2-4p BID	2-4p BID	-	-	-	-
110mcg	-	-	1p BID	1p BID	1p BID	1-2p BID	2p BID	2p BID	-
220mcg	-	-	-	-	-	1p BID	1p BID	1p BID	1-2p BID
Beclomethasone HFA (QVAR) *40 or 80mcg/puff*	*80**	80-160	80-240	*160**	160-320	240-480	*160-320**	>320	>480
40mcg	1p BID	1-2p BID	1-3p BID	2p BID	2p BID	3p BID	2p BID	-	-
80mcg	-	1p BID	1-2p BID	1p BID	2p BID	2-3p BID	2p BID	2-3p BID	>3p BID
Nebulized budesonide (Pulmicort) *Unit dose: 250, 500mcg*	250-500	500	NA	500-1000	1000	NA	1000-2000	2000	NA
250mcg	1 BID	1 BID	-	1-2 BID	2 BID	-	-	-	-
500mcg	-	-	-	1 BID	1 BID	-	1-2 BID	2 BID	-
Fluticasone/Salmeterol HFA (Advair) *21 mcg salmeterol/puff***	*90**	180	90-230	*230**	230-460	460	*460**	>460	920
45/21	1p BID	2p BID	2p BID	-	-	-	-	-	-
115/21	-	-	-	1p BID	2p BID	2p BID	-	2p BID	-
230/21	-	-	-	-			1p BID	2p BID	2p BID
Fluticasone/Salmeterol DPI (Advair) *50mcg salmeterol/puff***	NA	200	200	NA	200	500	NA	500-1000	1000
100/50	-	1p BID	1p BID	-	1p BID	-	-	-	-
250/50	-	-	-	-	-	1p BID	-	1p BID	-
500/50	-	-	-	-	-	-	-	1p BID	1p BID
Budesonide/Formoterol HFA (Symbicort) *budesonide/formoterol/puff***	*160**	160	160-320	*320**	320-640	640	-	-	-
80/4.5	1p BID	1p BID	2p BID		2p BID	-	-	-	-
160/4.5	-	-	1p BID	1p BID	1-2p BID	2p BID	-	-	-
Mometasone/Formoterol HFA (Dulera) *mometasone/formoterol/puff***	-	-	200	-	200-400	400	-	800	800
100/5	-	-	1p BID		1-2p BID	2p BID		-	-
200/5	-	-	-		1p BID	1p BID		2p BID	2p BID

**Not an FDA-approved usage in this age group. Consider alternatives*
***Dosing for ICS/LABA combos reported as daily dosage of ICS component*

NOTE: Advair may not be covered by some insurance plans; use the table below to switch to covered formulations

USE THE TABLE TO SWITCH PATIENTS ≥5 YEARS WHO ARE ALREADY ON ADVAIR TO SYMBICORT OR DULERA:

For children < 5 years: consult with pulmonologist / asthma specialist for recommendations

	Current Therapy	Comparable Alternate Therapy
Low Dose ICS	Advair 45/21 HFA 1 puff BID	**Symbicort HFA 80/4.5 - 1 puff BID**
	Advair 45/21 HFA - 2 puffs BID OR Advair 100/50 Diskus - 1 puff BID	**Symbicort HFA 80/4.5 - 2 puffs BID**$^{\Delta}$
Medium Dose ICS	Advair 115/21 HFA - 2 puffs BID OR Advair 250/50 Diskus - 1 puff BID	**Symbicort HFA 160/4.5 - 2 puffs BID**$^{\Delta}$ OR **Dulera HFA 100/5 - 2 puffs BID**$^{\Delta}$
High Dose ICS	Advair 230/21 HFA - 2 puffs BID OR Advair 500/50 Diskus - 1 puff BID	**Dulera HFA 200/5 - 2 puffs BID**$^{\Delta}$

Δ Max daily dose of formoterol is 20 mcg daily: do not exceed 4 puffs/day

References

EPR-3: NHLBI Guidelines on the diagnosis and management of asthma: http://www.nhlbi.nih.gov/health-pro/guidelines/current/asthma-guidelines/full-report.htm

EPR-3: Section 5 – Managing exacerbations of asthma:
http://www.nhlbi.nih.gov/files/docs/guidelines/11_sec5_exacerb.pdf

Bush, A., Grigg, J., & Saglani, S. (2014). Managing wheeze in preschool children. *BMJ, 348*. doi: 10.1136/bmj.g15