Asthma Clinical Pathway

February 2021

Outcomes/Goals	**1.** Early identification, classification and treatment of asthma using Asthma Severity Tool **2.** Standardize best practices for asthma treatment in the Emergency Department
Inclusion Criteria	Pediatric patients 2-19 years of age with a history of asthma
Exclusion Criteria	• Patients presenting with chief complaint of first-time wheezing, respiratory distress without history of asthma, and/or wheezing in children • Patients with chronic lung disease (e.g. CF) • Cardiac disease
NURSE Documentation	Chief complaint. Onset of symptoms. Asthma history, including use of peak flow, medications, last steroid use, recent illness, hospitalizations, PICU stays, intubation. General appearance, lung sounds, work of breathing, retractions, pulses, skin temperature/fever. Initial room air Asthma Severity Score. (See page 4 for Pediatric AST Severity Scale)
INTERVENTIONS Initiate on arrival	Determine severity of exacerbation (initial and rescoring is on room air) ESI Triage level II, III, or IV, depending on severity Evaluate need for isolation and initiate immediately if applicable Full set of vitals per standard of care Continuous pulse oximetry if SaO2 ≤ 95% Oxygen to maintain SaO2 > 90% Initiate Duo nebs for audible wheezing, retractions, or distress, and considering asthma history (consider initially using continuous albuterol for severe exacerbations) Administer continuous nebs with air, using oxygen as needed to maintain SaO2 levels
PHYSICIAN (LIP)	
Medication Bronchodilators	**Mild:** Albuterol inhaler with spacer 4-8 puffs, repeat x 1 within first 30-60 minutes if needed **Moderate/Severe:** 3 stacked Duo nebs. Do not delay time between nebs > 5 minutes, continue albuterol nebs Q 2-4 hours as needed **Continuous Albuterol:** Weight / Continuous Neb Dose 5-10 kg / 10 mg/hr. 10-20 kg / 15 mg/hr. >20 kg / 20 mg/hr. *Younger children may be dosed at 0.3-0.5 mg/kg/hr.
Steroids	Dexamethasone 0.6 mg/kg up to 16 mg max; PO x 1 (Use IV version orally to minimize volume) If unable to tolerate PO: Dexamethasone 0. 6 mg/kg up to 16 mg max IM/IV (second dose of dexamethasone 24 hours after first dose)
Additional Medications	Additional medication **considerations** for severe exacerbation: • **Magnesium** 25-50 mg/kg (maximum 150 mg/min) x 1 over 15-30 minutes, may repeat x 2 doses up to 2 g total • **Terbutaline** 10 mcg/kg IV (loading dose) over 10 minutes, then infusion 0.1- 10 mcg/kg/min IV pending PICU admission **Can be given **SQ/IM** 0.005-0.01 mg/kg/dose – max 0.4 mg/dose every 15-20 minutes x 3 doses • **Epinephrine SQ/IM** 0.01 mg/kg 1:1000 maximum 0.5 mg every 20 minutes x 3 doses if refractory to all other methods • **Heliox** (80/20%) with albuterol via mask
Rehydration	Evaluate/encourage oral rehydration as appropriate Consider IV rehydration if unable to tolerate PO fluids or significantly increased WOB
Non-Invasive Ventilation	• **CPAP/BiPAP:** Use EPAP 5 cm H_2O; IPAP 15 cm H_20 as initial order • **High-Flow Nasal Cannula:** 21-100% humidified warmed oxygen. Flow based upon cannula size and work of breathing, though 1-2L/kg initiation recommended.
Rescue Medication	• **Consider Ketamine** Loading dose 0.3 to 0.5 mg/kg IV over 1-2 minutes followed by infusion of 0.3-0.5 mg/kg/hr IV

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Initial Assessment & Immediate Action

Vitals/pulse oximetry/monitor

Consider isolation

Oxygen to maintain SaO2 >90% (Notify MD immediately if hypoxia)

Initial Asthma Severity Tool room air score to determine severity

TRIAGE- ASSESS & SCORE

Mild

AST < 6 (ESI IV)

No distress (may have end expiratory wheezing)

Mild accessory use

Room air SaO2 ≥93%

Moderate

AST 6-11 (ESI III)

Moderate accessory muscle use

Inspiratory/expiratory wheezing with good aeration

Tachypnea and/or tachycardia

Room air SaO2 ≥ 90

Severe

AST 12-18 (ESI II)

Severe accessory muscle use

Inspiratory/expiratory wheezing with poor aeration

Abnormal HR and RR

Room air SaO2 ≤90%

1ST HR RE-SCORE

Albuterol MDI with spacer 4-8 puffs

Repeat x 1 within 30-60 minutes if needed

Dexamethasone 0.6 mg/kg up to 16 mg maximum; PO

Oral hydration

Stacked duo nebs (3 within 20 minutes)

Dexamethasone 0.6 mg/kg up to 16 mg maximum; PO x 1 (may give IM/IV if unable to tolerate PO)

Consider MgSO4 25-50mg/kg up to 2g maximum IV

Oral hydration if improvement after 3 stacked nebs, otherwise consider IV hydration

Continue Q2 hr. albuterol nebs with AST assessments pre/post nebs

Consider chest x-ray

Call EARLY to setup transfer to PICU or a Children's Hospital

Worsening condition, fatigue with breathing give magnesium or terbutaline prior to transfer

2ND HR RE-SCORE AND DETERMINE DISPO

Review rescue inhaler and spacer use/technique

Discharge +/- second dose of oral steroid to take in 24 hours

Assure follow-up with primary provider or asthma specialist within 1 week

Admission vs. Discharge

Score >8 after the first hr. of neb therapy, ***consider transport to children's hospital/admission***

Score 6-8 following 2nd hr. of neb therapy or continued need for Q2 hr. nebs, ***consider transfer Children's hospital***

If able to space Q4 hour MDI puffs, consider discharge planning

Continuous albuterol 10-20 mg/hr.

Dexamethasone 0.6 mg/kg up to 16 mg maximum; PO x 1 (may give IM/IV if unable to tolerate PO)

IV hydration

Consider adjunct medications ***prior*** to transfer (magnesium, terbutaline, epinephrine, ketamine)

Consider Heliox

VBG

Chest x-ray

Asthma Rationale and Data

Goals of Clinical Pathway

1. Early identification, classification and treatment of Asthma using Asthma Severity Tool
2. Standardize best practices for asthma treatment in the Emergency Department

Weaning from continuous Albuterol nebs: Do not stop continuous nebs abruptly unless patient is deteriorating or in respiratory failure. To wean continuous nebs decrease dose in half for one hour. If tolerated, stop continuous Albuterol and resume Q2 hour nebs per protocol.

Data Considerations	Interventions	Rationale
Steroids	Dexamethasone	Two doses of oral dexamethasone is as effective as 5 days of oral prednisone in preventing relapse for pediatric asthma exacerbations and had better compliance Single dose oral Dexamethasone is as effective as 3-5 days of twice-daily prednisolone in the management of children with mild to moderate asthma Dexamethasone is well absorbed orally, has the same bioavailability as when given parenterally and duration of action lasting up to 72 hours after a single dose
Inhaled Medications	Albuterol & Ipratropium (Duoneb) Continuous Albuterol	Treatment with combination albuterol ipratropium appears to reduce hospitalization compared to albuterol alone. Patients with severe respiratory distress have decreased rates of hospitalization and improvement in pulmonary function when treated with continuous Albuterol nebulizer
Adjunct Medications	Magnesium	IV magnesium sulfate improves pulmonary function and prevents hospitalization
	Terbutaline	A trend toward improvement in clinical asthma severity score is seen with IV Terbutaline, but adverse effects may include cardiac dysrhythmias and elevated troponin
Rescue Medication	Ketamine	Ketamine IV bolus followed by a continuous infusion may have moderate benefits to standard therapy in children with moderately to severe asthma exacerbation

Pediatric Asthma Severity Scoring Tool (AST)

	Severity Score			
Parameter	0	1	2	3
Room air SPO2	>95%	93-95%	90-92%	<90%
Accessory Muscle Use	None	Mild	Moderate	Severe
Inspiratory/Expiratory Ratio	2:1	1:1	1:2	1:3
Wheezing	None	End expiratory	Inspiratory and expiratory with good aeration	Inspiratory and expiratory with poor aeration
Heart Rate <3 years old 3 years old or older	 <120 <100	 120-140 100-120	 141-160 121-140	 >160 >140
Respiratory Rate < 6years old 6 years old or older	 <30 <20	 31-45 21-35	 46-60 36-50	 >60 >50

TOTAL SCORE:

- 0-5 Mild Consider Q4 hour treatment and Assessment after initial treatment and stabilization
- 6-11 Moderate Consider Q2 hour treatment and Assessment after initial treatment and stabilization and admission/transfer
- 12-18 Severe Consider early transfer, continuous nebs and adjunct medications

Citations:

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Zemek R, Plint A, Osmond MH, et al. Triage nurse initiation of corticosteroids in pediatric asthma is associated with improved emergency department efficiency. Pediatrics 2012; 129:671.

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