

Clinical Pathway

Asthma

Updated: January 2012

Outcomes/Goals	<ol style="list-style-type: none"> 1. Identification and treatment of pediatric patients with asthma 2. Create a team-oriented approach to treatment and care 3. Decrease respiratory distress
NURSE Documentation	Chief complaint. Onset of symptoms. Asthma history, including use of peak flow, medications, last steroid use, recent illness, hospitalizations. General appearance, lung sounds, work of breathing, retractions, pulses, skin temperature/fever. Verify contraindications for duo nebs which include soy allergies, and peanut allergies for albuterol MDI.
INTERVENTIONS Initiate on arrival	<p>ESI Triage level II or III</p> <p>Full set of vitals per standard of care</p> <p>Continuous pulse oximetry if $SaO_2 \leq 95\%$</p> <p>Oxygen to maintain $SaO_2 > 90\%$</p> <p>Peak flow if able (≥ 5 years)</p> <p>Determine severity of exacerbation *</p> <p style="color: red;">Initiate Duo nebs for audible wheezing, retractions or distress; and asthma history (consider initially using continuous albuterol for severe exacerbations)</p> <p>Evaluate, begin (or update) asthma education record</p>
DIAGNOSTICS	<p>Consult with LIP for indications before ordering. May include:</p> <ul style="list-style-type: none"> • CBC with differential • BMP / CMS – draw and hold. Send if indicated/physician order • Blood culture • Chest x-ray • ABG/VBG
PHYSICIAN (LIP)	
Medication Bronchodilators	<p>Mild: Albuterol inhaler with spacer 4-8 puffs, repeat x 1 within first 30-60 minutes if needed</p> <p>Moderate/Severe: 3 stacked Duo nebs. Do not delay time between nebs > 5 minutes, continue albuterol nebs Q 1-2 as needed with ipratropium inhalation q4 hours</p> <p style="text-align: center;">Or</p> <p>continuous Albuterol 10-20 mg/hour for severe exacerbation, consider additional medications if no improvement</p>
Steroids	<p>Dexamethasone 0.6 mg/kg up to 10 mg maximum; po x 1</p> <p>If unable to tolerate po: Dexamethasone 0.6 mg/kg up to 10 mg maximum IM/IV x 1 (second dose of dexamethasone 24 hours after first dose obs admits/discharges)</p>
Additional Medications	<p>Additional medication considerations for severe exacerbation:</p> <ul style="list-style-type: none"> • Magnesium 25 mg/kg (maximum 150 mg/min) x 1 over 15-30 minutes, may repeat x2 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 • Epinephrine SC/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 • Ketamine
Rehydration	<p>Evaluate/encourage oral rehydration as appropriate</p> <p>Consider IV rehydration if unable to tolerate po fluids</p>
Pediatric AST Score	See page 3 for Pediatric AST Severity Scale*
Cost considerations:	<p>MDI with spacer \$68</p> <p>Nebulized treatment \$10.70</p>

Clinical Pathway Decision Making Process

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Initial Assessment & Immediate Action

Vitals
 Pulse oximetry/monitor
 Oxygen to maintain SaO₂ >90%
 Asthma Severity Tool
 Determine severity, H&P as able
 Peak flow if applicable/depending on severity

Mild

- AST < 6
- No distress (may have end expiratory wheezing)
- mild accessory use
- Peak flow near or at predicted value
- Room air SaO₂ ≥93%

Moderate

- AST 6-11
- Moderate accessory muscle use
- Inspiratory/expiratory wheezing with good aeration
- Tachypnea and/or tachycardia
- Room air SaO₂ ≥ 90

Severe

- AST 12-18
- Severe accessory muscle use
- Inspiratory/expiratory wheezing with poor aeration
- Abnormal HR and RR
- Room air SaO₂ ≤90%

Impending or actual respiratory arrest

- Severe distress, fatigue
- Poor or no aeration

- Albuterol MDI with spacer 4-8 puffs
- Repeat x 1 within 30-60 minutes if needed
- Dexamethasone 0.6 mg/kg up to 10 mg maximum; po x 1
- Oral hydration

- Stacked duo nebs (3 within 20 minutes)
- Dexamethasone 0.6 mg/kg up to 10 mg maximum; po x 1 (may give IM/IV if unable to tolerate po)
- Oral hydration if improvement after 3 stacked nebs, otherwise consider IV hydration
- Consider PANDA RT eval
- Continue q2 albuterol nebs with AST assessments pre/post nebs
- Consider chest x-ray

- Continuous albuterol 10-20 mg/hr
- Dexamethasone 0.6 mg/kg up to 10 mg maximum; po x 1 (may give IM/IV if unable to tolerate po)
- PANDA RT eval (initiate early if heliox anticipated)
- IV hydration
- Consider adjunct medications (heliox, magnesium, terbutaline, epinephrine)
- ABG/VBG
- Chest x-ray

- Intubation
- Dexamethasone 0.6 mg/kg up to 10 mg IV
- Albuterol per ETT by RT
- Adjunct medications
- Consult PICU for additional management

Pharmacy tech visit to review rescue inhaler and spacer use/technique

Discharge **home** with second dose of oral steroid to take in 24 hours

Assure follow up with primary provider or asthma specialist in 1-4 weeks

ED observation admission

Pharmacy tech and RN to review medications, rescue inhaler and home plan prior to discharge from obs.

Admit inpatient if continued q2 nebs required after 8 hours

Admit PICU

for worsening condition, fatigue with breathing, heliox, magnesium or terbutaline management

Admit intermediate unit for continuous neb requirements

Admit PICU

Asthma Rationale and Data

Goals of Clinical Pathway

1. Identification and treatment of pediatric patients with asthma
2. Create a team-oriented approach to treatment and care
3. Decrease respiratory distress

Data Considerations	Interventions	Rationale
Steroids	Dexamethasone	<p>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 (Greenberg 2008; Qureshi 2001).</p> <p>Single dose oral Dexamethasone is as effective as 5 days of twice-daily prednisolone in the management of children with mild to moderate asthma (Altamimi, 2006). 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 (Altamimi, 2006; Gries, 2000)</p> <p>Single dose dosing eliminates missed doses, compliance issues and when given orally is a significantly smaller volume for administration.</p>
Medications	<p>Continuous Duoneb (albuterol-ipratropium)</p> <p>Heliox (80%:20% helium/oxygen)</p> <p>Magnesium</p> <p>Terbutaline</p>	<p>Patients with severe respiratory distress have decreased rates of hospitalization and improvement in pulmonary function when treated with continuous albuterol nebulizer (Papo 1993; Camargo 2003).</p> <p>Use of heliox in patients with moderate to severe asthma resulted in shorter rates of hospitalization and greater improvement in pulmonary index score (Kim 2005).</p> <p>Heliox enhances delivery of nebulized aerosol therapy in children with severe lower airway obstruction. It is thought to decrease turbidity, increase laminar flow which lowers airway resistance and increases delivery of aerosol therapy to peripheral lung (Kim 2005, Piva 2002).</p> <p>IV magnesium sulfate improves pulmonary function and prevents hospitalization (Cheuk 2005).</p> <p>A trend toward improvement in clinical asthma severity score is seen with IV terbutaline, but it has been shown to cause significant cardiac dysrhythmia and elevated troponin (Bogie 2007).</p>

Pediatric Asthma Severity Scoring Tool (AST)

Parameter	Severity Score			
	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	<120	120-140	141-160	>160
3 years old or older	<100	100-120	121-140	>140
Respiratory Rate < 6years old	<30	31-45	46-60	>60
6 years old or older	<20	21-35	36-50	>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)
 12-18 Severe (Consider continuous nebs and admission)

Reviewed: ED pediatric nurse committee, PEM committee, DCH Pediatric Nursing Council (02/08, 7/10, 1/12)
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