Ann & Robert H. Lurie Children's Hospital of Chicago

Asthma Algorithm

Emergency Department

INCLUSION

≥ 2 years of age

AND

Current asthma exacerbation

OR

3rd episode of wheezing (patients < 2 y/o)

**Per provider discretion: patient < 2 years of age and/or < 3rd episode of wheezing can be placed on algorithm if clinically appropriate

EXCLUSION

- Intubated/CPAP/ BiPAP
- Active cardiac disease
- Airway abnormalities/ Tracheostomy
- Bronchiolitis
- Cystic Fibrosis
- Neuromuscular Disease
- Prematurity with severe lung disease

ALBUTEROL

- MDI:
  Pt < 20kg = 6 puffs
  Pt ≥ 20kg = 8 puffs
- Continuous:
  All continuous nebs need cardiac monitoring

TARGETS

- 1st albuterol < 30 min from arrival
- Steroid < 45 min from arrival
- 3 MDI treatments or continuous albuterol within 60 min of initiation of care

Triage Rapid Assessment (ESI & Severity)

Any one point or combination of points below can put you at that level

ESI 5 = Well	ESI 4 = Mild	ESI 3 = Moderate	ESI 2 = Severe	ESI 1 = Life-Threatening
• No WOB • Mild to no tachypnea • Mild or no wheeze • Good aeration • Pulse ox ≥ 95% if indicated • Talks in sentences	• Mild to no WOB • Mild to no tachypnea • Mild or no wheeze • Fair to good aeration • Pulse ox ≥ 95% if indicated • Talks in sentences • No mental status changes	• Mild to moderate WOB • Mild to moderate tachypnea • Mild to moderate wheeze • Diminished to fair aeration • Pulse ox ≥ 92% if indicated • Talks in phrases • No mental status changes	• Moderate to severe WOB • Moderate to severe tachypnea • Moderate to severe wheeze • Poor to diminished aeration or absent breath sounds • Prolonged expiration • Pulse ox < 92% if indicated • Difficulty speaking • May have mental status changes	• Respiratory arrest imminent • Mental status changes

Supplemental O2 should be administered to keep O2 sats > 90%

1st Hour

Rapid assessment and ESI Severity level at TRIAGE & FIRST HOUR

ESI 4 or 5	ESI 3	ESI 2 or 1
RN Initiated • Observe or MDI for mild wheeze • Re-assess if MDI required • Determine disposition	**RN Initiated: NO ROOM AVAILABLE (Initiate in triage)** • PO Steroid • 1-3 MDI Albuterol treatments q20min (assess after each for improvement) **RN Initiated: ROOM AVAILABLE** • PO Steroid • 1 hour continuous Albuterol + 1500mcg Atrovent (1500mcg = 3 bullets) • LIP consider IV access for Magnesium Sulfate and IVF bolus	**RN/Provider Initiated** • NPO & Notify Provider • Prioritize room – if unavailable, refer to ESI 3 MDI path until room available • 1 Hour of Continuous Albuterol + 1500mcg Atrovent (1500mcg = 3 bullets) • Steroid (consider IV steroid if not taking PO) • Obtain IV access • Provider to order IVF and Magnesium Sulfate • Consider HFNC/BiPap • Consider Epinephrine/Aminophylline/Terbutaline if in extremis

Assess and LCAS at end of 1st hour: LCAS to guide care in hours 2 and beyond

2nd Hour

LCAS = 0 – 4	LCAS = 5 – 8	LCAS = 9 – 12
• Observe for 1 hour if MDI given • Albuterol MDI with spacer with teaching • Consider PO steroids if > 2 MDI treatments OR known Asthma history • Determine disposition: D/C if no further treatments required	• Albuterol 2nd hour continuous (with 1500mcg if not already given; 1500mcg = 3 bullets) • Consider IV access • Consider IVF bolus • Consider IV Magnesium Sulfate	• 1 Hour of Continuous Albuterol • Consider HFNC/BiPap • IV access (if not already done) • IVF bolus • Give IV Magnesium Sulfate (if not already given) • Consider Epinephrine/Aminophylline/Terbutaline • Determine disposition

Assess and LCAS at end of 2nd hour

3rd Hour

LCAS = 0 – 4	LCAS = 5 – 8	LCAS = 9 – 12
• D/C home after MDI teaching (if not discharged in hour 2)	• Albuterol 1 hour continuous • Consider IV access • Consider IVF bolus • Consider Magnesium Sulfate • Determine disposition	• Continuous Albuterol x 4 hours • Consider HFNC/BiPap • IV access & IVF bolus (if not already done) • Give Magnesium Sulfate (if not already given) • Consider Epinephrine/Aminophylline/Terbutaline • Determine disposition

Assess and LCAS at end of 3rd hour

≥4 Hours

Continue care as above

Discharge Criteria:

- On room air
- Appropriate to initiate Beta agonist therapy Q4
- Tolerating PO & adequately hydrated
- Tolerating baseline activity
- Education & discharge instructions complete
- Follow-up recommended

Disposition Considerations

(does not substitute clinical judgment)

PICU
- **No FiO2 limit**
- **HFNC/BiPap**

GenMed/IP
- **Up to 50% FiO2**

Dexamethasone Discharge Dosing:

- If patient received PO Dexamethasone + Continuous, discharge with prescription for one dose of Dexamethasone at 24 hours (max 16mg)
- If patient received PO Dexamethasone but did NOT require continuous albuterol, no steroid prescription necessary
- Dosing: 0-6kg = 4mg, 7-14 kg = 8mg, 15-20 kg = 12 mg, > 21 kg = 16mg

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Last update: 09.07.22 NJS

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Asthma Algorithm

Emergency Department

Lurie Children's Asthma Score (LCAS)				
Score	**0**	**1**	**2**	**3**
Respiratory Rate ≤ 3 yrs 4-5 yrs 6-12 yrs > 12 yrs	**No tachypnea:** ≤ 28 ≤ 23 ≤ 21 ≤ 18	**Mild tachypnea:** 29 – 34 24 – 30 22 – 26 19 – 23	**Moderate tachypnea:** 35 – 39 31 – 35 27 – 30 24 – 27	**Severe tachypnea:** ≥ 40 ≥ 36 ≥ 31 ≥ 28
Oxygen Requirement	Room Air	---	**Low FiO2/Flow:** ≤ 40% FiO2 ≤ 4L NC	**High FiO2/Flow:** > 40% FiO2 > 4L NC or any HHNC
Aeration & Auscultation	**Good:** Good aeration and clear breath sounds	**Good & Wheezing:** Good aeration with inspiratory and/or expiratory wheeze	**Fair:** Fair aeration with/without expiratory wheeze	**Diminished:** Dim/absent aeration with/without inspiratory/expiratory wheeze
Work of Breathing	None	**1 of the following:** Subcostal, intercostal, suprasternal, substernal, *nasal flaring*	**2 of the following:** Subcostal, intercostal, suprasternal, substernal, *nasal flaring*	**3 of the following:** Subcostal, intercostal, suprasternal, substernal, *nasal flaring, head bobbing*

LCAS Reference Ranges:

Mild		Moderate		Severe
0	3	6	9	12

MEDICATION DOSING

***Albuterol MDIs:**
- Mild/Moderate
  - < 20kg = 6 puffs
  - ≥ 20kg = 8 puffs
- Home
  - < 20kg = 4 puffs
  - ≥ 20kg = 4-6 puffs

***Albuterol Continuous Nebs:**
- Hour 1 or Initial Continuous: < 20kg = 10mg
  ≥ 20kg = 15mg
  w/ 1500mcg of Atrovent
- Hour 2 or Second Continuous: < 20kg = 15mg
  ≥ 20kg = 20mg

***Steroids:**
- Dexamethasone **(PO, IM) – Recommended PO**
  0.6mg/kg/dose x 1 dose (Max = 16mg/dose)
- Prednisone/Prednisolone **(PO) – Alternative PO**
  Loading Dose: 2mg/kg/dose (Max = 60mg/dose)
  Maintenance Dose: 1mg/kg/dose BID PO (Max = 60mg/day)
- Methylprednisolone **(IV) – Recommended IV**
  Loading Dose: 2mg/kg/dose (Max = 60mg/dose)
  Maintenance Dose: 0.5mg/kg/dose q6 IV (Max = 60mg/day)

***Magnesium Sulfate (IV):**
- 50mg/kg bolus (Max = 2 grams)
- Give 20/kg NS bolus before
- Run over 20 minutes
- Monitor for hypotension

***Epinephrine (1mg/mL) (IM):**
- 0.01mg/kg/dose (Max = 0.5mg)

***Levalbuterol (Xopenex) Nebs:**
- 1.25mg (only used when taken at home or clinically indicated)
  (no differences in safety & efficacy of levalbuterol vs albuterol; LC's Pulmonary division strongly recommends using albuterol)

***Aminophylline (IV):**
- Bolus: 5.7mg/kg (do not give bolus if receiving aminophylline or theophylline at home)
- Continuous Infusion: 0.51 to 1mg/kg/hr (see order set for dosing recommendations)

***Terbutaline (IV):**
- Bolus: 4 to 10mcg/kg
- Continuous Infusion: 0.2 to 0.4mcg/kg/minute (titrate by 0.1 to 0.2mcg/kg/min in increments as frequently as every 30 minutes based on patient response or toxicity) (Max = 5mcg/kg/minute)

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Version History

Published version history:.

- June 2016
- June 2019
- August 2019
- October 2019
- March 2020
- August 2020
- October 2020
- October 2021
- December 2021
- September 2022

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