Pediatric Asthma

Clinical Practice Guidelines

Monroe Carell Jr. Children's Hospital at Vanderbilt

Inclusion/Exclusion Criteria

- This clinical pathway is designed for children 2 years of age or older who present to the ED with an asthma exacerbation.
- In patients with initial episode of wheezing, consider foreign body or upper airway obstruction, or other underlying pulmonary disease.
- Patients with other chronic, comorbid conditions that may alter the treatment recommendations on this guideline should be excluded from the pathway.

Educational Process

- The admitting team completes an asthma action plan, which includes identification of environmental control and control of other triggers, method and timing of rescue actions, use of controllers, and use of relievers.
- The respiratory therapist ensures that key elements of asthma education occur during the patient's hospitalization.

Adjunctive Therapies

Medications in order of escalation

- Terbutaline 10 mcg/kg (max 250 mcg/dose) SQ Q 20 minutes x3, then infusion of 0.1 - 10 mcg/kg/min
- Epinephrine 0.01 mg/kg (max 0.3 mg) IM x1
- Magnesium 75 mg/kg (max 2 gm) IV
- Ketamine: Bolus 2-3 mg/kg, then infusion 1-2 mg/kg/hr
- Heliox 80:20

Respiratory support for respiratory failure

- HFNC
- BiPAP (severe episode approaching respiratory failure with fatigue or significant uncorrected hypoxemia)

NOT Routinely Recommended

- CXR*
- Viral testing except for influenza
- Blood work
- Antibiotics

*CXR should only be performed if:

- Persistent severe respiratory distress (including O2 Sat ≤90%) OR focal findings (including localized rales, crackles, decreased breath sounds +/- documented fever ≥38.4C) **not improving on ≥12hrs of therapy**
- Concern for pneumomediastinum/pneumothorax during ED treatment

AAIRS Acute Asthma Severity Score

Component	Component Values			
	0	1	2	3
Retractions[a]				
SCM	No		Yes	
Intercostal	No		Yes	
Subcostal	No		Yes	
Air Entry	Normal	Decreased at bases	Widespread decrease	Absent or minimal
Wheezing	Absent	Expiratory	Inspiratory & Expiratory	Audible w/out stethoscope or silent chest
SpO_2 (on room air)	≥95%	92 – 94%	<92%	
Expiratory phase[b]	Normal; 1:1	Prolonged; 1:2	Severely prolonged; ≤1:3	
Add component values	___	+___	+___	+___
Total Score on scale of 0 to 16				___

Abbreviations: AAIRS, Acute asthma intensity research score; SCM, sternocleidomastoid; SpO_2, oxygen saturation by pulse oximetry on room air
[a] Any visible use of accessory muscle group (Yes/No); [b] Inspiratory to expiratory ratio
Severity levels: Mild 1 – 6; Moderate 7-11; Severe 12 - 16

Consider Pulmonary Consult:

- Asthma exacerbation requiring PICU care
- If not meeting goals of asthma therapy, such as admission to the hospital 2 or more times in a 12 month period
- When there is uncertainty whether the patient has asthma
- When there are other conditions that complicate asthma management
- When enhanced education may improve outpatient management

Other consults to consider, as needed:

- Social Work, when issues related to housing, transportation, or finances affect care
- Pharmacy, when enhanced education about medication regimen is needed
- Case management, when a visit by a home nurse may improve management

Discharge Process

- Arrange follow up appointment with PCP (required) and with specialist (as needed)
- Discharge instructions must include appointment and name/phone number of PCP
- In combination with the discharge instruction, the Asthma Action Plan constitutes the Asthma Home Management Plan of Care. The patient and/or caregiver is given a copy of this plan at discharge
- Follow up that RT has completed asthma education
- Follow up on SW, Pharmacy, and Case Management recommendations

REFERENCES

1. NHLBI. Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma. NAEPP, 2007.
2. Keeney GE, Gray MP, Morrison AK, Levas MN, Kessler EA, Hill GD, et al. Dexamethasone for Acute Asthma Exacerbations in Children: A Meta-analysis. Pediatrics 2014; 133:493-9.
3. Arnold DH, Saville BR, Wang W, Hartert TV. Performance of the Acute Asthma Intensity Research Score (AAIRS) for acute asthma research protocols. Ann Allergy Asthma Immunol 2012; 109:78-9.

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AAIRS Scoring for Asthma
Pediatric ED Guideline

Assess patient, score AAIRS
Give dexamethasone 0.6mg/kg (max 16mg)

- AAIRS 1-6 Mild
  - Albuterol MDI 2-4 puffs x1 (preferred) **PRN after first dose**
  - Reassess, score AAIRS in 15-60 min
  - **AAIRS ≤ 2?**
    - No → Consider continuing albuterol
    - Yes → Disposition asap continue tx as appropriate
  - Reassess in 30 - 60 min
  - **4 hrs since first tx?**
    - No → Consider trial off albuterol
    - Yes → Disposition asap continue tx as appropriate
  - Disposition asap continue tx as appropriate
    - Home if AAIRS ≤ 2
    - Floor admit if AAIRS 3 - 11 or Albuterol ≥ q2hr
- AAIRS 7-11 Moderate
  - Albuterol MDI 8 puff and reassess in 20min. May receive MDI 8 puff q20min x 2 more or continuous neb + Atrovent **if inability to administer MDI after initial 8 puff**
  - Reassess, score AAIRS in 60 min
  - Move to mild path at any time per AAIRS
  - **AAIRS decrease ≥ 2?**
    - Yes → Consider continuing albuterol
    - No → Continue albuterol
  - Reassess in 30 - 60 min
  - **AAIRS decrease ≥ 2?**
    - No → Consider trial off albuterol
    - Yes → Continue albuterol
  - **4 hrs since first tx?**
    - No → Continue albuterol
    - Yes → Disposition asap continue tx as appropriate
  - Reassess in 30 - 60 min
  - **AAIRS <12?**
    - Yes → Disposition asap continue tx as appropriate
    - No → PICU admit if AAIRS 12 -16 or Albuterol < q2hr Consider other adjuncts while waiting for bed
- AAIRS 12-16 Severe
  - Albuterol Neb 10mg/hr AND atrovent
  - Reassess, score AAIRS in 15 min
  - Move to moderate path at any time per AAIRS
  - **AAIRS decrease ≥ 2?**
    - Yes → Continue albuterol
    - No → Continue albuterol + consider adjuncts
  - Reassess in 30 - 60 min
  - **AAIRS decrease ≥ 2?**
    - Yes → Continue albuterol
    - No → Continue albuterol + consider adjuncts
  - Reassess in 30 - 60 min
  - **AAIRS <12?**
    - No → PICU admit if AAIRS 12 -16 or Albuterol < q2hr Consider other adjuncts while waiting for bed

Goal: Disposition Decision within 4 hours

AAIRS Scoring for Asthma
Pediatric Acute Care Guideline

Review current therapies
- Ensure Decadron has been administered
- Initiate inhaled corticosteroids OR continue home inhaled corticosteroid
- Initiate Asthma Action Plan
- Asthma Education Plan

Assess/reassess patient on arrival to floor and obtain score*

*If not due for treatment w/in 2hrs, re-score at 2hrs and treat appropriately

- AAIRS 1-6 Mild
  - Albuterol MDI 4 puffs every 4 hours; Rescore q4hr
  - **AAIRS score of 1-6**
    - No → Albuterol MDI 4 puffs every 3 hours; Rescore q3hr
    - Yes → **AAIRS Score of 1-6 AND no 02 requirements**
      - No → Albuterol MDI 4 puffs every 3 hours; Rescore q3hr
      - Yes → Consider preparing for discharge (See reverse)
- AAIRS 7-11 Moderate
  - Albuterol MDI 4 puffs every 2 hours; Rescore q2hr
  - **AAIRS score of 1-6**
    - No → Albuterol MDI 4 puffs every 3 hours; Rescore q3hr
    - Yes → **AAIRS Score of 1-6 AND no 02 requirements**
      - No → Albuterol MDI 4 puffs every 3 hours; Rescore q3hr
      - Yes → Consider preparing for discharge (See reverse)
- AAIRS 12-16 Severe
  - Initiate albuterol, notify house officer, and consider rapid response
  - **Pt. required transfer to Critical Care?**
    - No → **AAIRS score of 1-6**
    - Yes → **AAIRS Score of 1-6 AND no 02 requirements**
  - **AAIRS score of 1-6 AND no O2 requirement?**
    - No → **AAIRS <12?**
      - Yes → Albuterol MDI 4 puffs every 3 hours; Rescore q3hr
      - No → Consider preparing for discharge (See reverse)
    - Yes → De-escalate to mild pathway

- Dexamethasone 0.6mg/kg (max 16 mg) at discharge if at least 12 hours from initial dose or at 48 hours, whichever comes first

OR

- Patients who spend *any* time in the ICU should complete a 5-7 day prednisolone/prednisone burst upon discharge instead of decadron

The house officer must be notified, by voice, anytime therapy is escalated

AAIRS Scoring for Asthma
Pediatric ICU Guideline

Review current therapies
- Albuterol, Decadron
- Initiate inhaled corticosteroids OR continue home inhaled corticosteroid
- IV Methylprednisolone
- Adjunctive therapies
- Initiate Asthma Action Plan
- Asthma Education Plan

Perform baseline assessment with AAIRS on arrival

Reassess AAIRS score in 30-60 minutes (continue existing therapies)

Off adjunctive therapies? Albuterol spaced q2h?
- Yes → Consider transfer to ward and initiate asthma acute care protocol
- No
  - AAIRS <7 or <12 with decrease by 2pts or more since last evaluation → Decrease a single therapy, in the following order:
    - Adjunctive
    - Continuous albuterol or albuterol spacing
  - AAIRS 7-11 and score decreased less than 2pts since last evaluation → No change in therapy ∞ If no change for 4 hours, contact provider for decrease in a single therapy
  - AAIRS ≥ 12 OR Increase by 2 or more since last evaluation → Increase a single therapy in the following order:
    - Albuterol spacing or continuous therapy
    - Adjunctive therapy

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