

Aim: To standardize ED management for children ≥ 2 yrs age with acute asthma exacerbation.

DISCHARGE CRITERIA:

See page 3 for discharge criteria.

RN perform initial assessment:

- VS (including pulse-ox)
- Assess work of breathing and air entry through lung auscultation
- Assess perfusion/hydration
- Perform **PRAM Score** (See page 3)

EXCLUSION GUIDELINES

Patients **excluded** from this guideline:

- Chronic lung disease (CF, bronchiectasis, PCD, immune def, IPHSS disease)
- Acute or chronic airway disorder (malacia, stenosis, croup, bronchiolitis)
- Acute pneumonia (aspiration, infectious)
- Cardiac or neurologic disorder

PRAM 0–3
Mild

MD 60 min

- Intermittent pulse oximetry
- Maintain O₂ sat > 90%
- Albuterol 8 puffs MDI (or 5 mg neb)
- Ipratropium not indicated for mild cases
- Systemic steroids (for any PRAM ≥ 1); (prefer dexamethasone)
- CXR not routinely recommended
- **Repeat PRAM after intervention; if worse, move to Moderate path.**
- Plan for discharge if PRAM remains ≤ 3

Duoneb:

Albuterol 2.5 mg neb +
Ipratropium 0.5 mg for ≥ 2 yrs,
0.25 mg if < 2 yrs

PRAM 4–7
Moderate

MD 60 min

- Continuous pulse oximetry
- Maintain O₂ sat > 90%
- Albuterol and ipratropium via 2–3 duonebs
- Systemic steroids (prefer dexamethasone)
- CXR not routinely recommended
- **Repeat PRAM after intervention; if worse, move to Severe path.**

- Consider admit 2 hrs post-steroid, for PRAM ≥ 4
- Plan for discharge if PRAM ≤ 3
- Albuterol 8 puffs MDI (or 5 mg neb) Q2 hour until transferred to floor

PRAM 8–9
Severe

MD 60 min

- Continuous pulse oximetry, CR monitor
- O₂ to keep sats > 90%
- Duonebs x 3 (albuterol and ipratropium)*
 - Provider reassess within 10 mins of 3rd duoneb. If still PRAM 8+ (severe), order continuous albuterol. Continue giving additional albuterol Q15 min until continuous albuterol initiated.
- High flow nasal cannula if needed to support work of breathing.
- Systemic steroids
- Strongly consider magnesium sulfate IV 50 mg/kg x 1 (max 2 grams) if age ≥ 2 yo
 - If giving magnesium, place PIV and consider giving 20 mL/kg NS bolus
- Consider budesonide 1 mg neb
- CXR not routinely recommended
- **Repeat PRAM after intervention. If worse, move to respiratory failure.**

***Patient improved?**

- No**
 - Initiate continuous albuterol
 - Additional albuterol nebs/MDI Q15–30 min until continuous albuterol arrives
 - Admit patient to med-surg unless concern for high O₂ support, high work of breathing or mental status changes necessitating PICU
- Yes**
 - Admit to med-surg
 - Albuterol 8 puffs MDI Q2 hrs

PRAM 10–12
Respiratory failure

RESUS ROOM

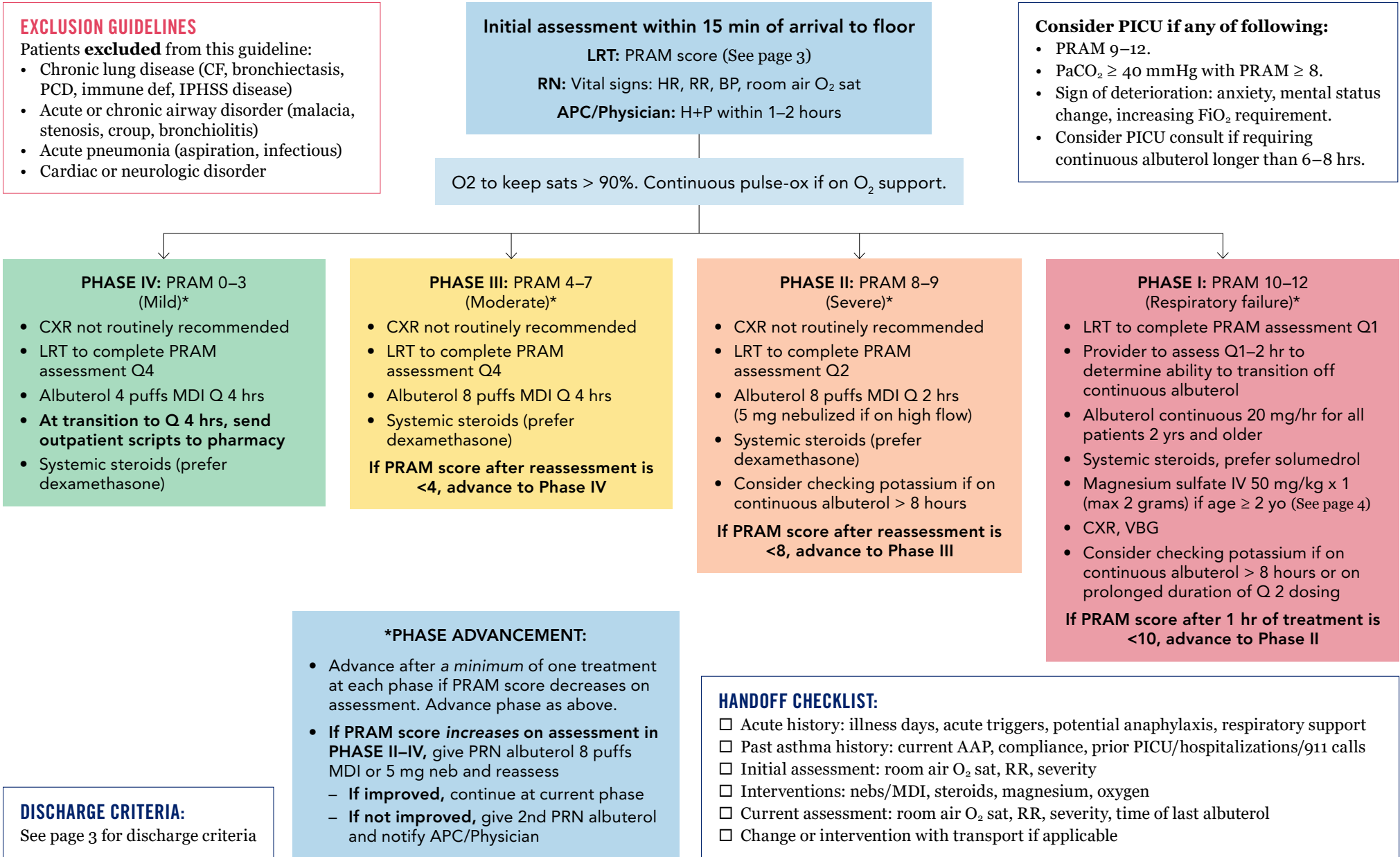
MD STAT

- CR monitor, HOB elevated, continuous pulse oximetry
- O₂ to keep sats > 90%
- Order albuterol continuous 20 mg/hr, provide duonebs x 3 while waiting for continuous albuterol
 - Order additional albuterol nebs q15 min if delay between completion of duonebs and initiation of continuous albuterol.
- High flow nasal cannula minimum 6 L 40% to deliver continuous albuterol
- Systemic steroids
- Place PIV, NS 20 mL/kg bolus
- Recommend magnesium sulfate IV 50 mg/kg x 1 (max 2 grams) if age ≥ 2 yo
- Consider budesonide 1 mg neb

Patient improved?

- No**
 - CXR and VBG
 - Admit to PICU
 - Consider intubation (See page 3)
- Yes**
 - Admit patient to med-surg unless concern for high O₂ support, high work of breathing or mental status changes necessitating PICU
 - CXR and VBG if PRAM 11–12

Aim: To standardize inpatient management for children ≥ 2 yrs age with acute asthma exacerbation.



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PRAM Scoring Table			
O ₂ Saturation	≥ 95%	0	
	92–94%	1	
	< 92%	2	
Suprasternal retractions	Absent	0	
	Present	2	
Scalene muscle retractions	Absent	0	
	Present	2	
Air Entry	Normal	0	
	↓ at bases	1	
	↓ at apex and bases	2	
	Minimal or absent	3	
Wheezing	Absent with good air movement	0	
	Expiratory Only	1	
	Biphasic	2	
	Audible without a stethoscope or silent chest	3	
PRAM Score (Max. 12)			
Severity	Mild	Moderate	Severe/ Resp failure
Score	0–3	4–7	8–12

DISCHARGE CRITERIA:

- Discharge only from Phase IV (inpatient), observe for minimum of two hours after initial treatment in Phase IV
- Room air sat ≥ 90%, PRAM ≤ 3
- Education: triggers, mask/inhaler/space
- Asthma action plan (AAP) provided
- Medications reviewed
- Adequate PO intake
- Family support in place
- Follow-up in place: Primary clinic appointment in 1–2 days. Subspecialty clinic if appropriate, consider home assessment, school support

PRE-INTUBATION CHECKLIST:

- | | |
|--|---|
| <input type="checkbox"/> Review meds, allergies, last meal | <input type="checkbox"/> Nasal cannula for high-flow in RSI |
| <input type="checkbox"/> Prior intubation history | <input type="checkbox"/> Positioning: ear-sternal notch |
| <input type="checkbox"/> Head of bed elevated | <input type="checkbox"/> Capnography, back-up plan |
| <input type="checkbox"/> Equipment checklist | <input type="checkbox"/> Assured IV access, 20 mL/kg NS bolus |
| <input type="checkbox"/> Bag/mask O ₂ /flow/suction | |

INTUBATION CHECKLIST:

- | | |
|--|--|
| <input type="checkbox"/> Rapid sequence intubation | <input type="checkbox"/> NG/OG, record ETT number at lip |
| <input type="checkbox"/> Ketamine 2 mg/kg IV | <input type="checkbox"/> 100% oxygen, low rate, long expiratory time |
| <input type="checkbox"/> Rocuronium 1 mg/kg IV | <input type="checkbox"/> CXR before transfer |
| <input type="checkbox"/> RSI, inflate cuff ETT, ongoing sedation | |

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REFER HIGH-RISK ASTHMA TO PULMONARY

Definition: 1 major + 2 minor **or** 3 minor criteria

Major criteria:

- Oral corticosteroids $\geq 25\%$ /yr
- High dose inhaled corticosteroid
- Any life-threatening asthma event
- ICU admit within 5 year

Minor criteria:

- Daily inhaled corticosteroid (ICS) + 2nd controller
- ≥ 3 steroid bursts/yr
- $FEV_1 \leq 50\%$ predicted, anytime
- Persistent $FEV_1 \leq 80\%$ predicted
- 2 ED visits or hospitalization in last year
- Daily smoke exposure
- Daily environmental exposures
- Socioeconomic factors impacting disease
- Poor attitude/belief regarding meds
- Low or high perceiver of symptoms
- Kenalog injection(s) required
- History of anaphylaxis
- Co-morbid conditions
 - Sinus disease
 - Severe atopy
 - Obesity
 - Sick cell disease
 - Chronic lung disease

Workgroup: Asthma Committee, Januschka, Damas, Schultz, Raschka, Allen, Fontenot, Cavanaugh, Sicoli, Schwartz, Ryan, Deisz, Blackwell, O'Neill, Juarez-Sweeney

REFERENCES:

Other guidelines reviewed:

- UCSF, Stanford, Seattle, Sutter Health, GINA 2021 Guidelines
- Seattle Children's Hospital, Atkins R, Ken L, Beardsley E, Drummond K, Foti J, Klee K, Mitgita R. 2015 July. Asthma Pathway. Available from seattlechildrens.org/pdf/asthma-pathway.pdf

MEDICATION DOSING

Albuterol

All patients need a spacer with MDI. Many children, particularly those <5 yrs will also need a mask.

- 8 puffs by MDI for all patients (preferred route)
- 5 mg nebulized for all patients (use neb ONLY if patient intubated, tracheostomy, high flow nasal cannula or other indications)
- * **Discharge Albuterol dosing:** 4 puffs by MDI for all patients
- Jitteriness, tachycardia, nausea and vomiting are common side effects of albuterol.

Duoneb: Albuterol 2.5 mg + 0.5 mg ipratropium (0.25 mg if < 2 yrs)

Ipratropium (ED only, with albuterol treatment, not recommended after admission)
1.5 mg for 2 yrs and older, 0.75 mg for < 2 yrs (total dosing to be achieved by series of 3 duonebs)

Budesonide (ED only)

1 mg nebulized

Magnesium Sulfate

- 50 mg/kg IV (maximum dose 2 g) with 20 mL/kg NS bolus for patients ≥ 2 yo
- Mag sulfate may be redosed at the same dose every 6 hours. If patient needs multiple doses should consider PICU.
- Key side effects include vasodilation and hypotension due to smooth muscle relaxation. Patients should have HR and BP closely monitored during infusion and for 60 minutes after infusion. Flushing of skin may occur.
- Strongly consider a fluid bolus of 10–20 mL/kg NS if giving magnesium sulfate, given risk of hypotension. Use caution if any concern for fluid overload.

Systemic steroids*

- Dexamethasone (preferred steroid)
0.6 mg/kg PO or IM (max dose 12 mg) x 2 doses 24–48 hours apart
- Prednisolone/Prednisone
2 mg/kg PO per day x 5 days (max daily dose 60 mg)
- Methylprednisolone
1 mg/kg IV Q 6 hrs while NPO (max dose 80 mg)

Inhaled Corticosteroids

Not recommended inpatient when patients are receiving systemic steroids.

* Dexamethasone and Prednisone had similar efficacy in a comparative effectiveness study in U.S. children's hospitals (Parikh et. al 2015)