


Clinical Guideline

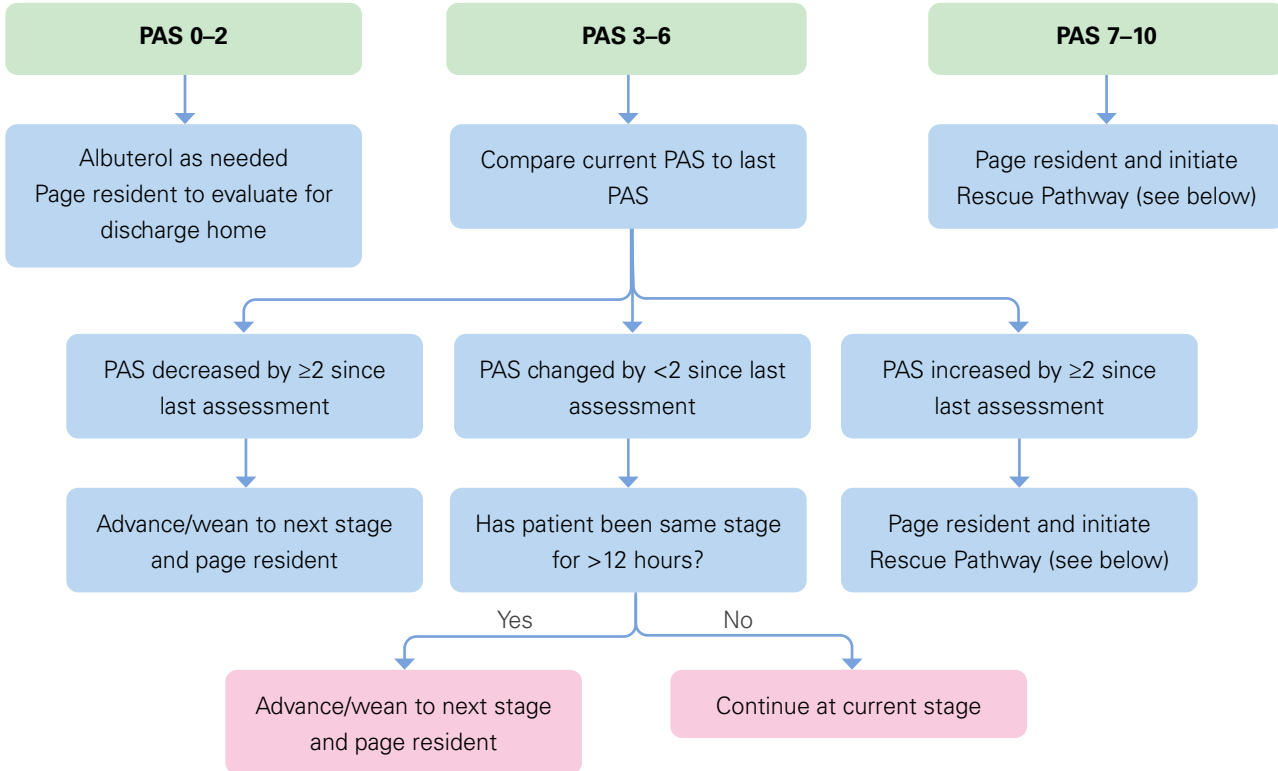
 This guideline should not replace clinical judgment.

Asthma

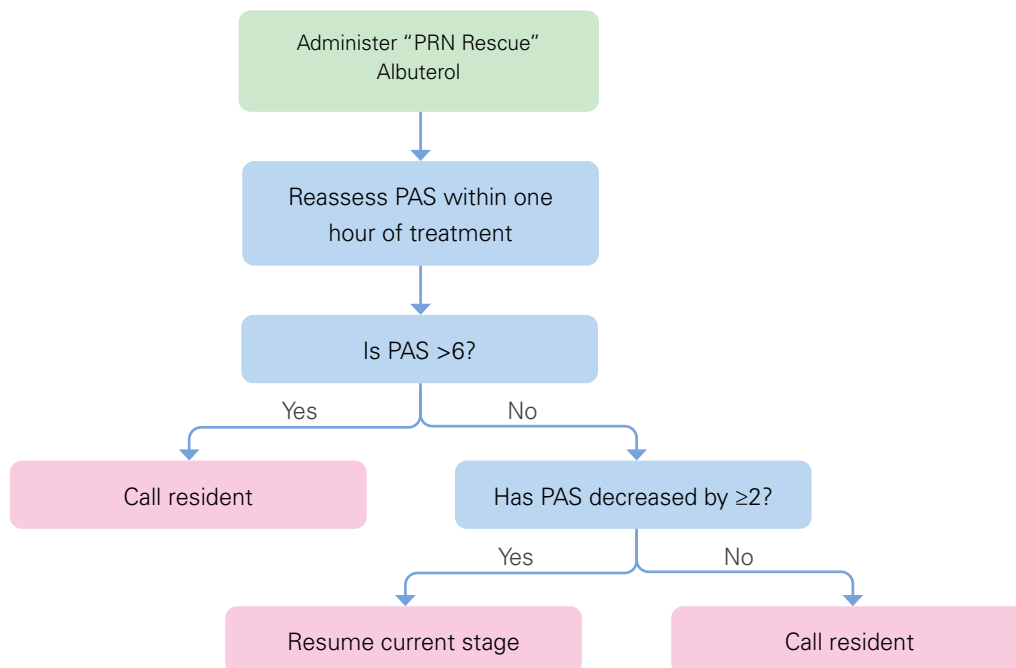
**Some children with severe chronic airway inflammation may have persistent wheezing and hypoxia without signs of respiratory distress after bronchospasm has resolved. If this is suspected, the appropriate treatment should be discussed with the pulmonary consultant.*

Pediatric Acute Care

PAS Assessment Pathway: How a patient progresses toward discharge




Rescue Pathway



*Call RRT as needed

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Asthma

Pediatric Acute Care

Standard medications (for all patients)

- Albuterol MDI 6 puffs regardless of weight and age.
- MDI delivery should incorporate a valved holding chamber with either a mouthpiece or facemask, dependent upon patient's ability to coordinate placement and inhalation, under age 4 years use mask, over age 4 years can try mouthpiece. The mouthpiece on valved holding chamber roughly doubles airway deposition compared to mask.
- Use nebulized albuterol only if patient is unable to perform/tolerate MDI delivery
- Continue patient's prescribed inhaled corticosteroids.

Initiate supplemental oxygen if SpO₂<90%

Inclusion criteria

- Children age 2–18 years
- Known history of asthma
- History consistent with asthma, use of albuterol, symptoms of reversible airway obstruction

Exclusion criteria

- Age <2 or >18 years
- Other pulmonary diseases including: CLD, CF, bronchiolitis, croup, stridor, aspiration, pneumonia, BPD,
- Airway issues including: vocal cord paralysis, tracheostomy, tracheomalacia
- Congenital heart disease
- Neurologic diseases including: cerebral palsy, ventilator dependence
- Sickle cell anemia
- ICU status

*Patients with the exclusion health conditions are not excluded from asthma exacerbation treatment

Notify provider

- For all stage transitions based on respiratory assessment
- Signs of clinical deterioration (PEWS increasing, PAS of 7 or higher, silent chest exam, drowsiness, confusion, agitation) consider calling an RRT

Asthma education to begin at admission and include:

- Pulmonary consultant and UCAN involvement
- Parental knowledge assessment and education on etiology, prognosis, risk factors of exacerbation
- Focus on modifiable environmental exposures: smoking cessation, avoidance of known triggers (if patient has a positive smoking screen family to receive educational handout and cessation counseling)
- Medication compliance
- Demonstration of proper MDI usage
- Asthma action plan reviewed (completed asthma action plans are available in UCAN folder outside education office.)

Asthma

Pediatric Acute Care

Discharge criteria

- Patient is well appearing and has a low PAS score (0-2).
- PO adequate to maintain hydration
- Patient has been off supplemental oxygen for >12 hours
- Flu and COVID vaccine offered (if not given previously)
- Recommendations for controller medication(s) made and discussed with family if indicated
- Prescriptions complete and in hand or ecribed
- Asthma education complete, asthma discharge folder provided to parent (Folder to be provided and reviewed with parent/patient by UCAN nurse or provider. If UCAN provider is not available, folder to be reviewed with parent/patient by Pediatric Hospital Medicine provider. Extra folders are in UCAN folder outside education office.)
- Plan communicated with pediatrician and follow up arranged
- Follow up scheduled with pulmonology unless not indicated

Discharge plan

- Pediatrician follow up within 3 days from discharge

- Prednisolone/prednisone 1mg/kg/day (round up), max dose 60mg/day. Total length of administration, on average, should be 5 days but may be 3–10 days, depending on the perceived degree of airway inflammation as judged by history and clinical inpatient course. Pulmonology consult should be helpful in making this determination. Preferred administration time is afternoon/evening, however a time of day that family would remember to administer daily is most important.
- Albuterol MDI 6 puffs q4–6 hours PRN for cough or wheezing.
- Discharge instructions to include: If significant wheezing develops, administer 6 puffs every 4–6 hours. If your child needs more frequent albuterol treatments, call pediatrician or UCAN program or return to the emergency department.
- If discharge team considers parent or child to be a poor perceiver of asthma symptoms, albuterol may be prescribed every 4–6 hours for the first 24–48 hours post discharge with pediatrician follow up at that time.

Phase 1

Initial assessment using Modified Pediatric Asthma Score (PAS)

- Does patient meet inclusion criteria
- Is patient followed by Pulmonology and have they been contacted in the ED

Table 1: (Modified) Pediatric Asthma Score

Variable	Score		
	0 points	1 point	2 points
Resp Rate (b/min) 2–3 years 4–5 years 6–12 years >12 years	<35 <31 <27 <24	35–39 31–35 27–30 24–27	>39 >35 >30 >27
Dyspnea	Full sentences and good PO intake	Poor sentences or poor PO	Single words or unable to PO
Retractions*	1 or less accessory group	2 accessory groups	3 or more accessory groups
Auscultation	Normal breath sounds	Expiratory wheezing only	Inspiratory and expiratory wheezing or diminished breath sounds
Oxygen Sats (%) On Room Air	>95	90–95	<90

*Accessory muscle groups considered in evaluation of retractions:

1. Nasal (flaring), 2. Supra-sternal (retractions), 3. Intercostals (retractions), 4) Substernal (retractions)

Instructions for assessment of PAS

1. If applicable, turn oxygen therapy off on entry into patient's room.
2. Step-wise assesment (RR, Dyspnea, Retractions, Auscultation).
3. Throughout assessment, monitor oxygen saturation. Determine score for oxygen saturation based on overall assessment throughout exam (i.e. an unsustained downward drift to 88% with self-resolution to 94% would be scored as "1." Alternatively, a progressive decline in saturations from 97% to 85% following cessation of O₂ should be scored as "2" and oxygen therapy should be resumed immediately.)
4. Calculate total score.

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Phase 2

Provider uses total score from PAS to determine appropriate intensity of service and bronchodilator stage

Table 2: Initial Assessment of Service and State

Score	Intensity of Service	Brochodilator Stage
7–10	Intensive Care Unit	Stage 1
3–6	Inpatient Floor	Stage 2
0–2	23-hour observation or discharge home from pediatric Emergency Department	Stage 3

Phase 3

Determine albuterol frequency and PAS assessment frequency as per Bronchodilator stage

- Follow titrating protocol
- Begin asthma education

Table 3: Description of Bronchodilator Stages

Stage/PAS Score	Bronchodilator	Frequency of PAS assessments	Other
Stage 1 / 7–10	Albuterol Neb Cont	Every hour	See PICU pathway for Status Asthmaticus
Stage 2 / 3–6	Albuterol MDI q2 hrs	Every 2 hrs	Asthma ed
Stage 3 / 0–2	Wean albuterol MDI, administer as needed	Every 4 hrs	-Asthma ed -Fill Rx -Evaluate for d/c

**A rapidly improving patient can quickly move through bronchodilator stages and pathway, PAS score and frequent reassessments can help to determine treatment and discharge home.*

Phase 4

Nurse and/or RT performs PAS at interval depicted based on stage, see table above

- Nurse and/or RT uses total score from PAS to determine next course of action

(PAS Assessment Pathway Algorithm on page 1)

Phase 5

Assess the patient for discharge status

(Discharge criteria on page 3)

Pediatric Acute Care Asthma Guideline

Executive Summary

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References:

Guidelines Reviewed:

Children's Hospital Colorado. (2019, April). Clinical Pathway-Asthma Exacerbation Management. childrenscolorado.org/49e72a/globalassets/healthcare-professionals/clinical-pathways/asthma-exacerbation-management.pdf

Children's Hospital of Montefiore. Clinical Asthma Pathway (ED and Inpatient). [Cham.org/for-health-professional/clinical-pathways](https://cham.org/for-health-professional/clinical-pathways)

Children's of Omaha, Children's Hospital and Medical Center. (2020, January). Asthma Pathway. [Childrensomaha.org/ap-content/uploads/2020/01/AsthmaPathway-1.23.2020.pdf](https://childrensomaha.org/ap-content/uploads/2020/01/AsthmaPathway-1.23.2020.pdf)

Children's Hospital of Philadelphia. (2022, June). Inpatient Clinical Pathway for children with Acute Asthma Exacerbation. [Chop.edu/clinical-pathway/asthma-inpatient-care-clinical-pathway](https://chop.edu/clinical-pathway/asthma-inpatient-care-clinical-pathway)

Connecticut Children's Medical Center. (2022, February). Clinical Pathway: Inpatient Asthma. [Connecticutchildrens.org/wp-content/uploads/2022/02/Inpatient-2.14.22.pdf](https://connecticutchildrens.org/wp-content/uploads/2022/02/Inpatient-2.14.22.pdf)

Dell Children's Medical Center. (2019, March). Asthma Pathway Guidelines. [Dellchildrens.net/wp-content/uploads/sites/60/2019/08/asthma-guidelines-4-22-20.pdf](https://dellchildrens.net/wp-content/uploads/sites/60/2019/08/asthma-guidelines-4-22-20.pdf)

Seattle Children's Hospital. (2019, October). CSW Asthma Pathway. [Seattlechildrens.org/pdf/asthma-pathway.pdf](https://seattlechildrens.org/pdf/asthma-pathway.pdf)

Texas Children's Hospital. (2017, January). Texas Children's Hospital Evidence-Based Outcomes Center Asthma/Recurrent Wheezing Clinical Guideline. [Texaschildrens.org/sites/default/files/uploads/documents/outcomes/standards/acuteasthma-042117.pdf](https://texaschildrens.org/sites/default/files/uploads/documents/outcomes/standards/acuteasthma-042117.pdf)

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- Beam, W. R., Weiner, D. E., & Martin, R. J. (1992). Timing of prednisone and alterations of airways inflammation in nocturnal asthma. *American Review of Respiratory Disease*, 146(6), 1524–1530. <https://doi.org/10.1164/ajrccm/146.6.1524>
- Castro-Rodriguez, J. A., & Rodrigo, G. J. (2004). B-Agonists through metered-dose inhaler with valved holding chambers versus nebulizer for acute exacerbation of wheezing or asthma in children under 5 years of age: A systematic review with meta-analysis. *The Journal of pediatrics*, 172-177. <https://doi.org/10.1016/j.jpeds.2004.04.007>
- Chandra, A., Shim, C., Cohen, H. W., Chung, V., Maggiore, D., Mani, K., & Dhuper, S. (2005). Regular vs ad-lib albuterol for patients hospitalized with Acute Asthma. *Chest*, 128(3), 1115–1120. <https://doi.org/10.1378/chest.128.3.1115>
- Global Initiative for Asthma. Global strategy for asthma management and prevention. [Ginaasthma.org](https://ginasthma.org).
<https://ginasthma.org/gia-reports>
- Krakowiak, K., & Durrington, H. J. (2018). The role of the body clock in asthma and COPD: Implication for treatment. *Pulmonary Therapy*, 4(1), 29–43. <https://doi.org/10.1007/s41030-018-0058-6>
- Lo, H.-ying, Messer, A., Loveless, J., Sampayo, E., Moore, R. H., Camp, E. A., Macias, C. G., & Quinonez, R. (2018). Discharging asthma patients on 3-hour β -agonist treatments: A quality improvement project. *Hospital Pediatrics*, 8(12), 733–739. <https://doi.org/10.1542/hpeds.2018-0072>
- Muchão, F. P., Souza, J. M., Torres, H. C., De Lalibera, I. B., de Souza, A. V., Rodrigues, J. C., Schvartsman, C., & da Silva Filho, L. V. (2016). Albuterol via metered-dose inhaler in children: Lower doses are effective, and higher doses are safe. *Pediatric Pulmonology*, 51(11), 1122–1130. <https://doi.org/10.1002/ppul.23469>

Citation

Title: **Pediatric Acute Care Asthma Guideline**

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Retrieval website: <http://www.chrichmond.org/clinicalguideline-AcuteCarePediatricAsthma>

Example:

Children's Hospital of Richmond at VCU, Spinella A, Schechter M, Rubin B, Tseng A, Silverman J, DerBoghossian K, Gay-Overstreet A. Pediatric Acute Care Asthma Guideline. Available from: <http://www.chrichmond.org/clinicalguideline-AcuteCarePediatricAsthma>