

INCLUSION CRITERIA

Children ≥ 2 years old with a history of asthma or wheezing necessitating albuterol use who present with symptoms of asthma exacerbation or wheezing

EXCLUSION CRITERIA

- Anaphylaxis
- Pneumonia
- Cardiac disease requiring chronic medications
- Cystic fibrosis
- Immunodeficiency
- Suppurative lung disease
- Tracheostomy
- Sickle cell disease
- Medically complex
- Impending respiratory failure

MEASURES

- Respiratory score utilization
- Time from arrival to steroid administration
- Time from arrival to albuterol administration
- LOS

ALBUTEROL ADMINISTRATION

- MDI with spacer preferred for intermittent dosing

DIFFERENTIAL DIAGNOSES

- Foreign body aspiration
- Pneumonia
- Croup
- Heart failure
- Anaphylaxis

NOT ROUTINELY RECOMMENDED

- CXR unless significant hypoxia, focal abnormality, prolonged course of illness, or persistent severe distress
- Antibiotics

DISCHARGE CRITERIA

- Pulse ox $\geq 90\%$
- Tolerating oral intake

INITIAL ASSESSMENT

- Perform physical examination to assess exacerbation severity, complicating factors, and differential diagnoses of acute breathlessness
- Obtain spot check pulse ox.
- Provide oxygen/respiratory support PRN to achieve oxygen saturation of $\geq 90\%$
- Obtain brief history including current reliever and maintenance medications

Determine Respiratory Score

Respiratory Score 2-8 Initial Treatment

- Give albuterol nebulized once every 15 minutes up to 3 doses with reassessment between doses
- Give dexamethasone PO

Respiratory Score ≥ 9 Initial Treatment

- Give ipratropium with albuterol nebulized every 15 min. for 3 doses
- Give dexamethasone PO
- Provide oxygen PRN to achieve oxygen saturation of $\geq 90\%$
- Call 911 to transfer to ED

Reassess and rescore

Respiratory Score 1-4

Discharge Medication

- Prescribe a second dose of dexamethasone to take in 48 hours
- Albuterol¹ Q4 hrs. while awake until primary care follow up in 48 hrs.

Respiratory Score 5-8

Transfer to ED

- Contact Kid Admit to give report

Discharge Patient

- Discharge when criteria are met
- Provide related educational resources
- PCP follow up within 2 days

Respiratory Score				
Variable	0 Points	1 Point	2 Points	3 Points
Respiratory Rate				
2-3 yo		≤ 34	35-39	> 40
4-5 yo		≤ 30	31-35	> 36
6-12 yo		≤ 26	27-30	> 31
> 12 yo		≤ 23	24-27	> 28
Retractions				
	None	Mild retractions: subcostal or intercostal	Moderate retractions in 2 of the following: subcostal, intercostal, substernal OR nasal flaring	Severe retractions in 3 of the following: subcostal, intercostal, substernal, supraclavicular, OR nasal flaring/ head bobbing
Dyspnea * Automatic score of 1 for enteric feeding device or NPO				
2-4 yo (or >4 yo and nonverbal at baseline)	Normal feeding, vocalizations and play	1 of the following: decreased appetite, increased coughing after play, hyperactivity	2 of the following: decreased appetite, increased coughing after play, hyperactivity	Stops eating or drinking, stops playing, OR drowsy and confused
> 4 yo	Counts to ≥ 10 in one breath	Counts to 7-9 in one breath	Counts to 4-6 in one breath	Counts to ≤ 3 in one breath
Auscultation				
	No wheezing and/or clear breath sounds	End-expiratory wheeze only	Expiratory wheeze only (greater than end- expiratory wheeze)	Inspiratory/ expiratory wheeze OR diminished breath sounds OR both

ED/Urgent Care Albuterol Acute Treatment			
Weight	Dose		
	Albuterol MDI	Albuterol Nebulized	Albuterol Continuous
< 10 kg	4 inhalations	2.5 mg	5 mg/hr.
10-20 kg	6 inhalations	5 mg	10 mg/hr.
> 20 kg	8 inhalations		15 mg/hr.

Albuterol Discharge (Low Dose)		
Weight	Dose	
	Albuterol MDI	Albuterol Nebulized
< 10 kg	2 inhalations	2.5 mg
10-20 kg	4 inhalations	
> 20 kg		

Clinical Pathway Abbreviations

Abbreviation	Definition
ACT	Asthma Control Test
CBC with diff	Complete Blood Count with Differential
CXR	Chest-Xray
FEV1	Forced Expiratory Volume in 1 second
GERD	Gastroesophageal Reflux Disease
ICS	Inhaled Corticosteroid
IgE	Immunoglobulin E
LABA	Long-Acting Beta-Agonist
LAMA	Long-Acting Muscarinic Antagonist
LTRA	Leukotriene Receptor Antagonist
OCS	Oral Corticosteroid
PRN	As Needed
RAST	Radioallergosorbent Test
SABA	Short-Acting Beta-Agonist
SMART	Single Maintenance And Reliever Therapy

Disclaimer: The clinical pathways are based upon publicly available medical evidence and/or a consensus of medical practitioners at Nemours Children's Health ("Nemours") and are current at the time of publication. These clinical pathways are intended to be a guide for practitioners and may need to be adapted for each specific patient based on the practitioner's professional judgment, consideration of any unique circumstances, the needs of each patient and their family, and/or the availability of various resources at the health care institution where the patient is located.

VERSION MANAGEMENT

- Version 1.0 (3/31/2025): Go Live.

Questions about this pathway should be directed to **clinicalpathways@nemours.org**.

AUTHORS & REFERENCES

Central Florida Authors: Syed Ali (Hospital Medicine), Heather Ammirata (Clinical Pathways), David Conomon (Respiratory), Cara Harwell (Clinical Pathways, Emergency Medicine), Alex Lopilato (Pharmacy), Amit Patel (Emergency Medicine), Andre Rebaza (Pulmonology), Robert Smith (Critical Care)

Delaware Valley Authors: Danielle Burns (Pharmacy), Katlyn Burr (Respiratory), Christina Conrad (Respiratory), Leah Graham (Respiratory), Ryan Holton (Hospital Medicine), Swati Jain (Pharmacy), Courtney Nelson (Emergency Medicine), Odiraa Nwankwor (Critical Care), Vandna Passi (Pulmonology), Arianna Phillips (Clinical Pathways), Michael Reedy (Pharmacy), Marina Watson (Respiratory), Arezoo Zomorodi (Emergency Medicine)

- Besbes-Ouanes L, Nouria S, Elatrous S, Knani J, Boussarsar M, Abroug F. Continuous versus intermittent nebulization of salbutamol in acute severe asthma: a randomized, controlled trial. *Ann Emerg Med*. 2000;36(3):198-203. doi:10.1067/mem.2000.109169
- Cheuk DK, Chau TC, Lee SL. A meta-analysis on intravenous magnesium sulphate for treating acute asthma. *Arch Dis Child*. 2005;90(1):74-77. doi:10.1136/ad.2004.050005
- Global Initiative for Asthma. Global Strategy for Asthma Management and Prevention. Updated May 2023. Accessed March 5, 2024. https://ginasthma.org/wp-content/uploads/2023/05/GINA-Main-report-2023_tracked-v-2022_202305_03-WMSA.pdf.
- Griffiths B, Ducharme FM. Combined inhaled anticholinergics and short-acting beta2-agonists for initial treatment of acute asthma in children. *Cochrane Database Syst Rev*. 2013;(8):CD000060. Published 2013 Aug 21. doi:10.1002/14651858.CD000060.pub2
- Hardasmani MD, DeBari V, Bithoney WG, Gold N. Levalbuterol versus racemic albuterol in the treatment of acute exacerbation of asthma in children. *Pediatr Emerg Care*. 2005;21(7):415-419. doi:10.1097/01.pec.0000169433.91196.6a
- National Heart, Lung, and Blood Institute. 2020 focused updates to the asthma management guidelines: clinician's guide. Accessed March 5, 2024. https://www.nhlbi.nih.gov/sites/default/files/publications/Asthma%20Clinicians%20Guide%20508_02-03-21.pdf.
- Qureshi F, Zaritsky A, Welch C, Meadows T, Burke BL. Clinical efficacy of racemic albuterol versus levalbuterol for the treatment of acute pediatric asthma. *Ann Emerg Med*. 2005;46(1):29-36. doi:10.1016/j.annemergmed.2005.02.001
- Rank MA, Hagan JB, Park MA, et al. The risk of asthma exacerbation after stopping low-dose inhaled corticosteroids: a systematic review and meta-analysis of randomized controlled trials. *J Allergy Clin Immunol*. 2013;131(3):724-729. doi:10.1016/j.jaci.2012.11.038
- Rowe BH, Bretzlaff JA, Bourdon C, Bota GW, Camargo CA Jr. Intravenous magnesium sulfate treatment for acute asthma in the emergency department: a systematic review of the literature. *Ann Emerg Med*. 2000;36(3):181-190. doi:10.1067/mem.2000.105659