

Children's Hospital and Health System, Inc.
Patient Care Evidence Based Guideline
CW Urgent Care

SUBJECT: Bronchiolitis

Purpose: To evaluate and initiate treatment of bronchiolitis.

Definition: Bronchiolitis is a viral illness of the lower airways that presents in children less than two years old without a history of previous wheezing. It usually begins with 2-3 days of typical upper respiratory infection symptoms such as nasal congestion or discharge and mild cough, followed by symptoms of fever, increased cough, increased respiratory effort, mild wheezing or crackles and mild hypoxia. Symptoms peak at 5-7 days and may last up to 3 weeks, especially the cough. Treatment is mainly supportive. Certain patients are at high risk of respiratory failure or apnea, so recognizing risk factors and signs or symptoms of severe disease is critical. Possible complications and comorbidities of bronchiolitis include: otitis media (up to 50%), bacteremia (< 1-2%) and pneumonia (1%).

Etiology: Viral infection of the terminal bronchiolar epithelial cells causing direct damage and inflammation; edema, excessive mucous, and sloughed epithelial cells lead to obstruction of the small airways and atelectasis. The most common viral pathogen is RSV followed by rhinovirus.

Inclusions: Infants 1-24 months of age

Exclusions: Children with known recurrent wheezing, immunodeficiency, chronic neonatal lung disease (bronchopulmonary dysplasia), neuromuscular disease, cystic fibrosis, hemodynamically significant congenital heart disease.

Differential Diagnosis

- Recurrent viral-triggered wheezing or asthma
- First episode of reactive airway disease
- Pneumonia, including aspiration pneumonia
- Foreign body aspiration
- Chronic pulmonary disease
- Cardiac conditions such as congenital heart disease, heart failure, vascular ring

Guideline

Subjective Data/History

- Assess oral intake / urine output to determine hydration status
- Risk factors for severe disease:

Supersedes: 12/2015, 12/2018

Approved by UC Clinical Practice Council and Medical Director 7/2022

Next review due 7/2025

UC EVIDENCE BASED GUIDELINE: BRONCHIOLITIS

- Prematurity (< 37 weeks)
- Age less than 12 weeks
- Chronic pulmonary disease (especially BPD)
- Congenital and anatomic defects of the airways
- Congenital heart disease
- Immunodeficiency
- Neurological disease
- Risk factors for apnea or respiratory failure:
 - Age (or corrected age for preemies) < 8 weeks
 - Previous apnea during this illness
 - Respiratory rate at presentation < 30 or > 70 breaths per minute
 - Room air sat < 90% at presentation

Objective Data/Physical Exam

- Vital signs:
 - Fever (typically less than 38.3°C / 101°F) may be present (absent in 50% of patients)
 - Tachypnea
 - Tachycardia (due to fever, dehydration or hypoxia)
 - Hypoxia, may range from mild (90-95%) to more severe
- Nasal congestion, rhinorrhea which may be copious and interfere with feeding and breathing
- Assess work of breathing including respiratory rate, retractions, nasal flaring and grunting
- Assess for degree of aeration, crackles and/or wheezing
- Assess hydration including fontanelle for infants, mucus membranes, presence of tears, activity and circulation
- Assess for complications and comorbidities including otitis media (common) and bacterial pneumonia (rare)

Diagnostic Studies

The diagnosis is based on the history and physical. Routine labs and x-rays are usually not indicated.

- Testing for RSV is not helpful for outpatients as it does not change the management plan.
- Testing for influenza may be helpful in certain situations such as during peak influenza season in a more ill-appearing child with a high fever, exposure to influenza, at high risk for complications of influenza or with family members at high risk for complications of influenza. *See CW Urgent Care Evidence Based Guideline: Influenza for additional details.*
- Testing for SARS-CoV-2 as appropriate per current testing criteria is indicated, as it would alter isolation / quarantine recommendations for patient and contacts.

Supersedes: 12/2015, 12/2018

Approved by UC Clinical Practice Council and Medical Director 7/2022

Next review due 7/2025

UC EVIDENCE BASED GUIDELINE: BRONCHIOLITIS

- Exceptions for x-ray include patients in whom alternative diagnosis is strongly suspected

Treatment

Supportive care is the main focus of treatment. Outpatient management is appropriate if the patient is adequately hydrated, tolerating feeds, has no signs of moderate to severe respiratory distress, pulse ox $\geq 90\%$ and has a reliable caretaker.

Although patients with bronchiolitis often have wheezing and retractions, the etiology of their lower airway obstruction is different than patients with bronchospasm. It is the presence of edema, mucous and cellular debris in the small airways that cause wheezing and retractions, not smooth muscle constriction. It is for this reason that treatments aimed at relaxing airway smooth muscles (ie albuterol) are not effective.

- Recommended treatment:
 - Nasal or NP suction may be beneficial, and should be performed prior to other interventions for temporary relief of nasal congestion or upper airway obstruction.
 - Aids in clearance of upper airway secretions
 - May induce cough which assists in clearance of lower airway secretions
 - Limited data exist to recommend for or against suctioning in the management of acute bronchiolitis, but is widely considered a mainstay of supportive care for patients with feeding problems or increased work of breathing due to excessive secretions
 - Oxygen for pulse ox $< 90\%$ (while awaiting transfer to ER)
 - No need to recheck pulse ox if initial pulse ox $\geq 95\%$ on room air
 - Recheck pulse ox if clinically indicated
 - Only monitor with continuous pulse ox if patient is receiving oxygen therapy
 - Management of fever with antipyretic (fever may further increase work of breathing / respiratory rate / heart rate).
- NOT recommended treatment:
 - Deep suction (NP and nasal aspirators are NOT considered deep suction)
 - Bronchodilators not recommended for bronchiolitis, but may be considered for certain patients such as:
 - Patients in whom presentation is suspicious for first episode of asthma, such as those > 12 months with strong family history of severe atopic disease
 - Personal history of recurrent wheezing, or prior inhaled corticosteroid use
 - Severe symptoms or high risk while anticipating transfer to ER
 - Steroids
 - Antibiotics unless otitis media or other bacterial infection is present
 - Nebulized hypertonic saline or racemic epinephrine
 - Chest physiotherapy

Supersedes: 12/2015, 12/2018

Approved by UC Clinical Practice Council and Medical Director 7/2022

Next review due 7/2025

Transfer to ER

Transfer patients to ER if may deteriorate, are clinically unstable, or if the diagnosis or need for admission is uncertain. Consider direct admit for those patients ill enough to require admission, but stable. Patients fitting these criteria should be sent by ambulance, ALS or BLS as appropriate.

- Signs/symptoms of impending respiratory failure:
 - Significant nasal flaring
 - Significant retractions or accessory muscle use
 - Note: mild subcostal retractions are common in infants with bronchiolitis who have mild disease, and do not require additional diagnostic evaluation if infant is well hydrated, with appropriate pulse oximetry and otherwise reassuring history and exam.
 - Grunting or head bobbing
 - Respiratory rate > 70 or < 30 breaths per minute
 - Cyanosis
 - Any history of apnea
- Hypoxia (pulse ox < 90%)
- High risk patient with moderate symptoms, especially prematurity < 32 weeks gestational age or age < 3 months because of increased risk of progression to severe disease
- Symptoms or signs of dehydration or not tolerating oral fluids, generally <50-75% of normal feeding volumes in otherwise healthy children, use clinical judgment on appropriate feeding status in high risk infants and children
- Infants under 8 weeks old (60 days) with a fever (38.0°C or higher) should be sent for further evaluation. *See CW Urgent Care Evidence-Based Guideline: Febrile Neonate for additional details.*

Education of Patient/Family

- Supportive care
 - Nasal saline and suction at regular intervals, especially prior to feeding
 - Oral fluids
 - Control of fever or discomfort using antipyretics and other supportive measures
- Recognizing signs of respiratory distress, apnea, dehydration
- Manage expectations: discuss usual course (i.e. symptoms may peak at one week and last up to 3 weeks); possible recurrence of cough/wheeze
 - 50% of patients are without symptoms at 13 days
 - 90% of patients are without symptoms at 21 days
- Preventative measures:
 - Hand-washing before and after direct contact
 - Alcohol-based rubs preferred
 - Soap and water when rubs not available

Supersedes: 12/2015, 12/2018

Approved by UC Clinical Practice Council and Medical Director 7/2022

Next review due 7/2025

UC EVIDENCE BASED GUIDELINE: BRONCHIOLITIS

- Prevent patient exposure to tobacco smoke
 - Counsel families on the danger of secondhand smoke exposure

Follow-up

- Recheck in 24 hours if:
 - Moderate symptoms
 - Patient fits high-risk criteria as previously noted
 - High parental anxiety
- Return for NP suctioning may be helpful
- Recheck in 2-3 days for mild symptoms

Amy Romashko, MD
Medical Director, CW Urgent Care

This guideline is designed to serve as a reference for clinical practice and does not represent an exclusive course of treatment nor does it serve as a standard of medical care. Providers should apply their professional judgment to the management of individual patient conditions and circumstances. Children's Hospital and Health System (CHHS) does not make any representation with respect to any sort of industry recognized standard of care for the particular subject matter of this clinical guideline. Additionally, CHHS form documents are subject to change, revision, alteration, and/or revocation without notice.

Supersedes: 12/2015, 12/2018

Approved by UC Clinical Practice Council and Medical Director 7/2022

Next review due 7/2025

References

- Abaya, R., Crescenzo, K., Delgado, E., Dunn, M., Kerrigan, M., ... Zorc, J. (rev 2022). ED pathway for evaluation/treatment of children with bronchiolitis. *The Children's Hospital of Philadelphia*. Retrieved from <https://www.chop.edu/clinical-pathway/bronchiolitis-emergent-evaluation-clinical-pathway>
- Bronchiolitis in children: diagnosis and management. London: National Institute for Health and Care Excellence (NICE); 2021 Aug 9. (NICE Guideline, No. 9.) Available from: <https://www.ncbi.nlm.nih.gov/books/NBK573086/>
- CHOC Children's Bronchiolitis Care Guideline – Outpatient (2016). Retrieved from: <https://www.choc.org/wp/wp-content/uploads/2017/01/BronchiolitisCareGuideline-Outpatient.pdf>
- Children's Mercy Bronchiolitis Algorithm. Retrieved from: <https://www.childrensmercy.org/health-care-providers/evidence-based-practice/clinical-practice-guidelines/bronchiolitis-algorithm/>
- Dawson-Caswell, M., & Muncie, H.L. (2011). Respiratory syncytial virus infection in children. *American Family Physician*, 83(2), 141-146.
- Fernandes, R.M., & Bialy, L.M., Vandermeer, B., Tjosvold, L., Plint, A.C., Patel, H., Johnson, D.W., Klassen, T.P., & Hartling, L. (2013). Glucocorticoids for acute viral bronchiolitis in infants and young children. *The Cochrane Database of Systematic Reviews*. Retrieved from <https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD004878.pub4/epdf/full>
- Florin, T.A., Plint, A.C., & Zorc, J.J. (2017). Viral bronchiolitis. *Lancet*, 389, 211–224.
- Gadomski, A.M., & Scribani, M.B. (2014). Bronchodilators for bronchiolitis. *The Cochrane* Supersedes: 12/2015, 12/2018
- Approved by UC Clinical Practice Council and Medical Director 7/2022
Next review due 7/2025

UC EVIDENCE BASED GUIDELINE: BRONCHIOLITIS

Database of Systematic Reviews. Retrieved from <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD001266.pub4/abstract;jsessionid=106D2D42BE3F7CBFE1310635A7DA1B68.f01t03>

Piedra, P.A., & Stark, A.R. (2022). Bronchiolitis in infants and children: Clinical features and diagnosis. *UpToDate*. Retrieved from <http://www.uptodate.com>

Piedra, P.A., & Stark, A.R. (2022). Bronchiolitis in infants and children: Treatment, outcome and prevention. *UpToDate*. Retrieved from <http://www.uptodate.com>

Ralston, S.L., Lieberthal, A.S., & Meissner, H.C. (2014). Clinical practice guidelines: The diagnosis, management and prevention of bronchiolitis. *Pediatrics*, *134*(5), 1474-1502.

Seattle Children's Hospital, Chang, P., Abrams, L., Burns, B., Di Blasi, R., Herrman, A., Lein, M., Roberts, J., Striegl, A., Migita, D., 2020 December. Bronchiolitis Pathway (2022 version). Available from: <https://www.seattlechildrens.org/pdf/bronchiolitis-pathway.pdf>

Silver, A, Nazif, J. (2019). Bronchiolitis. *Pediatrics in Review*. *40*(11), 568-576.

Wagner, T. (2009). Bronchiolitis. *Pediatric Review*, *30*(10), 386-395.

Wright, M., & Piedimonte, G. (2011). Respiratory syncytial virus prevention and therapy: Past, present and future. *Pediatric Pulmonology*, *46*(4), 324-347.

Treatment information also provided by Chris Schwake, M.D., Pediatrician and Interim Medical Director, Children's Medical Group, and Sarah Thill, Assistant Professor, Pediatric Emergency Medicine, Medical College of Wisconsin/Children's Wisconsin, (personal communications, June, 2022).

Supersedes: 12/2015, 12/2018

Approved by UC Clinical Practice Council and Medical Director 7/2022

Next review due 7/2025