Bronchiolitis

Emergency Department/Urgent Care

Nationwide Children's — When your child needs a hospital, everything matters.

Center for Clinical Excellence

[Inclusion & Exclusion Criteria]

Assess Symptom Severity

[Risk factors for severe disease and apnea]

NCH Bronchiolitis Symptom Severity Assessment Guide

	Low Severity	Moderate Severity	High Severity
Respiratory Rate ≤ 2 mo	<60	60-69	≥70
3-11mo	<50	50-59	≥60
12-24 mo	<40	40-49	≥50
Work of Breathing (WOB)	Mild or no retractions	Mild to moderate retractions or nasal flaring (infant)	Severe retractions or nasal flaring with head bobbing or grunting (infant)
General Appearance and Feeding	Alert and appropriate; normal feeding & vocalization	Tired but interactive or fussy but consolable; Decreased feeding	Drowsy/lethargic or inconsolable/ agitated; Refusing to feed
Breath Sounds	End-expiratory wheeze, minimal crackles; good aeration	Expiratory wheeze throughout; moderately impaired aeration	Inspiratory and expiratory wheeze or diminished with severity impaired aeration

- Nasal suctioning
- Spot check O_2 saturation
- Supplemental O_2 if <90% saturation for ≥ 2 min and not resolved by suctioning

Consider ONE time albuterol trial if**:**

- >6 month old **AND** wheezing on exam **AND** h/o recurrent wheezing OR atopic dermatitis/eczema OR allergies OR parent/sibling with asthma
- Then, **reassess** symptom severity and document response
- Continue albuterol **ONLY if improvement after trial**

Reassess Bronchiolitis Symptom Severity and
[Criteria for Admission]

[Definition]

[Red Flags]

[Differential Diagnosis]

Rest is Best!

The following are NOT routinely recommended in typical bronchiolitis:

- Albuterol
- Steroids
- Hypertonic saline
- Racemic epinephrine
- CXR

Low Severity

[Meets ED Discharge Criteria?]

No

Yes

Discharge Patient

Moderate or High Severity

- HFNC / BiPAP or mechanical ventilation as indicated
- IVF as indicated by hydration status

On HFNC or higher level of respiratory support?

Yes

No

Meets floor HFNC criteria?
[LCED] [MCED]

No

Yes

Admit to Floor

Admit to PICU

Inclusion & Exclusion Criteria

Inclusion criteria

- Children <24 months old with uncomplicated bronchiolitis

Exclusion criteria

- Critically ill child or requiring PICU
- Underlying respiratory conditions including but not limited to asthma, cystic fibrosis (CF), bronchopulmonary dysplasia (BPD) and laryngotracheomalacia.
- Neuromuscular disease
- Hemodynamically significant congenital heart disease
- Immunodeficiency – confirmed or suspected
- Suspected serious bacterial infections (SBI)

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Risk Factors for Severe Disease & Apnea

Risk Factors for Severe Disease

- Age <12 weeks
- Prematurity ≤ 36 weeks
- Birth weight < 5 lbs
- Chronic pulmonary disease
- Airway abnormalities
- Hemodynamically significant CHD
- Immunodeficiency
- Neurologic disease

Risk factors for apnea:

- Age < 2 months
- Prematurity ≤ 36 weeks
- Respiratory rate at presentation < 30 or > 70 BPM
- Oxygen saturation < 90%

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Return to Admission Criteria

Definition, Red Flags & Differential Diagnosis

Is this Bronchiolitis?

Bronchiolitis is a lower respiratory tract infection affecting infants and young children characterized by inflammation and congestion of the bronchioles (small airways), caused by RSV or other viruses.

Typical Presentation:

- Starts with viral URI symptoms: rhinorrhea, congestion, cough, fever
- Progresses to lower respiratory tract involvement: increases work of breathing including tachypnea and/or accessory muscle use & Abnormal and shifting lung sounds including rales and/or wheezes

Consider Other Alternate Diagnoses when:

- No upper respiratory symptoms are present.
  - *Consider pneumonia, foreign body aspiration, congenital anomaly, aspiration.*
- Persistently and disproportionately high heart rate or hepatomegaly.
  - *Consider myocarditis or other cardiac etiology.*
- Recurrent episodes:
  - *Consider aspiration or congenital airway anomaly.*
  - *Consider asthma (& Asthma Pathway) if risk factors for asthma esp. ≥ 12 mo old with wheezing on exam **AND** history of either recurrent wheezing **OR** atopic dermatitis/ecxema **OR** h/o asthma in 1st degree relative.*
- Paroxysmal coughing spells, apneic spells, and/or known pertussis exposure. *Consider pertussis.*
- Fever in infant less than 60 days
- Fever late in illness course.
  - *Consider pneumonia or other serious bacterial illness.*

Red Flags

- Severe atopy (allergic conditions or eczema, requiring steroids)
- Prolonged fevers
- Fever in child less than 60 days
- Concern for foreign body aspiration
- Severe dehydration
- Persistent tachycardia
- Heart Murmur
- Poor perfusion
- Hepatomegaly

Differential Diagnosis

- Asthma
- Febrile Infant
- Pneumonia
- Laryngotracheomalacia
- Foreign body aspiration
- Gastroesophageal reflux
- Congestive heart failure
- Vascular ring
- Allergic reaction
- Cystic fibrosis
- Mediastinal mass
- Tracheoesophageal fistula
- Sepsis

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Monitoring

- Level of **respiratory distress** and **overall appearance** should be monitored.
- **Pulse oximetry spot checks** with vitals when on room air and at any point when clinically indicated, including before and after suctioning.
- Supplemental O_2 if pulse oximetry spot check is <90%. **Continuous pulse oximetry only if receiving supplemental O_2.**
- **Evidence-Based Practice:**
  - There is **very poor correlation between respiratory distress and oxygen saturations among infants with lower respiratory tract infections.**(3)
  - Accuracy of pulse oximetry is poor, especially in the 76% to 90% range.(2)
  - Further, it has been well demonstrated that oxygen saturation has much less impact on respiratory drive than carbon dioxide concentrations in the blood.(3)
  - Other than cyanosis, no published clinical sign, model, or score accurately identifies hypoxemic children.(5)
  - Transient desaturation is a normal phenomenon in healthy infants. In 1 study of 64 healthy infants between 2 weeks and 6 months of age, 60% of these infants exhibited a transient oxygen desaturation below 90%, to values as low as 83%.(7)

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Recommended Treatments

- **Nasogastric or intravenous fluids** should be administered to infants with a diagnosis of bronchiolitis who cannot maintain hydration orally. *AAP Recommendation*
- **Suctioning** of the nares with a non-invasive device (NoseFrida, bulb, Little Sucker®, BBG nasal aspirator) may be performed at scheduled intervals. If nasal suctioning provides inadequate improvement in respiratory symptoms, nasopharyngeal (deep) suctioning is indicated. *Evidence Quality: Low; Recommendation Strength: Weak*
- **Supplemental O_2** should be provided if pulse oximetry is <90% for ≥2 minutes on room air with good waveform on monitor and no improvement is obtained by repositioning and non-invasive suctioning. *NCH Consensus Recommendation*
- **Positioning** of the child should **adhere to safe sleep guidelines**. Modify patient position as clinically required to optimize respiratory status. *NCH Consensus Recommendation*
- **High Flow Nasal Canula (HFNC)** is recommended for patients in ED who meet Indication and Criteria. *NCH Consensus Recommendation*

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Treatments Not Recommended

- Administration of **albuterol** in the ED or outpatient setting does not reduce the risk of hospital admission. Airway obstruction and plugging rather than bronchospasm has been shown to be the primary mechanism of wheezing in bronchiolitis. While albuterol may provide small, short-term improvements in symptoms in the outpatient setting, side effects including tachycardia and tremors are common. The risk of side effects and lack of benefit, combined with cost, does not justify the routine use of albuterol in patients with bronchiolitis. *Evidence Quality: High; Recommendation Strength: Strong*

- Consider one time **albuterol trial** with subsequent re-assessment if >6 month old **AND** wheezing on exam **AND** h/o recurrent wheezing OR atopic dermatitis/eczema OR allergies OR parent/sibling with asthma.

- **Deep suctioning** such as nasotracheal and nasopharyngeal suctioning (or use of suction catheter) should not be performed routinely in children with bronchiolitis. Deep suctioning is indicated if secretions and respiratory distress is not improved after nasal suctioning. Frequent deep suctioning may cause harmful side effects including increased airway edema and increased length of stay. *Evidence Quality: Moderate; Recommendation Strength: Weak*

- **Systemic corticosteroids** should not be administered to infants with a diagnosis of bronchiolitis. *Agreement with AAP Recommendation*

- **Chest physiotherapy** should not be used for infants and children with a diagnosis of bronchiolitis. *Agreement with AAP Recommendation*

- **Antibacterial medications** should not be administered to infants and children with a diagnosis of bronchiolitis unless there is a concomitant bacterial infection or a strong suspicion of one. *Agreement with AAP Recommendation*

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Treatments with Inconclusive Evidence

- **Nebulized 3% hypertonic saline** has not been shown to decrease length of stay and should not be routinely administered to infants and children with bronchiolitis. Limited use after individualized patient assessment may be considered as symptomatic improvement may be seen in select patients hospitalized with bronchiolitis. *Evidence Quality: Moderate; Recommendation Strength: Weak*

- **Nebulized racemic epinephrine** should not be routinely administered to infants and children with bronchiolitis. Limited use based on individualized patient assessment may be considered as symptomatic improvement may be seen in select patients with bronchiolitis. *Evidence Quality: Moderate; Recommendation Strength: Weak*

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Admission Criteria

Consider admission if ≥ 1 of following criteria are met:

- Respiratory Status
  - Persistent tachypnea for age
  - Respiratory distress, respiratory fatigue, or apnea
  - Lethargy or poor perfusion
  - Parent unable to clear the patient's airway using nasal noninvasive suction (NoseFrida)
  - O_2 saturation persistently <90% in room air

- Hydration & Nutritional Status
  - Inability to maintain level of oral feedings to prevent dehydration

- Inadequate resources for necessary care at home

Lower threshold for admission if risk factors for severe disease or early in the course of illness at time of evaluation

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MCED High Flow Nasal Cannula
Protocol for Admission to Hospital Pediatrics

Inclusion Criteria:

Patient between 1 month and 12 months of age with a primary condition of Bronchiolitis and respiratory distress or increased work of breathing unresponsive to standard nasal cannula

Exclusion Criteria:

- Patients in severe respiratory failure (lethargy, prolonged apnea, bradycardia)
- Patients with significant comorbidities (cardiac, pulmonary, or neuromuscular disease, craniofacial abnormalities, immunodeficiency)
  - Patients with hemodynamically insignificant cardiac defects (small ASD/ VSD) are not excluded
- History of prematurity < 34 weeks gestation
- Known concurrent bacterial pneumonia

Main Campus Emergency Department to Hospital Pediatrics Admission Process

Criteria:

- Patient on ≤ 2 L/min/kg flow and FiO2 ≤ 30% for at least 30 minutes AND demonstrating response to HFNC:
  - Improvement in tachycardia by ≥10 bpm OR
  - Improvement in tachypnea by ≥10 bpm OR
  - Decrease in the number or severity of retractions
- IV access is established

Initiation on maximum floor settings is encouraged

Above criteria met?

No → **Off Pathway** Consider admission to PICU

Yes

ED to place bed request for Hospital Pediatrics

ED to page HP Admitting Resident to inform of HFNC admission

Resident holding the admission pager assigns an HP team
If HP is capped, may ask for re-triage to Pulmonary service

Assigned senior resident notifies charge RN of the intended unit

In person evaluation by charge RN/care partner & senior resident/attending **within 30 minutes** of receiving the admission notification

Senior resident calls for sign-out **or** arranges to meet ED team for direct handoff

Any concerns over stability or suitability for the floor must be reconciled by the Primary Attending or Safety Officer of the Day along with ED Attending.

"Care Complete" if the following criteria are met:

- Patient demonstrates >1 hour of improvement/stability after HFNC initiation **AND**
- The floor physician and RN have completed bedside evaluation and communicated acceptance to ED physician team.

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LCED High Flow Nasal Cannula
Protocol for Admission to Hospital Pediatrics (HP)

Inclusion Criteria:

Patient between 1 month and 12 months of age with a primary condition of Bronchiolitis and respiratory distress or increased work of breathing unresponsive to standard nasal cannula

Exclusion Criteria:

- Patients in severe respiratory failure (lethargy, prolonged apnea, bradycardia)
- Patients with significant comorbidities (cardiac, pulmonary, or neuromuscular disease, craniofacial abnormalities, immunodeficiency)
  - Patients with hemodynamically insignificant cardiac defects (small ASD/ VSD) are not excluded
- History of prematurity < 34 weeks gestation
- Known concurrent bacterial pneumonia

Lewis Center Emergency Department to Hospital Pediatrics Admission Process

Criteria:

- Patient on ≤ 2 L/min/kg flow and FiO2 ≤ 30% for at least 30 minutes AND demonstrating response to HFNC:
  - Improvement in tachycardia by ≥10 bpm OR
  - Improvement in tachypnea by ≥10 bpm OR
  - Decrease in the number or severity of retractions
- IV access is established or a plan is in place to establish IV access by transport Team or VAT

Initiation on maximum floor settings is encouraged

Clinical stability for admission to HP determined by FiO2 prior to transport

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Above criteria met? — No → **Off Pathway** Consider admission to PICU

LCED attending contacts Safety Officer (SOD) by page or Vocera

SOD will notify Hospital Peds admitting pager

Accepting HP team will call LCED attending for signout

Accepting HP senior resident will obtain Vocera and add themselves to “Lewis Center High Flow” group

- Transport to call ECC 15 minutes prior to arriving to NCH
- ECC with then broadcast the “Lewis Center High Flow” vocera group about pending arrival

Transport Team arrives to Trauma Bay hallway, met by senior resident and Floor Charge RN (or designee) for evaluation of continued patient stability for HP admission

Any concerns over suitability to HP service must be resolved prior to transport to HP:

- MCED Orange pod physician and SOD will be notified to assist in determination of appropriate site of care
- If concerns cannot be reconciled within 5-10* minutes, the patient will be admitted to the ED for further evaluation/ stabilization

*There is a limited amount of time a patient can be supported on portable O2 tank

Discharge Criteria & Planning

Respiratory Status:

- No signs of fatigue from tachypnea or WOB
- Improving and stable work of breathing
- Caregiver able to clear the infant's airway using nasal suctioning device

Hydration & Nutritional Status:

- Patient taking sufficient oral feedings/fluids to maintain hydration

Follow Up:

- PCP follow-up appointment within 1-3 days

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Quality Metrics

Goals:

- Decrease use of:
  - Chest x-ray
  - Rapid RSV lab testing
  - Albuterol use
  - Continuous O_2 saturation monitoring
  - Antibiotic use
- Decrease ED length of stay, admission rate, and revisit rate

Utilization Metrics:

- Use of ED/UC Bronchiolitis Order Set

Outcome Metrics:

- Rate of albuterol, CXR, continuous O_2 saturation monitoring and antibiotic use
- ED/UC LOS
- ED Admission Rate
- HFNC Rate

Balancing Metrics:

- 72hr return visit rate to ED/UC

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Key References

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Clinical Pathway Development

This clinical pathway was developed using the process described in the NCH Clinical Pathway Development Manual Version 6, 2022. Clinical Pathways at Nationwide Children's Hospital (NCH) are standards which provide general guidance to clinicians. Patient choice, clinician judgment, and other relevant factors in diagnosing and treating patients remain central to the selection of diagnostic tests and therapy. The ordering provider assumes all risks associates with care decisions. NCH assumes no responsibility for any adverse consequences, errors, or omissions that may arise from the use or reliance on these guidelines. NCH's clinical pathways are reviewed periodically for consistency with new evidence; however, new developments may not be represented, and NCH makes no guarantees, representations, or warranties with respect to the information provided in this clinical pathway.

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