

## Initial Evaluation & Management of Bronchiolitis

### Purpose & Background

Bronchiolitis is a disorder commonly caused by viral lower respiratory tract infections in infants. Bronchiolitis is characterized by acute inflammation, edema, necrosis of epithelial cells lining small airways, and increased mucus production. The most common etiology of bronchiolitis is respiratory syncytial virus (RSV), with the highest incidence of infection occurring between December and March in North America. Other viruses that cause bronchiolitis include human rhinovirus, human meta-pneumovirus, influenza, adenovirus, coronavirus, and parainfluenza viruses. Bronchiolitis is the most common cause of hospitalization among infants during the first 12 months of life.<sup>1</sup> The purpose of this guideline is to reduce variation in the initial evaluation and management of bronchiolitis and to reduce the use of therapies shown to be ineffective in the first 24 hours of care.

### Treatment Algorithm for Suspected Bronchiolitis in Urgent Care/Primary Care Physician

### Treatment Algorithm for Suspected Bronchiolitis in the Emergency Department

### Treatment Algorithm for Suspected Bronchiolitis with Inpatient Admission

### Summary of Key Management Statements

- ❖ Clinicians should diagnose bronchiolitis and assess disease severity based on history and physical examination. Radiographic and laboratory studies should not be obtained routinely during an initial evaluation.
- ❖ Clinicians should assess risk factors for severe disease when making decisions about evaluating and managing bronchiolitis. Family and social circumstances that may affect the ability to follow up and/or provide supportive care should also be considered when making decisions regarding disposition.
- ❖ The treatment for bronchiolitis is largely supportive, focusing on nasal suctioning, maintaining hydration, and delivering oxygen as indicated.
- ❖ The following interventions are not routinely recommended: albuterol, nebulized hypertonic saline, or systemic corticosteroids. Antibiotics should not be administered unless there is a concomitant bacterial infection or a strong suspicion of concomitant bacterial infection.

### Inclusion – Exclusion Criteria

- ❖ This guideline is intended for physicians, nurse practitioners, physician assistants, and nurses caring for pediatric patients with suspected bronchiolitis in the emergency department or inpatient care setting.
- ❖ Signs and symptoms typically begin with rhinitis and cough, which may progress to tachypnea, wheezing, rales, use of accessory muscles, and/or nasal flaring.
- ❖ Risk factors for severe disease include: current age of less than 12 weeks, a history of prematurity (born between 32-37 weeks), and immunodeficiency or immunocompromised.
- ❖ Infants with failure to thrive or malnourished, poor feeding (defined as 50% reduction in oral intake), or risk of dehydration require additional consideration for admission.

#### INCLUSION CRITERIA

- a. 30 days to 23 months of age with viral symptoms +/- wheezing & increased work of breathing

#### EXCLUSION CRITERIA (excluded patients are at risk of deteriorating rapidly and require escalation of care, therefore, these pathways may not be appropriate)

- a. Born < 32 weeks gestation
- b. Cardiac disease requiring home medications
- c. Chronic lung disease or on home oxygen or requires airway clearance support at baseline for any reason
- d. Significant neuromuscular disease (requires assistance with breathing and/or feeding); known or suspected dysphagia
- e. Presenting with apnea
- f. Patient requiring immediate HFNC, CPAP, BiPAP or intubation for respiratory failure

### Clinical Bronchiolitis Score (CBS)

- ❖ No bronchiolitis score is accepted as a gold standard for assessing disease severity. Despite the importance and variety of tools that have been developed, few have been validated or are partially validated.<sup>2</sup>
- ❖ The Clinical Bronchiolitis Score (CBS) was developed locally to assess disease severity and assist staff in recognizing the need for additional treatment interventions, escalation of care, or readiness for discharge.
- ❖ The CBS below is intended to be performed at presentation/admission, clinical change/deterioration, or preparation for care transitions according to care setting treatment algorithms. A modified version is used for urgent care/PCP settings.

	0 – None	1– Mild	2 – Moderate	3 – Severe
<b>Heart Rate</b>	<2 mos: <160 bpm 2-11 mos: <150 bpm 1-2 yrs: <140 bpm	<2 mos: 160-180 bpm 2-11 mos: 150-170 bpm 1-2 yrs: 140-160 bpm	<2 mos: 181-200 bpm 2-11 mos: 171-180 bpm 1-2 yrs: <161-170 bpm	<2 mos: >201 bpm 2-11 mos: >181 bpm 1-2 yrs: >171 bpm
<b>Respiratory Rate</b>	< 2 mos: < 60 bpm 2-11 mos: < 50 bpm 1-2 yrs: < 40 bpm	< 2 mos: 60-70 bpm 2-11 mos: 50-60 bpm 1-2 yrs: 40-50 bpm	< 2 mos: 71-80 bpm 2-11 mos: 61-70 bpm 1-2 yrs: 51-60 bpm	<2 mos: > 81 bpm 2-11 mos: > 71 bpm 1-2 yrs: > 61 bpm
<b>Oxygenation</b>	SpO2 ≥93% on room air	SpO2 90-92% on room air	SpO2 88-89% on room air or SpO2 ≥ 93% on low flow/supplemental O2	SpO2 < 88 % on room air or SpO2 < 93% on low flow/supplemental O2
<b>Work of Breathing</b>	None	Belly breathing or mild subcostal retractions	Nasal flaring and/or moderate retractions (intercostal, tracheosternal, or subcostal)	Any severe retractions, head-bobbing, and/or grunting
<b>Auscultation</b>			Diminished breath sounds, diffuse wheeze, or marked prolonged expiration	Severe diffuse wheeze breath sounds becoming inaudible

### Management & Treatment Guideline Statements

(See “How was this guideline developed?”)

Guideline statements are followed by level of evidence quality and strength of recommendation.

- ❖ When clinicians **diagnose bronchiolitis** based on history and physical examination, **radiographic or laboratory studies** should not be obtained routinely.<sup>1</sup> (*Evidence Quality: B; Strength: Moderate*)
- ❖ Evidence supporting scheduled **nasal suction** is limited. Bulb nasal suctioning with or without suction tip (ex: Neosucker®) may be helpful before feeding or sleep or can be performed to alleviate work of breathing. Nasopharyngeal (deep) suctioning should be reserved for patients with moderate-severe distress.<sup>1,4,7</sup> (*Evidence Quality: Very Low; Strength: Strong [local consensus statement]*)
- ❖ Clinicians should not administer **albuterol** to infants 1-12 months of age with bronchiolitis.<sup>1,3</sup> (*Evidence Quality: High; Strength: Strong*)
  - Clinicians can consider an albuterol trial in infants > 12 months with features suggestive of possible asthma, such as recurrent wheeze, family history of asthma, and prior inhaled corticosteroid use.<sup>1,3,4</sup> (*Evidence Quality: Low; Strength: Weak*)
- ❖ Clinicians should initiate **supplemental oxygen** if the oxyhemoglobin saturation is persistently < 90% when awake or persistently less than 88% when sleeping.<sup>1,4</sup> (*Evidence Quality: Very Low; Strength: Weak [local consensus statement]*)
  - Clinicians should not initiate continuous pulse oximetry for pediatric patients that do not require oxygen supplementation. Discontinue continuous pulse oximetry monitoring with maintained SpO2 > 90% for 4 hours once off supplemental O2.<sup>1,7</sup> (*Evidence Quality: Very Low; Strength: Strong [local consensus statement]*)
- ❖ Clinicians should administer **nasogastric or intravenous fluids** for infants diagnosed with bronchiolitis who cannot maintain hydration orally.<sup>1</sup> (*Evidence Quality: High; Strength: Strong*)
  - Neither fluid modality is superior. Enteral tube insertion is more successful at first attempt and intravenous fluid group is more likely to change therapy modality and have local complications.<sup>5</sup>
  - Give intravenous fluids to infants clinically dehydrated requiring volume resuscitation, concern for safe feeding due to escalating respiratory distress, and/or necessitating admission to pediatric intensive care unit.<sup>5</sup> (*Evidence Quality: Moderate; Strength: Strong*)
  - Give enteral fluids in infants unable to take oral fluids. Give intravenous hydration if not tolerating enteral hydration. (*Evidence Quality: Moderate; Strength: Weak*)
- ❖ When **High Flow Nasal Cannula (HFNC)** is warranted for infants with bronchiolitis and initiated outside of the ICU setting use a weight-based protocol, with a starting flow of 1.5 L/kg/min (max 20 LPM).<sup>6</sup> (*Evidence Quality: Moderate; Strength: Strong*)
- ❖ Clinicians should not administer **systemic corticosteroids** to infants with a diagnosis of bronchiolitis in any setting.<sup>1,4,7</sup> (*Evidence Quality: A; Strength: Strong*)
- ❖ Clinicians should not administer **nebulized hypertonic saline** in any care setting.<sup>1,4,7</sup> (*Evidence Quality: Low; Strength: Strong*)
- ❖ Clinicians should not administer **antibacterial** medications to infants and children diagnosed with bronchiolitis unless there is a concomitant bacterial infection, or a strong suspicion of one.<sup>1,4,7</sup> (*Evidence Quality: B; Strength: Strong*)

### High Flow Nasal Cannula Initiation Pause (HIP)

- A HIP is similar to a timeout or huddle and is recommended for a bronchiolitis score of 5-8.
- During the huddle, the team discusses need for escalation and attempts other interventions before initiating HFNC.
- The goal of the HIP is to reduce premature or unnecessary HFNC use.

### Discharge Criteria and Discharge Education

- ❖ In general, infants may be safely discharged home with a bronchiolitis score 0-4, able to maintain oxygen saturation,  $\geq 90\%$  on room air, and able to maintain hydration.
- ❖ The following components of discharge education are recommended to be delivered to families prior to discharge:
  - Bulb suction
  - Need for frequent, small feeds
  - Return precautions
  - Smoking cessation handout as indicated
  - When/how to follow up with PCP

### Major References:

1. Ralston et al. Clinical Practice Guideline: The Diagnosis, Management, and Prevention of Bronchiolitis. *Pediatrics* (2014) 134 (5): e1474–e1502. <https://publications.aap.org/pediatrics/article/134/5/e1474/75848/Clinical-Practice-Guideline-The-Diagnosis>
2. Rodriguez-Martinez, CE. et al. Systematic review of instruments aimed at evaluated the severity of bronchiolitis. *Pediatr Respir Rev*. 2018; 25:43-57. doi:10.1016/j.prrv.2016.12.006
3. Gadowski AM, Scribani MB. Bronchodilators for bronchiolitis. *Cochrane Database of Systematic Reviews* 2014, Issue 6. Art. No.: CD001266. doi: 10.1002/14651858.CD001266.pub4
4. Bronchiolitis in children: diagnosis and management. NICE. NG9. 2021. <https://www.nice.org.uk/guidance/ng9>
5. Gill PJ, Anwar MR, Kornelsen E, Parkin P, Mahood Q, Mahant S. Parenteral versus enteral fluid therapy for children hospitalised with bronchiolitis. *Cochrane Database of Systematic Reviews* 2021, Issue 12. Art. No.: CD013552. DOI: 10.1002/14651858.CD013552.pub2.
6. Dafydd C, Saunders BJ, Kotecha SJ, et al. Efficacy and safety of high flow nasal oxygen for children with bronchiolitis: systematic review and meta-analysis. *BMJ Open Res* 2021; 8:e000844.
7. Australasian Bronchiolitis. PREDICT.2022. <https://www.predict.org.au/bronchiolitis-guideline>

### How was this guideline developed?

- ❖ This guideline was developed by a multi-disciplinary group of caregivers and subject matter experts experienced in the management of infants with bronchiolitis.
- ❖ The team first reviewed three high quality published national/international guidelines conducted in the US, Europe, and Australia/New Zealand from the AAP, NICE, and PREDICT, respectively.
- ❖ The team also reviewed two Cochrane systematic reviews and other primary literature to supplement the guidelines where further evidence was sought. Key references are cited.
- ❖ Guideline statements directly adopted from national guidelines are cited, and the original evidence levels and recommendation strengths were retained according to the group's guideline framework. See reference links for additional detail.
- ❖ The local guideline team used the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) framework to assign evidence levels and recommendation strengths when evidence was sufficient. Local consensus statements that are not graded should be interpreted as low-level evidence.

### Acronyms and Abbreviations

<b>AAP</b>	American Academy of Pediatrics
<b>BS</b>	Bronchiolitis Score
<b>GRADE</b>	Grading of Recommendations Assessment, Development, and Evaluation
<b>HFNC</b>	High Flow Nasal Cannula
<b>HIP</b>	High Flow Nasal Cannula Initiation Pause
<b>NG</b>	Nasogastric
<b>NICE</b>	National Institute for Health and Care Excellence
<b>PREDICT</b>	Paediatric Research in Emergency Departments International Collaborative

**Disclaimer:** Practice recommendations are based upon the evidence available at the time the clinical practice guidance was developed. Clinical practice guidelines (including summaries and pathways) do not set out the standard of care and are not intended to be used to dictate a course of care. Each physician/practitioner must use his/her independent judgement in the management of any specific patient and is responsible, in consultation with the patient and/or the patient's family, to make the ultimate judgement regarding care.

If you have questions about any of the clinical practice guidelines or about the guideline development process please contact the Rainbow Evidence Practice Program at [RainbowEBPprogram@uhhospitals.org](mailto:RainbowEBPprogram@uhhospitals.org)

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**Child Presents to Primary Care or Urgent Care with Suspected Bronchiolitis**

**Inclusion Criteria:** Age 30 days – 23 months with viral respiratory symptoms +/- wheezing & increased work of breathing  
(See Box 1 for Exclusion Criteria)

**Box 1: Exclusion Criteria**

- Born < 32 weeks gestation
- Cardiac disease requiring home medications
- Chronic lung disease or on home oxygen or requires airway clearance support at baseline for any reason
- Significant neuromuscular disease (requires assistance with breathing and/or feeding); known or suspected dysphagia
- Presenting with apnea
- Patient requiring immediate HFNC, CPAP, BiPAP or intubation for respiratory failure

**Perform Bronchiolitis Assessment**

Severity Indicator	Low Concern	Moderate Concern	Severe Concern
<b>Heart Rate</b>	<2 mos: <160 bpm 2-11 mos: <150 bpm 1-2 yrs: <140 bpm	<2 mos: 160-180 bpm 2-11 mos: 150-170 bpm 1-2 yrs: 140-160 bpm	<2 mos: > 181 bpm 2-12 mos: > 171 bpm 1-2 yrs: <161 bpm
<b>Respiratory Rate</b>	< 2 mos: < 60 bpm 2-11 mos: < 50 bpm 1-2 yrs: < 40 bpm	< 2 mos: 60-70 bpm 2-11 mos: 50-60 bpm 1-2 yrs: 40-50 bpm	< 2 mos: > 71 bpm 2-11 mos: > 61 bpm 1-2 yrs: > 51 bpm
<b>Oxygenation</b>	SpO2 ≥93% on room air	SpO2 90-92% on room air	SpO2 < 89% on room air
<b>Work of Breathing</b>	Comfortable, Mild or no retractions	Uncomfortable, use of accessory muscles, retractions, or nasal flaring	Distressed, severe retractions with grunting or head-bobbing
<b>Feeding</b>	Normal to mildly decreased	Decreased (~50% of usual)	Refusing to feed
<b>Auscultation</b>			Diminished breath sounds, diffuse wheeze, or marked prolonged expiration

**Albuterol is not recommended for bronchiolitis**

**Place patient in concern category severity based on highest indicator in any single category**

**Box 2: Additional Considerations for Admission**

- Immunodeficiency/immunosuppression
- Age < 3 months (10-12 weeks)

**Low Concern**  
Review **Mild** Supportive Care

Counsel on outpatient supportive therapy options

**Discharge Criteria**

- Low concern
- May consider discharge for patients with O2 saturation 90-92% on RA on case by case basis
- Able to feed to maintain hydration
- Discharge education

Suctioning	Schedule follow-up
Frequent feeding	Return precautions
Smoking cessation	Provide written handouts when applicable

**Moderate Concern**  
Trial **Moderate** supportive care measures *in office* if clinical capacity allows

**Suggested in office supportive care options:**

- Administer antipyretic if febrile
- Nasal suction with bulb syringe and saline
- Feeding trial

After supportive therapy trial (if any), repeat bronchiolitis assessment

**Discharge criteria met?**

YES → Discharge Criteria section

NO → Refer to ED<sup>^</sup>

**Severe Concern**

**Refer to ED<sup>^</sup>**

**<sup>^</sup>When to Use EMS for Transport**

- Severe tachypnea
- Bradypnea or apnea
- Severe retractions, nasal flaring, or grunting
- Mental status changes or decrease level of alertness from respiratory effort
- Pulse oximetry < 90 (Consider < 93% dependent on family circumstances and travel time)
- Any infant on supplement oxygen

**Recommended Supportive Therapy Options:**

Feeds	<ul style="list-style-type: none"> <li>• Recommend lower volume, more frequent feedings</li> <li>• If vomiting, consider electrolyte drink (e.g Pedialyte®)</li> </ul>
Suction	<ul style="list-style-type: none"> <li>• Bulb suction</li> </ul>
Fever Management	<ul style="list-style-type: none"> <li>• First line: acetaminophen 15mg/kg/dose every 6 hours prn for temp ≥ 38 C</li> <li>• Second line (only if &gt; 6 months of age): ibuprofen 10mg/kg/dose every 6 hours prn for temp ≥ 38 C and inadequate response 60 minutes after first line dose</li> </ul>
<b>Diagnostics and Therapeutics Not Routinely Recommended</b>	
Antibiotics	<ul style="list-style-type: none"> <li>• Do NOT prescribe antibiotics without evidence of bacterial infection (e.g. otitis media, pneumonia)</li> </ul>
Albuterol	<ul style="list-style-type: none"> <li>• Studies have shown NO benefit for albuterol treatment in infants with typical bronchiolitis. (An albuterol trial may be considered in children with features suggestive of possible asthma, such as: recurrent wheezing, age &gt; 12 months, family history of asthma, prior inhaled corticosteroid use)</li> </ul>
Other Therapeutics	<ul style="list-style-type: none"> <li>• Corticosteroids and nebulized hypertonic saline are NOT recommended for bronchiolitis</li> </ul>
Viral Testing	<ul style="list-style-type: none"> <li>• Viral testing is NOT routinely recommended but may be considered for infection control purposes and shared decision making with family</li> </ul>
Chest X-ray	<ul style="list-style-type: none"> <li>• Chest X-ray is NOT recommended in initial evaluation of uncomplicated bronchiolitis</li> </ul>

**Child Presents to Emergency**  
**Department with Suspected Bronchiolitis**  
**Inclusion Criteria:** Age 30 days – 23 months with viral respiratory symptoms +/- wheezing & increased work of breathing  
 (See Box 1 for Exclusion Criteria)

- Box 1: Exclusion Criteria**
- Born < 32 weeks gestation
  - Cardiac disease requiring home medications
  - Chronic lung disease or on home oxygen or requires airway clearance support at baseline for any reason
  - Significant neuromuscular disease (requires assistance with breathing and/or feeding); known or suspected dysphagia
  - Presenting with apnea
  - Patient requiring immediate HFNC, CPAP, BiPAP or intubation for respiratory failure

Assess patient using **Clinical Bronchiolitis Score (CBS)**

	0 – None	1– Mild	2 – Moderate	3 – Severe
<b>Heart Rate</b>	<2 mos: <160 2-11 mos: <150 1-2 yrs: <140	<2 mos: 160-180 2-11 mos: 150-170 1-2 yrs: 140-160	<2 mos: 181-200 2-11 mos: 171-180 1-2 yrs: <161-170	<2 mos: >201 2-11 mos: >181 1-2 yrs: >171
<b>Respiratory Rate</b>	< 2 mos: < 60 2-11 mos: < 50 1-2 yrs: < 40	< 2 mos: 60-70 2-11 mos: 50-60 1-2 yrs: 40-50	< 2 mos: 71-80 2-11 mos: 61-70 1-2 yrs: 51-60	<2 mos: > 81 2-11 mos: > 71 1-2 yrs: > 61
<b>Oxygenation</b>	SpO2 ≥93% on room air (RA)	SpO2 90-92% on RA	SpO2 88-89% on RA or SpO2 ≥ 93% on low flow/supplemental O2	SpO2 < 88 % on RA or SpO2 < 93% on low flow/supplemental O2
<b>Work of Breathing</b>	None	Belly breathing or mild subcostal retractions	Nasal flaring and/or moderate retractions (intercostal, tracheosternal, or subcostal)	Any severe retractions, head-bobbing, and/or grunting
<b>Auscultation</b>			Diminished breath sounds, diffuse wheeze, or marked prolonged expiration	Severe diffuse wheeze breath sounds becoming inaudible

Albuterol is not recommended for bronchiolitis. See Additional Treatment Considerations (Pg 2) for further guidance

Place patient on carepath based on **Clinical Bronchiolitis Score (CBS)**

- Box 2: Additional Considerations for Admission**
- Immunodeficiency/immunosuppression
  - Age < 3 months
  - Prematurity (32-36 weeks gestation)
  - Poor feeding (50% reduction of oral intake)/risk of dehydration
  - Failure to thrive or malnourished

**CBS 0-4**  
Start **Mild Supportive Care**

**CBS 5-8**  
Start **Moderate Supportive Care**

**CBS ≥ 9**  
Go to **Severe Algorithm (Pg 2)**

- Administer antipyretic if febrile
- Nasal suction with bulb syringe and saline
- Consider using suction tip (i.e. Neosucker®) if severe congestion or significant work of breathing
- Oral hydration if indicated
- Re-score in 1 hour

- HFNC Initiation Pause (HIP)**  
*Bedside huddle (MD/RT/RN) to assess patient and trial interventions prior to HFNC*
- Nasal suction with syringe tip (NeoSucker®) and saline if not done recently
  - Administer antipyretic for comfort if not already given
  - Address hydration needs; consider IV bolus if clinically dehydrated
  - Trial administration of humidified low-flow nasal cannula (for saturation ≤90% and/or severe work of breathing requiring intervention)

**Clinical judgement supersedes CBS, may initiate HIP if clinical concern at any score**

**CBS ≤ 4**

**CBS ≤ 4 on RA:** Assess parental readiness for discharge, social circumstances for follow-up and ability to care.  
 (See Box 2: Additional Considerations for Admission and Box 3: Discharge Criteria)

<b>Successful Room Air Trial (SpO2 ≥ 90%)</b>	Assess readiness and consider for discharge; <b>Go to Box 3: Discharge Criteria</b>
<b>Failed Room Air Trial</b>	<b>Go to Box 4: Initiate Admission to PCRS</b>

**Medical Team Determine HIP Outcome 30 min later:**  
 Is the CBS improved?  
 No signs of clinical deterioration?

**FAIL**

- Go to Severe Algorithm and initiate HFNC protocol or non-invasive positive pressure ventilation
- Document HIP outcome (MD in note; RT/RN in flowsheet)
- Admit to PICU

- Box 3: Discharge Criteria**
- CBS 0-4, and
  - O2 saturation ≥ 90% on room air, and
  - Able to feed to maintain hydration
- Discharge Education**
- |  |   |
|--|---|
| Educate family on suctioning; dispense bulb suction (if available) | Provide bronchiolitis discharge brochure (if available) |
| Need for frequent feeding  | Follow up with PCP (schedule preferably)                |
| Smoking cessation handout as indicated                             | Return precautions                                      |

**PASS**

- Remains on RA or low-flow nasal cannula
- Document HIP outcome (MD in note; RT/RN in flowsheet)
- Re-score in 1 hour and determine disposition

**Box 4: Initiate Admission to PCRS (for any of the following):**

- Patient requires inpatient supportive measures and observation
- Concern for parental readiness and social circumstances
- CBS 5-8 with PASS HIP

**CBS ≤ 4?**

**ED Severe Algorithm**  
CBS ≥ 9

**Goal for severe bronchiolitis is to stabilize and monitor the patient closely until placement in PICU**

1. Place patient on continuous pulse oximetry and continuous CR monitor
2. Suction patient with neo-sucker
3. Re-score patient
4. Initiate **HFNC Outside of ICU Protocol**
  - See Job Instruction for instruction on equipment set-up (Airvo® or Vapotherm®) and initiation of HFNC
5. Once HFNC is initiated, admit patient to PICU

HFNC Outside of ICU Protocol				
Weight	Flow Rate (L/min)	FiO2	Re-assessment	Escalation While Awaiting Transfer
< 13 kg	1. Weight x 1.5 = starting flow rate 2. Round up to nearest whole number flow rate  <i>Ex: 7 kg x 1.5 = 11 L/min</i>	Start at FiO2 40% Titrate to keep SpO2 92-97%	Obtain vitals and re-score patient every 30 minutes after HFNC initiation x 2  If stable after 60 minutes, obtain vitals and re-score every 1 hour x 3 hours, then every 2 hours thereafter and until transfer	Perform team bedside huddle (RT, RN, MD/LIP) 60 minutes on HFNC initiation  <b>Contact receiving PICU for additional guidance if patient needs &gt; 60% FiO2 to maintain SpO2 &gt; 92%</b>
≥13 kg	20 L/min			

6. Make patient NPO
7. Obtain peripheral IV access and if possible obtain CBC and RFP
8. Administer 10-20mL/kg NS bolus, unless signs of fluid overload or heart failure (i.e. hepatomegaly)
9. If febrile, provide IV/PR acetaminophen
10. Obtain CXR
11. All pediatric patients initiated on HFNC in the ED should be transferred to PICU as soon as possible
12. In the event of transfer delays, provider to provider discussions must occur regularly to guide treatment steps. While awaiting transfer, conference with PICU every 6 hours or more frequently if needed

**\*\*if the clinical impression supports a decision different from this guidance, then the RN, RT, and MD/LIP should discuss the decision together**

**Additional Treatment Considerations**

Albuterol (Nebulized or MDI) Trial	Studies have shown no benefit for albuterol treatment in infants with typical bronchiolitis.  An albuterol trial may be considered in children with features suggestive of possible asthma (recurrent wheezing, age > 12 months, family history of asthma, prior inhaled corticosteroid use)
Nebulized Racemic Epinephrine	Consider use in patients with increasing severe respiratory distress on severe algorithm; this may provide bronchodilator and/or airway clearance effects
High Flow Nasal Cannula	Provides warm, humidified air with adjustable oxygen concentration and reduces work of breathing. Indicated only if not responding to supportive care. See HFNC Job Instruction to set-up treatment
Nebulized Hypertonic Saline	Current research does not support a role for routine use of nebulized hypertonic saline in the ED or Inpatient unit
Antibiotics	Do NOT prescribe antibiotics without evidence of bacterial infection. Consider further evaluation for possible bacterial superinfection or sepsis if patient is persistently febrile or tachycardic, toxic appearing, or worsening clinical status. See focal infection treatment or sepsis pathway

**Pediatric Inpatient Admission for Bronchiolitis**

Inclusion Criteria: Age 30 days – 23 months with viral respiratory symptoms +/- wheezing & increased work of breathing (See Box 1 for Exclusion Criteria)

**Exclusion Criteria:**

- Born < 32 weeks gestation
- Cardiac disease requiring home medications
- Chronic lung disease or on home oxygen or requires airway clearance support at baseline for any reason
- Significant neuromuscular disease (requires assistance with breathing and/or feeding); known or suspected dysphagia
- Presenting with apnea
- Patient requiring immediate HFNC, CPAP, BiPAP or intubation for respiratory failure

Assess with Clinical Bronchiolitis Score (CBS) on admit, transfer, or change in status  
(Ex: concern for clinical deterioration or change in PEWS)

	0 – None	1– Mild	2 – Moderate	3 – Severe
<b>Heart Rate</b>	<2 mos: <160 bpm 2-11 mos: <150 bpm 1-2 yrs: <140 bpm	<2 mos: 160-180 bpm 2-11 mos: 150-170 bpm 1-2 yrs: 140-160 bpm	<2 mos: 181-200 bpm 2-11 mos: 171-180 bpm 1-2 yrs: <161-170 bpm	<2 mos: >201 bpm 2-11 mos: >181 bpm 1-2 yrs: >171 bpm
<b>Respiratory Rate</b>	< 2 mos: < 60 bpm 2-11 mos: < 50 bpm 1-2 yrs: < 40 bpm	< 2 mos: 60-70 bpm 2-11 mos: 50-60 bpm 1-2 yrs: 40-50 bpm	< 2 mos: 71-80 bpm 2-11 mos: 61-70 bpm 1-2 yrs: 51-60 bpm	<2 mos: > 81 bpm 2-11 mos: > 71 bpm 1-2 yrs: > 61 bpm
<b>Oxygenation</b>	SpO2 ≥93% on room air	SpO2 90-92% on room air	SpO2 88-89% on room air or SpO2 ≥ 93% on low flow/supplemental O2	SpO2 < 88 % on room air or SpO2 < 93% on low flow/supplemental O2
<b>Work of Breathing</b>	None	Belly breathing or mild subcostal retractions	Nasal flaring and/or moderate retractions (intercostal, tracheosternal, or subcostal)	Any severe retractions, head-bobbing, and/or grunting
<b>Auscultation</b>			Diminished breath sounds, diffuse wheeze, or marked prolonged expiration	Severe diffuse wheeze breath sounds becoming inaudible

CBS ≤ 6 with ongoing need for hospitalization

Maintain [Inpatient Supportive Measures](#)  
See [Additional Treatment Considerations](#)  
Scheduled rescore not required unless concern for clinical deterioration or assessing for discharge readiness  
(See Box 5: Assessing Discharge Readiness)

**Box 5: Assessing Discharge Readiness**  
Begin to score patient more frequently to assess for discharge, when:

- SpO2 ≥ 90% on room air
- None or only mild work of breathing
- CBS ≤ 4 (or expected score ≤ 4 on assessment)
- Using bulb syringe and improved suctioning burden
- Family received education and demonstrates ability to care for patient
- Able to maintain hydration

**Discharge Criteria**

- CBS 0-4
- O2 saturation ≥ 90% on room air
- Able to feed to maintain hydration
- Home-going education provided

CBS ≥ 7, ANY score with concern for deterioration, or PACT Called (@St. John – notify hospitalist)

Initiate HIP/PACT within 15-30 minutes and obtain full set of vitals

**HFNC Initiation Pause (HIP)**

- Bedside huddle (MD/RT/RN) to assess patient/trial interventions prior to HFNC
- Nasal suction with neo sucker and saline
- Administer an antipyretic for comfort if not already given
- Address hydration needs, consider bolus if clinically dehydrated
- Trial administration of humidified low-flow nasal cannula or increase to floor max (for saturation ≤90% and/or severe work of breathing requiring intervention)

Clinical judgement supersedes CBS, may initiate HIP if clinical concern at any score

**Medical Team Determine HIP Outcome 30 min later:**  
Is the CBS improved? No signs of clinical deterioration?

YES

NO

**PASS**

- Remains on division
- Continue low-flow cannula, if started
- Document HIP outcome (MD in note; RT/RN in communication notes)
- Continue bronchiolitis care per [Inpatient Supportive Measures](#)

**FAIL**

- Initiate PACT (if not already done) OR direct transfer to PICU
- Place on CR monitor
- Document HIP outcome (MD in note; RT/RN in communication notes)

**Discharge Education**

Educate family on suctioning; dispense bulb suction (if available)	Provide bronchiolitis discharge brochure (if available)
Need for frequent feeding	Follow up with PCP (schedule preferably)
Smoking cessation handout (as indicated)	Return precautions

**Oxygen Delivery Outside of ICU**  
See [Patient Care Guideline: Oxygen Administration](#)

Low Flow Nasal Cannula	Infants (0-10 kg) on ≤ 2 LPM Pediatric patients (10-20 Kg) on ≤4 LPM
High Flow Nasal Cannula	May be initiated in ED or PICU only; may be initiated on general divisions at discretion of PICU service while awaiting transfer to PICU

### Inpatient Supportive Measures

Place in precautions based on viral testing

Feeds	<ul style="list-style-type: none"><li>• Continue oral feeding if low concern for <u>dehydration</u> and PO tolerated</li><li>• Consider placing NG (over IV access) for patient admitted with poor oral intake/mild dehydration after shared decision making with family</li><li>• Obtain IV access for patient clinically dehydrated requiring volume resuscitation or patient with significant respiratory distress with concern for clinical deterioration</li></ul>
Suction	<ul style="list-style-type: none"><li>• Does NOT need to be performed on a scheduled basis. Only as needed for secretions; may be helpful before feeding or sleep or can be performed to alleviate work of breathing</li><li>• If increasing respiratory distress, suction first and re-score</li></ul>
Supplemental O2	<ul style="list-style-type: none"><li>• Humidified low flow nasal cannula not to exceed weight and floor limits. Use bubble humidifier if flow exceeds 1 LPM for neonates or 2 LPM for pediatrics</li><li>• Wean as tolerated for SpO2 &gt; 90% and improving dyspnea</li></ul>
Fever Management	<ul style="list-style-type: none"><li>• First line: acetaminophen 15mg/kg/dose every 6 hours prn for temp <math>\geq</math> 38 C</li><li>• Second line (only if &gt; 6 months of age): ibuprofen 10mg/kg/dose every 6 hours prn for temp <math>\geq</math> 38 C and inadequate response 60 minutes after first line dose</li></ul>
Phenylephrine 0.125% Nasal	<ul style="list-style-type: none"><li>• 1 spray in each nostril X1 dose for ongoing suctioning burden and/or for epistaxis in the setting of suctioning</li><li>• Repeat as needed per MD order</li></ul>
Monitoring Plan	<ul style="list-style-type: none"><li>• Vitals and PEWS per floor standards; continuous pulse oximetry ONLY if on supplemental O2</li><li>• Discontinue continuous monitoring when SpO2 &gt; 90% off supplemental O2 for 4 hours</li></ul>
When to repeat CBS	<ul style="list-style-type: none"><li>• As needed only - based on nursing clinical judgement, change in vital signs, or increase in PEWS</li></ul>
Additional Treatments	<ul style="list-style-type: none"><li>• See <b>Additional Treatment Considerations</b> that may be considered in select circumstances</li></ul>
Discharge Education	<ul style="list-style-type: none"><li>• See recommended elements of Discharge Education</li></ul>

### Additional Treatment Considerations

Albuterol (Nebulized or MDI) Trial	<ul style="list-style-type: none"><li>• Studies have shown no benefit for albuterol treatment in infants with typical bronchiolitis</li><li>• An albuterol trial may be considered in children with features suggestive of possible asthma (recurrent wheezing, age &gt; 12 months, family history of asthma, prior inhaled corticosteroid use)</li></ul>
Nebulized Racemic Epinephrine	<ul style="list-style-type: none"><li>• Consider use in patients with increasing severe respiratory distress on severe algorithm; this may provide bronchodilator and/or airway clearance effects</li></ul>
High Flow Nasal Cannula	<ul style="list-style-type: none"><li>• Provides warm, humidified air with adjustable oxygen concentration and reduces work of breathing. Indicated only if not responding to supportive care</li><li>• See HFNC Job Instruction to set-up treatment</li></ul>
Nebulized Hypertonic Saline	<ul style="list-style-type: none"><li>• Current research does not support a role for routine use of nebulized hypertonic saline in the ED or Inpatient unit</li></ul>
Antibiotics	<ul style="list-style-type: none"><li>• Do NOT prescribe antibiotics without evidence of bacterial infection. Consider further evaluation for possible bacterial superinfection or sepsis if patient is persistently febrile or tachycardic, toxic appearing, or worsening clinical status</li><li>• See focal infection treatment or sepsis pathway</li></ul>