



DAYTON CHILDREN'S HOSPITAL
CLINICAL PRACTICE GUIDELINES

DISCLAIMER: This Clinical Practice Guideline (CPG) generally describes a recommended course of treatment for patients with the identified health needs. This CPG is not presented and should not be used as a substitute for the advice of a licensed independent practitioner, as individual patients may require different treatments from those specified, and guidelines cannot address the unique needs of each patient. Dayton Children's shall not be liable for direct, indirect, special, incidental or consequential damages related to the use of this CPG.



Bronchiolitis Clinical Practice Guidelines

Emergency Department Management

- If initial examination demonstrates life threatening symptoms (apnea, cyanosis, Severe retractions, lethargy) implement emergency management.
- Give O₂ if SpO₂ on R.A. is \leq 91-94%. Patients presenting in acute respiratory distress should be placed on oxygen until respiratory status can be stabilized.
- Perform nasopharyngeal suction to clear secretions.
- Assess the following: Oxygen dependency, respiratory distress level, ability to feed, hydration status, fever, parent/social situation, pre-existing conditions, exposure to tobacco.

NOTE: If above findings are within normal limits, observation should be continued and discharge preparations considered.

If patient at risk, continue monitoring:

- Consider: RSV EIA or Respiratory Infectious Disease Panel, only if admission is likely. These test should not be ordered on routine patients who are being discharged from the ED. An RSV-EIA may be ordered for a repeat patient or complex patient where the etiology could help determine prognosis.
- Electrolytes, CBC (only if secondary infection suspected)
- CBG/CXR, if patient exhibits significant respiratory distress or at physician discretion in borderline cases.
- Reassess respiratory status, repeat SPO₂ in room air. If patient is being evaluated for discharge or admission with the diagnosis of bronchiolitis, the oxygen saturation goal shall be 91% with oxygen weaning accordingly.

Aerosol Trial: Routine bronchodilator trials are no longer being recommended as very few infants respond positively. Bronchodilator treatments have been shown to create hypoxemia in infants with bronchiolitis as the medication causes tachycardia (increased cardiac output) while doing little for improving ventilation. This results in increased shunting and hypoxemia. Much of the improvement seen with aerosols can be attributed to the suctioning that occurs pre and post treatment and the moisture from the aerosol. If the physician believes the level of respiratory distress in the infant warrants a trial:

- 0.5 cc (2.5 mg.) albuterol is the medication of choice. Infants with history of wheezing and night time coughing not associated with an URI, eczema, atopy or strong family history of asthma are most likely to respond.
- Only one treatment should be ordered to gauge response; if the infant improves, additional aerosols may be ordered.
- Duoneb is not indicated, ipratropium bromide is not effective with viral wheezing.

CONSIDER AEROSOL RESPONSE WHEN DETERMING CONTINUED CARE, ADMITTING DIAGNOSIS AND ORDERS.

Criteria for Consideration of Hospitalization

- Persistent Respiratory Distress
- Hypoxia
- Need for IV fluid
- Co-morbidity
- Apnea

Patient Placement: For No IV and No O₂, place patient in observation in AHU. For patients on oxygen, admit to inpatient. For patients with IV but no O₂, determine the patient's level of illness. If you are not sure the patient will need more than 24 hours of care, err on the side of observation/AHU.

ADMIT TO INPATIENT (For any of the following criteria)

- Continued supplemental O₂ requirement
- Inability to P.O. intake effectively with potential to require IV fluids
- Pre-existing conditions/co-morbidity (CHD, CF, BPD, RAD, age < 4 weeks)

PLACE IN OBSERVATION (For any of the following criteria)

- No supplemental O₂ requirement
- Non-supportive social environment
- Inability to P.O intake effectively with the potential to require IV fluids

ADMIT ICU (For any of the following criteria)

- Witnessed apnea
- CO₂ retention per blood gas
- High flow cannular oxygen or O₂ requirement > 40-50%
- Severe respiratory distress
- High risk co-morbidity (severe BPD, cyanotic CHD)

ED Discharge criteria (All must be met)

- RR < 60
- Adequate PO intake

- Supportive social environment
- Minimal respiratory distress
- SaO2 \geq 91%
- No co-morbidity factors
- If obtained, pCO2 < 45

If applicable, family members should be counseled to not use tobacco products around infant.

Inpatient/Observation Management

Clinical Respiratory Assessment:

- History of upper respiratory symptoms and/or rhinorrhea.
- Respiratory rate, heart rate
- Color/Oxygen saturation
- Degree of wheezing/air entry
- Degree of retractions
- Level of consciousness

These symptoms should be evaluated and the patient assigned a score using the Bronchiolitis scoring system. This allows for an objective evaluation of the patient’s condition that can be compared to later scores, indicating improvement or worsening of the patient’s clinical condition.

BRONCHIOLITIS SCORING SYSTEM

	0 - NORMAL	1 – MILD	2 – MODERATE	3 - SEVERE
Resp Rate	< 40	40-50	50-60	>60
Color O2 Sat on RA Cap Refill	Normal >97% <2 sec.	Normal 94-96% on RA < 2 sec.	Normal 90-93% < 2 sec. Normal color on O2 \leq 1 lpm	Dusky, Mottled < 90% => 3 sec. Normal color on O2 > 1 lpm
Retractions / WOB	None	Subcostal	Intercostal and Subcostal when Quiet	Supraclavicular Sternal Paradoxical Respiration
Air Entry Wheezing	Breath Sounds Clear/ Good	Good Entry End Exp. Wheeze +/- Rales	Fair Air Entry Insp and Exp Wheeze +/- Rales	Poor/ Grunting Insp and Exp wheeze +/- Rales
LOC	Normal/ Alert	Mild Irritability	Restless When Disturbed- Agitated	Lethargic Hard to Arouse

Other factors used in evaluation of infants with suspected bronchiolitis:

- Signs of dehydration/difficulty feeding.
- Parental ability to provide necessary care for child during acute infection.
- Pre-existing condition contributing to increased possibility of respiratory failure.

Laboratory and Radiologic Assessments:

RIDP is recommended for admitted patients for a variety of reason. (See teaching document). Chest X-rays, blood work, and blood gases should be order *only* when clinical conditions of patient warrants the test.

Management:

Isolation: All patients in respiratory distress due to viral illness will be placed in “Droplet/Contact” isolation with or without viral confirmation.

Cardio-respiratory monitoring: This should be applied during the acute phase of the disease because of the risk of apnea and bradycardia. Continuous pulse oximetry is not recommended for patients in general care.

Oxygen per protocol: All patients should be placed on Oxygen per protocol upon admission but will not be actively weaned for first 24 hours. In protocol the patient will be set up on the appropriate oxygen delivery device with the FiO₂ titrated to maintain an adequate saturation. The patient will be reassessed Q30 minutes until stable then Q4 and PRN until the patients is on room air.

Aerosol per Protocol: This allows the patients to be evaluated by a respiratory therapist at a frequency based on their Bronchiolitis severity score. Since aerosols very rarely improve the symptoms in bronchiolitis and have been shown to cause worsening hypoxemia, bronchodilator trials should be limited to those who present with moderate to severe distress.

Aerosol Trial: Patients who score 8 or higher will be given an aerosol trial. Patients will be suctioned if necessary, scored, given aerosol and scored again. A positive response is defined as a decrease of the patient’s post aerosol bronchiolitis score by 2 or more (decrease wheezing, WOB, RR, increased aeration). Vaponephrine (0.5 cc) is generally the recommended aerosol medication to be trialed in hospitalized patients, unless patient responded to albuterol in the ED.

- **Normal – Bronchiolitis Score 0-4** Assess Q6
- **Mild Symptoms – Bronchiolitis Score 5-7** Assess Q4

- **Moderate Symptoms – Bronchiolitis Score 8-10**

Vaponephrine trial X1. If the patient responds continue aerosols Q4 hrs. for scores ≥ 8 , if no response to first medication, consider trial with albuterol. Continue to assess the patient Q2.

- **Severe Symptoms – Bronchiolitis Score 11-15**

Vaponephrine trial X1. Evaluate response. Consider trial with albuterol. If no response and severity persists, consider PICU transfer.

Note: The respiratory therapist will notify the medical resident when a patient scores ≥ 8 and an aerosol is given. This alerts the medical staff to the patient's acuity.

Hypertonic Saline: Hypertonic saline aerosols may be considered for those infants with documented copious secretions, after the second day of inpatient care. TID would be an appropriate frequency for 3% Saline aerosols.

Airway Clearance: It is recommended that patients be suctioned PRN and prior to therapies and feedings. BBG suctioning may be utilized to clear nasal passages. Pharyngeal suctioning is recommended when secretions are obstructive and causing respiratory distress. Chest percussion is not indicated for patients with bronchiolitis.

Intravenous Fluids: The need for an intravenous line and fluid management should be based on clinical assessment of hydration and the patient's ability to feed orally. Intravenous fluids are recommended for the first day of hospitalization for those with hydration needs.

Nutrition: Nasogastric feeding is recommended for those requiring fluid support on the second day. ND feeding is to be used with HFNC use greater than 4 lpm.

Antibiotics: Are not recommended unless patient exhibits indication of bacterial infection.

High Flow Nasal Cannula (HFNC): This high humidity, high flow oxygen therapy should be considered for infants with significant respiratory distress with rising PCO₂. HFNC therapy can reduce the infant's work of breathing.

For Patients in General Pediatrics Prior to Transfer to PICU

Inclusion Criteria:

- Infants with viral bronchiolitis, IV fluids, and respiratory distress (i.e. retractions, tachypnea, coarse breath sounds) that does not improve with conventional therapy (generally a Bronchiolitis score of 8 or higher) who must have the following:
- Oxygen requirement of > 1 lpm nasal cannula < 4 mo. of age. Or > 1.5 lpm > 4 mo. of age

- CBG results $pCO_2 > 50$

Note: Positive radiologic findings should also be considered for HFNC initiation.

Exclusion Criteria:

- Patient exhibiting signs of respiratory failure (i.e. $pCO_2 > 60$, severe respiratory distress decreased level of consciousness, lethargy, apnea or bradycardia). A PRT (PICU Consult) or Code Blue (Immediate Response) should be called with a prompt transfer to PICU.

Note: If the patient does not meet all criteria for HFNC or the clinical team wants to discuss the infant's care/other options with the intensivist, a PRT must be called.

RCP HFNC Protocol:

Prior to initiation of HFNC the RCP should consult with the respiratory supervisor and general pediatric medical staff evaluating the patient to confirm the plan to initiate HFNC. The general pediatric medical staff will notify the PICU medical staff at the time a decision is made to initiate HFNC therapy and discuss transfer.

Procedure:

1. Patient will be set up on Vapotherm Precision Flow at 6-8 lpm. Flow can be adjusted to a maximum of 8 lpm based on improvement of symptoms.
2. FiO_2 will be adjusted for SaO_2 .
3. Patient will be continuously monitored for HR, RR and SaO_2 .
4. Patient will be scored prior to initiation of therapy and scored every 30 minutes after initiation for the first hour of therapy.
5. CBG will be obtained prior to initiation of therapy and after 1 hour of therapy.

Patient Assessment

- Respiratory therapy will assess patient Q1 hour after the first hour until transfer. Document all vital signs and scores.
- Observe for signs of worsening respiratory distress.
- Monitor patient for \uparrow WOB, \uparrow Respiratory Rate, presence of Apnea and Bradycardia, \uparrow HR, decreasing saturations

If the patient does not transfer, contact PICU Medical Staff immediately for

- Consistently rising FiO_2 ($>60\%$) to maintain desired SaO_2
- Deteriorating blood gases
- Worsening respiratory distress or impending respiratory failure.
- Apnea and bradycardia requiring manual ventilation or other interventions

Patients that demonstrate no response to HFNC will require a PRT or Code Blue for PICU medical staff evaluation and transfer to PICU.

Special Considerations

- HFNC is not meant to be a substitute for patients requiring positive pressure (CPAP/ mechanical ventilation)

For Patients in PICU to be Transferred to General Pediatrics

Inclusion Criteria:

- $FiO_2 < 40\%$
- Stable for >24 hours on current therapy
- Stable or improving CBG
- Patient will be on central monitoring for HR, RR and SaO₂.

RCP Weaning:

- Once initial flow rate is established, wean FiO_2 to the lowest concentration tolerated, while maintaining target saturations.
- Weaning of flow rate is based on, work of breathing, respiratory rate and chest x-ray findings.
- An order is not needed to wean flow.

Patients may not need to go to a low flow cannula unless there is an oxygen need. If there is, give just enough flow to maintain target SaO₂ levels, not the same flow on HFNC.

Contact General Pediatric Medical Staff Immediately:

- Consistently rising FiO_2 (>60%) to maintain desired SPO₂
- Deteriorating blood gases
- Worsening respiratory distress or impending respiratory failure.
- Apnea and bradycardia requiring manual ventilation or other interventions

Parent Education: Parents should be educated on:

- Bronchiolitis pathophysiology and duration of illness.
- Proper techniques for airway clearance and suctioning.
- Handwashing and infection control.
- When to call their health care provider by explaining the signs of worsening symptoms.
- The value of continuing breastfeeding up to six months of age, when applicable.
- **Clinicians should counsel caregivers/family about exposing the infant to environmental tobacco smoke and offer smoking cessation counseling and information on the Ohio Quit Line.**

Discharge Criteria:

- Respiratory Rate < 60 breaths per minute.
- Adequate P.O. intake.
- Patient SpO2 adequate on room air or is on supplemental oxygen consistent with previous home therapy.
- Parents’ proficient with all necessary therapies for home, especially, secretion clearance using a bulb syringe.

INPATIENT/OBSERVATION MANAGEMENT PROTOCOL

SCORE	<u>Respiratory Treatment</u>	<u>Other Therapy</u>
0-4 NORMAL	Assess Q6	Suction PRN Bulb Syringe suction for home
5-7 MILD	Assess Q4	Oxygen per Protocol Suction PRN
8-10 MODERATE	Aerosol Trial X1 with Vaponephrine. If the patient responds continue aerosols Q4 hrs. for scores ≥ 8 , If not responsive consider a trial with an alternate bronchodilator. Assess Q2	IV fluids Oxygen per Protocol Consider Chest X-ray Capillary Blood Gas Suction PRN Consider HFNC if meets criteria Place on “watcher” list
11-15 SEVERE	Aerosol Trial X1 with Vaponephrine. If response is positive, continue aerosol Q2. Consider PICU transfer	On “watcher “ list IV fluids Oxygen per Protocol Chest X-Ray Capillary Blood Gas HFNC if meets criteria Excessive PCO2/acidosis warrants transfer to PICU

Title of Responsible Party: Director Respiratory Care /Transport.

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