High Flow Nasal Cannula on General Pediatrics Unit

Prior to HFNC:
- Failed supportive care with standard NC.
- Score, Suction, Score. (superficial acorn suctioning) – if bronchiolitis
- Pre-Huddle: RT, RN, Physician(s)
- Place on cardiorespiratory monitors and continuous pulse ox
- Consider transcutaneous CO2, Blood gas, and CXR

Initiate HFNC:
- Consider NPO, IV, NS bolus depending on clinical status (RR>60, FiO2>40%, etc.)
- Start at 1 L/min/kg at prior FiO2 (min 30%), titrate every 15mins, and titrate up to max
  - 2 L/min/kg for PR/OL
  - 1.5 L/min/kg for community sites
- Titrate FiO2 to Keep SpO2 90-94% (max 50% PR/OL, 40% community)
- Consider PICU transfer if at community site
- Reassess HR, RR, SpO2 q30 minutes
  - Bronchiolitis score if applicable
  - PAAS score if applicable

Wean:
- Wean FiO2 as tolerated to 30% (keep O2 sat 90-94%).
- If stable/improving for 2-4 hrs, wean Flow by 1-2 L/min q2 hrs until reach minimum 1L/min/kg, then transition to low flow oxygen delivery or RA
- Pulmonology consult if no improvement >72hrs

60 minutes after initiating HFNC:
- Re-Huddle: RN, RT, Physician(s)
- Clinical assessment for improvement?
  - Re-evaluate HR, RR, temperature, physical exam

Consider PICU Transfer:
PR/OL: call RRT; community: call ACH transfer center
May need intubation prior to transfer

Complications:
- Air leak syndromes: Pneumothorax, pneumomediastinum, subcutaneous emphysema
- Epistaxis
- Gastric distention

Owners: T.Wolf, T.He
Published: 9/18, revised 5/19, revised 8/19

Consider exclusion criteria (bedside huddle)
- Preterm ≤ 34 weeks (corrected gestational age <52 weeks), BPD, CLD, prior intubations for respiratory failure
- Neuromuscular disease & unstable cardiac disease
- Pertussis, tracheitis, epiglottitis
- Pneumothorax, Pneumomediastinum
- Continuous nebulizer therapy

General Pediatric Floor:
- Continue consideration of cardiorespiratory monitor and/or continuous pulse ox
- Continue supportive care- SUCTION!
- RN ratio 1:3-4 (site dependent)
- Re-assess q30 minutes (either RT, RN, physician) x1hr, then q2hr until stable for 2-4 hours.

Feeding:
- NPO, on IVFs until improving, RR age appropriate, and weaning HFNC
- Consider NG feeds if unable to safely oral feed and clinically stable
References


Protocols: Seattle Children’s, Texas Children’s West Campus, PCH/Riverton Children’s (Utah), University of New Mexico Children’s, Ministry of Health NSW North Sydney, Northshore Pediatrics Inpatient pathways, PHM listserv review

<table>
<thead>
<tr>
<th>Bronchiolitis Scoring System</th>
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<th>1</th>
<th>2</th>
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<tbody>
<tr>
<td><strong>Respiratory Rate (&lt;2 years)</strong></td>
<td>Less than 49</td>
<td>Greater or equal to 50</td>
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<td><strong>Accessory Muscle Use</strong></td>
<td>None</td>
<td>Retractions (intercostal, substernal, subcostal)</td>
<td>Neck or abdominal muscles</td>
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<td><strong>Wheeze</strong></td>
<td>Normal breath sounds or end expiratory</td>
<td>Entire expiratory</td>
<td>Entire expiration and inspiration</td>
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### Summary of Bronchiolitis Scoring System

<table>
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<tr>
<th>Air Exchange</th>
<th>normal</th>
<th>Localized decreased</th>
<th>Diffuse decreased</th>
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1. Scoring should be assessed by respiratory therapist **post-suction**
2. Consider nebs if score is equal or greater than 3. – SABA nebs Q3hrs for up to 3 treatments – discontinue SABA if no improvement in the score
3. A decrease in score of greater or equal to 2 is considered significant improvement, suggestive of continued inhaled treatments.
4. If pre-treatment score is less than 3, nebs are not indicated.

### Education

**What is HFNC?** - A humidified devise to deliver high flow oxygen via non-invasive nasal cannula. It is thought to be able to provide a form of positive pressure support that can reduce work of breathing, reduce intubation rates, reduce hospital LOS and total hospital charges, and decrease transfers to PICUs and tertiary care centers.

**How it works?** - Maximal inspiratory flow that a healthy infant achieves during regular breathing is 0.8 L/kg/min for each breath. An infant with bronchiolitis generates higher inspiratory flow rates around 1-1.6 L/kg/min. The aim of HFNC is to match this maximal inspiratory flow. HFNC is proposed to provide low-level PEEP (2-5 cm H2O) and aid in lung recruitment. Provides CO2 “washout” of respiratory physiologic dead space. Warmth and humidity keep secretions moist, improve mucociliary clearance, and inhibits inflammatory reactions and bronchoconstriction reflexes triggered by cold and dry air.

**Uses?** - Most pediatric research currently focuses on use in infants with bronchiolitis. This area continues to expand and guidelines are ever changing with uses expanding to acute respiratory failure, severe sepsis/septic shock, and asthma.

### Nursing Care and RT Management

<table>
<thead>
<tr>
<th>Steps</th>
<th>Add. Info</th>
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| Check that oxygen is flowing freely and that the tubing/nasal cannula is not blocked at least hourly. Replace the nasal cannula if it becomes blocked with secretions/milk. | A blockage in the tubing may manifest as:  
• An increase in respiratory effort  
• Respiratory distress  
• A fall in SpO2 levels |
<p>| Check the tubing/nasal cannula for presence of condensation at least hourly and empty as necessary by draining back into the humidifier chamber. | Water in tubing/nasal cannula may lead to aspiration. |
| Check water level in humidifier chamber and replace water bag as necessary | The flotation device will prevent overfilling |</p>
<table>
<thead>
<tr>
<th>Check nasal cannula position to ensure no pressure is placed on nasal septum at least hourly.</th>
<th>Ensure weight of circuit is supported to prevent drag on nasal tubing</th>
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<tbody>
<tr>
<td>Provide nasal suctioning if required.</td>
<td>Nasal secretions can impair the effectiveness of the High Flow Oxygen Delivery System. One side of the cannula can be lifted at a time so that some flow is still provided to child during procedure.</td>
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<tr>
<td>Monitor oxygen saturations (SpO2) continuously. Adjust oxygen concentration to maintain acceptable SpO2 levels</td>
<td>Keep O2 sats &gt;90%</td>
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<td>Observe for increased abdominal distension</td>
<td>There is a risk of abdominal distension due to high flow of gases.</td>
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