Bronchiolitis Pathway v13.0: Table of Contents

Stop and Review

Stop and Review

Inpatient & ED Inclusion Criteria
- Age <2 years
- Prematurity and/or age <12 weeks may be included, but expect a more severe course of illness
- Viral upper respiratory symptoms & lower respiratory symptoms that may include: increased work of breathing, cough, feeding difficulty, tachypnea, wheeze, fever

Inpatient & ED Exclusion Criteria
- Cardiac disease requiring baseline medication
- Anatomic airway defects
- Neuromuscular disease
- Immunodeficiency
- Chronic lung disease

HFNC Inclusion Criteria
- Primary diagnosis of bronchiolitis
- Age 44 weeks PMA to <2 years
- Severe respiratory distress PLUS persistent SpO2 <92% on maximum low-flow NC (1L if 30-90 days, 1.5L if 91 days-6 months, 2L if 6 months-2 years)

HFNC Exclusion Criteria
- Concern for impending respiratory failure (lethargy, poor perfusion, apnea)
- Primary diagnosis of pneumonia, asthma, or croup
- Born prematurely <34 weeks (if <6 mo)
- History of intubation for respiratory failure
- Cardiac disease requiring baseline medication
- Anatomic airway defects
  - Neuromuscular disease
  - Immunodeficiency
  - Chronic lung disease

Bronchiolitis Care

Criteria & Respiratory Score
ED Management
Inpatient Phase
HFNC Phase

Appendix

Version Changes
Approval & Citation
Evidence Ratings
Bibliography
### Bronchiolitis Pathway v13.0: Criteria and Respiratory Score

#### Inclusion Criteria
- Age <2 years
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#### Exclusion Criteria
- Cardiac disease requiring baseline medication
- Anatomic airway defects
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- Immunodeficiency
- Chronic lung disease

#### RESPIRATORY SCORE (RS)

<table>
<thead>
<tr>
<th>Variable</th>
<th>0 points</th>
<th>1 point</th>
<th>2 points</th>
<th>3 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>RR &lt;2 mo</td>
<td>≤60</td>
<td>61-69</td>
<td>≥70</td>
<td></td>
</tr>
<tr>
<td>RR 2-12 mo</td>
<td>≤50</td>
<td>51-59</td>
<td>≥60</td>
<td></td>
</tr>
<tr>
<td>RR 1-2 yr</td>
<td>≤40</td>
<td>41-44</td>
<td>≥45</td>
<td></td>
</tr>
<tr>
<td>Retractions</td>
<td>None</td>
<td>Subcostal or intercostal</td>
<td>2 of the following: subcostal, intercostal, substernal, OR nasal flaring (infant)</td>
<td>3 of the following: subcostal, intercostal, substernal, suprasternal, supraclavicular OR nasal flaring / head bobbing (infant)</td>
</tr>
<tr>
<td>Dyspnea 0-2 years</td>
<td>Normal feeding, vocalizations and activity</td>
<td>1 of the following: difficulty feeding, decreased vocalization or agitated</td>
<td>2 of the following: difficulty feeding, decreased vocalization or agitated</td>
<td>Stops feeding, no vocalization or drowsy and confused</td>
</tr>
<tr>
<td>Auscultation</td>
<td>Normal breathing, no wheezing present</td>
<td>End-expiratory wheeze only</td>
<td>Expiratory wheeze only (greater than end-expiratory wheeze)</td>
<td>Inspiratory and expiratory wheeze OR diminished breath sounds OR both</td>
</tr>
</tbody>
</table>
Bronchiolitis Pathway v13.0: ED Management

Inclusion Criteria
- Age <2 years
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- Viral upper respiratory symptoms & lower respiratory symptoms that may include: increased work of breathing, cough, feeding difficulty, tachypnea, wheeze, fever

Exclusion Criteria
- Cardiac disease requiring baseline medication
- Anatomic airway defects
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- Chronic lung disease

Urgent Care Transfer Criteria
- Severe respiratory distress after suction and reevaluation
- Inadequate oral hydration
- Hypoxemia
- Apnea
- Signs of clinical deterioration
- *Transport via ALS

Initial assessment
- SCORE, SUCTION, SCORE: nasal suction; follow with NP suction if needed
- Provide supplemental O2 to keep saturation >90% (>88% asleep). Start at ½ L and titrate as needed.

Rehydration
- Give supplemental NG or IV fluids if moderately to severely dehydrated: NPO and IV fluids if severe respiratory distress
- Encourage NG over IV fluids, esp. if <1 year old
- If safe for PO feeds and mildly to moderately dehydrated, attempt oral feeding

Family teaching
- Viral illness, treated by hydration and suction
- Signs of respiratory distress
- When and how to suction
- Frequent feeds and watch hydration status
- Cough may last 2-4 weeks, do not use OTC cough and cold medications, avoid tobacco smoke

Suction and reevaluation
- Respiratory score (SCORE, SUCTION, SCORE) Q 1 hour + prn if mild to moderate distress
- Respiratory score and suction q30 minutes + prn if severe respiratory distress
- For patients with prolonged ED stays, may space suctioning per MD discretion

Medical Unit Admit Criteria (any of the following)
- Sustained hypoxemia (SpO2 <90% awake, 88% asleep)
- Apnea
- Dehydration/impaired oral hydration requiring ongoing IV or NG fluids
- HFNC trial initiated, clinically improved or unchanged
- Moderate to severe respiratory distress AND one of the above criteria

Decision to Admit or Discharge
- Able to discharge
- Medical Unit Admit Criteria

ICU Admit Criteria (any of the following)
- Clinical worsening despite acute care max HFNC support
- Desaturations below 90% despite 50% FiO2
- Other late findings of respiratory failure: Inappropriately low respiratory rate with worsening obstruction
- Lethargy despite noxious stimuli
- Poor perfusion
- Apnea >20 seconds with associated bradycardia/desaturation requiring intervention

Therapies NOT routinely recommended
- Albuterol
- Racemic Epinephrine
- Corticosteroids
- Chest Physiotherapy
- Montelukast
- Antibiotics
- Hypertonic Saline

Routine testing for viral pathogens NOT recommended unless for cohorting

Chest X-rays NOT routinely recommended

Escalation for severe respiratory distress
- Start low-flow NC if SpO2 <90% (1L if 30-90 days, 1.5L if 91 days-6 months, 2L if 6 months-2 years)
- May consider one-time albuterol trial (continue PRN if improves work of breathing)
- Suction and administer antipyretic as clinically indicated
- Consider CBG

SpO2 <92% on low-flow NC after 30 min
- Go to HFNC Phase

Concern for clinical deterioration
- Escalate respiratory support

Discharge
- Recommend follow up in 24-48 hours

Stop and Review
- Family teaching
- Suction and reevaluation
- Initial assessment
- Rehydration
- Decision to Admit or Discharge
- Medical Unit Admit Criteria
- ICU Admit Criteria
- Therapies NOT routinely recommended
- Routine testing for viral pathogens NOT recommended unless for cohorting
- Chest X-rays NOT routinely recommended
- Escalation for severe respiratory distress
- SpO2 <92% on low-flow NC after 30 min
- Concern for clinical deterioration
- Go to HFNC Phase
- Discharge
- Recommend follow up in 24-48 hours

For questions concerning this pathway, contact: bronchiolitis@seattlechildrens.org
If you are a patient with questions contact your medical provider.
Inclusion Criteria
- Age <2 years
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Patient admitted

Begin family teaching
- Signs of respiratory distress
- How to suction
- When to suction

Assess patient
- Calculate respiratory score

Pre-suction score is LOW (1-4)
- Score, Suction, Score minimum q4 hours, prior to feeds or if more distressed
- Nasal suction
- No continuous pulse oximetry
- If on NG/IV fluids, discontinue fluids and restart oral feeds

Pre-suction score is MODERATE (5-8)
- Score minimum q 2 hours
- Suction minimum q2-4 hours. Score after suctioning.
- Nasal suction
- NP suction if clinically indicated for work of breathing after nasal suctioning
- Spot SpO2 checks; continuous pulse oximetry if on supplemental O2 or per care team request due to clinical concerns

Pre-suction score is HIGH (9-12)
- Score minimum q 1 hours
- Suction minimum q2-4 hours. Score after suctioning.
- Nasal suction
- NP suction if clinically indicated for work of breathing after nasal suctioning
- Continuous pulse oximetry
- Consider albuterol trial and HFNC trial (see below)

Stop and Review

Signs of clinical deterioration:
Lethargy despite noxious stimuli, inappropriately low respiratory rate with worsening obstruction, apnea, poor perfusion; Deterioration does not correlate with day of illness

Place CR monitors
- Notify MD
- Call Rapid Response Team

Rescore at interval specified above (either 1, 2, or 4 hours)
- Recategorize based on pre-suction score

Ready for discharge?

Discharge Criteria
Patients should be meet ALL of the following criteria:
- Respiratory score <5 for at least 8 hours
- No need for NP suctioning for 4 hours
- Off supplemental O2 for 12 hours
- If apnea occurred, no further apnea for 48 hours
- Feeding adequately
- Family teaching completed, teach-back done
- PCP follow up as needed

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Inadequate PO Intake
- Encourage NG over IV fluids, especially if <1 year old
- NPO and IV fluids if severe respiratory distress

Inpatient Management

Escalation for severe respiratory distress
- Start low-flow NC if SpO2 <92% (1L if 30-90 days, 1.5L if 91 days-6 months, 2L if 6 months-2 years)
- May consider one-time albuterol trial (continue PRN if improves work of breathing)
- Suction and administer antipyretic as clinically indicated
- Consider end-tidal CO2 monitoring x1 hour or CBG (if EtCO2 not available)

SpO2 <92% on low-flow NC after 1 hour
- Concern for clinical deterioration

Go to HFNC Phase

Call RRT

Stop and Review

Signs of clinical deterioration:
Lethargy despite noxious stimuli, inappropriately low respiratory rate with worsening obstruction, apnea, poor perfusion; Deterioration does not correlate with day of illness

Place CR monitors
- Notify MD
- Call Rapid Response Team

Rescore at interval specified above (either 1, 2, or 4 hours)
- Recategorize based on pre-suction score

Ready for discharge?

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Patients should be meet ALL of the following criteria:
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- May consider one-time albuterol trial (continue PRN if improves work of breathing)
- Suction and administer antipyretic as clinically indicated
- Consider end-tidal CO2 monitoring x1 hour or CBG (if EtCO2 not available)

SpO2 <92% on low-flow NC after 1 hour
- Concern for clinical deterioration

Go to HFNC Phase

Call RRT
**Bronchiolitis Pathway v13.0: HFNC Management**

**HFNC Inclusion Criteria**
- Primary diagnosis of bronchiolitis
- Age 44 weeks PMA to <2 years
- Severe respiratory distress PLUS persistent SpO2 <92% on maximum low-flow NC (1L if 30-90 days, 1.5L if 91 days-6 months, 2L if 6 months-2 years)

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### Acute Care initiation: call RRT
- Initiate HFNC at acute care max flow, FiO2 21%
  - Titrate FiO2 to maintain SpO2 ≥92%; max acute care FiO2 is 50%
  - VS q30 min x3
  - Ensure NPO

### Huddle 60 minutes post HFNC initiation
- ED: Include ED (RN, RT, APP/MD) and accepting acute care MD
- Acute Care: Include RISK RN, PICU APP/MD (optional), RN, RT, and general medicine MD

### Hypoxia or Respiratory Distress Not Improved
- In ED: Call PICU
- Acute Care: Call RRT
- If transferring to PICU:
  - May escalate respiratory support with ICU guidance
  - Vitals q1h

### Hypoxia or Respiratory Distress Improved
- In ED:
  - Transfer to acute care
  - Suction + vitals q2hr until transfer
- Acute Care:
  - Wean flow rates and FiO2 as tolerated (see below)
  - Suction q2-4 hours until off HFNC
  - VS q2 hours x 12 hours, then q4 hours
  - Place NG if anticipated NPO >2 days
  - May orally feed once weaned to acute care min flow and safe for feeding
  - RN or MD to observe first feed
  - Use extra caution in neonates <90 days old

### Weaning HFNC on the medical unit
- **Rapidity:** wean flow and FiO2 quickly in improving patients, including at night
  - Acute care max flow → min flow → off OR max flow → off, as patient condition allows
  - Avoid gradual weans using other flow
  - Frequency: at least once a day, unless worsening trajectory or ongoing resp distress
  - RT or RN to assess improving patients for readiness to wean q4 hours
  - **Team guidance:** observe patient for 10 minutes after flow wean, and reassess within 2 hours to ensure sustained successful wean
  - **Definition of failed wean:** increased work of breathing that the team judges difficult to sustain for next 12-24 hours, which resolves when flow wean is reversed
  - **RRT considerations:** may restart HFNC without RRT, if within 24 hours of failed trial off, and if severity does not warrant RRT

### Criteria for transfer to the ICU
- Clinical worsening despite acute care max HFNC support
- Desaturations below 90% despite 50% FiO2
- Other late findings of respiratory failure:
  - Inappropriately low respiratory rate with worsening obstruction
  - Lethargy despite noxious stimuli
  - Poor perfusion
  - Apnea >20 seconds with associated bradycardia/desaturation requiring intervention

### Criteria for transfer from the ICU to acute care
- Meets pathway criteria and stable on flow rate at or below the acute care maximum for >12 hours
- If does not meet bronchiolitis HFNC pathway criteria, see HFNC policy

<table>
<thead>
<tr>
<th>Age</th>
<th>HFNC floor maximum (L/min)</th>
<th>HFNC floor minimum (L/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>44wk PMA - 90 days*</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>91 days - 6 months*</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>&gt;6 months - 1 year</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>&gt;1 year - &lt;2 years</td>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>

*Correct for gestational age

**Medical Disclaimer**

If you are a patient with questions contact your medical provider.

bronchiolitis@seattlechildrens.org

For questions concerning this pathway, contact:

bronchiolitis@seattlechildrens.org
How do I use the respiratory scoring tool?

<table>
<thead>
<tr>
<th>4 Respiratory Assessment Elements</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. RESPIRATORY RATE: assessed over 60 seconds</td>
<td>(1-3)</td>
</tr>
<tr>
<td>2. RETRACTIONS: work of breathing</td>
<td>(0-3)</td>
</tr>
<tr>
<td>3. DYSPNEA: shortness of breath</td>
<td>(0-3)</td>
</tr>
<tr>
<td>4. AUSCULTATION: wheezing on lung exam</td>
<td>(0-3)</td>
</tr>
<tr>
<td>TOTAL SCORE</td>
<td>1-12</td>
</tr>
</tbody>
</table>

- The respiratory scoring tool consists of 4 elements that make up the respiratory assessment of the patient in distress.
- You assess each component distinctly and add them to make a total between 1-12.
  - A patient’s RR is 1-3 whereas all other categories are scored 0-3.

- The Seattle Children’s respiratory scoring tool was adapted from the Seattle Children’s asthma pathway. Interrater reliability was validated (see asthma pathway for references).
- Other scoring tools have been validated, but no single tool has been adopted universally or has clearly superior performance in bronchiolitis.
**Treatment: Supplemental Oxygen**

Supplemental oxygen should be provided if SpO2 falls persistently below 90%. The goal is to provide oxygen to maintain SpO2 at or above 90%. (AAP 2014)

- Oxygen is supplied via nasal cannula, using the lowest flow possible.
- SpO2 drops to 88% are acceptable during sleep.
- <20 sec drops in SpO2 to the 80s in the sleeping child do not require supplemental oxygen; these may occur in healthy infants. (Hunt 1999)
- Deeper self-resolving desaturations may not be clinically meaningful in mild-to-moderate bronchiolitis patients, who should therefore be taken off continuous pulse oximetry once off supplemental oxygen. (Principi 2016)

**Treatment: NG or IV Fluids**

Intravenous (IV) or nasogastric (NG) fluid administration should be considered if the patient cannot maintain hydration orally or is severely dehydrated (AAP 2014).

- NG hydration is as effective as IV hydration in patients with bronchiolitis, and requires fewer attempts at placement. It is advisable to involve caregivers in the decision of how to hydrate their child.
- Because respiratory distress may increase the risk of aspiration:
  - Patients with significant coughing, choking, gagging, or worsening tachypnea with feeds should be made NPO, and IV/NG feeds started.
  - Patients with a sustained respiratory rate > 60 should be evaluated for safety of a feeding trial. If severe distress, do not attempt feeding trial and make NPO.
  - Patients on HFNC at acute care maximum flow rates should be NPO.
Caregiver and Family Teaching

Teaching should start on arrival:
- Signs of respiratory distress
  - When to call PCP, go to ED, call 911
- How and when to nasally suction
  - Using bulb syringe or mouth operated nasal aspirator
- Maintaining hydration
  - Small frequent feeds
  - Signs of dehydration
- Anticipatory guidance:
  - Cough can last up to 4 weeks
  - Do not use over-the-counter cough/cold medications

Prevention

RSV can persist on fomites for hours and has been identified in the air up to 22 feet from the patient’s bed.

- Viral isolation is standard for inpatients at Seattle Children’s:
  - Strict handwashing / alcohol-based rubs, gown, gloves, mask
  - Wash hands or gel before and after patient contact, after contact with inanimate objects directly near the patient, and after glove removal
  - Limit visits by young children
- Family education re: hand hygiene (AAP 2014)
- Consider RSV monoclonal antibody (i.e. monthly Synagis) for at-risk infants (AAP palivizumab policy statement 2014)

Source: AAP 2014, AAP Committee on Infectious Diseases 2014
Suctioning is not widely evaluated in the literature, but is considered essential to bronchiolitis care.

- Used to clear secretions from the nares / airway that the child is unable to clear himself / herself.
- Induces coughing, which allows child to clear lower airway secretions.
- Reduces work of breathing and improves oral intake.
- Suction gaps may be associated with longer LOS
- Patients admitted with bronchiolitis should receive suction of the nares at frequent intervals

Mussman 2013, AAP 2014

**Suction should be primarily nasal:**

- **Nasal suction** (with an olive tip catheter, bulb, or parental mouth-operated nasal aspirator) should be used routinely, at regular intervals.
- **Nasopharyngeal suction** should be used in patients in severe respiratory distress and fail to improve with olive tip suction. Nasal edema may result from repeated nasopharyngeal suction events. Some articles suggest nasopharyngeal suction is associated with a longer LOS, and using it less often does not make outcomes worse (Mussman 2013, Mittal 2014).
- Suction response should be documented, with a respiratory score recorded before and after all types of suctioning.
- Family should be trained how/when to use nasal suction at home.
Escalation Therapies: High Flow Nasal Cannula

- **Terms:** Also called high-flow, or high-humidity nasal cannula
- **Function:** HFNC delivers a higher flow of air or oxygen than nasal cannula. Gas is delivered with a mixer so FiO2 can be adjusted (21-100%), although actual delivered FiO2 does not reach 100%. By contrast, nasal cannula oxygen is not humidified and dries airways at higher flow rates.

- **Proposed mechanisms of HFNC action in bronchiolitis:**
  - Provides CO2 “washout” of respiratory physiologic dead space
  - Provides very low-level positive pressure that aids lung recruitment
    - Exact amount of PEEP varies based on:
      - Flows
      - Nasal cannula fit to nares
      - Whether mouth is open or closed
  - **Warmth and humidity**
    - Keep secretions moist, improving mucociliary clearance
    - Inhibit bronchoconstriction reflexes triggered by cold and dry air
HFNC should be weaned quickly in improving patients.

- FiO2 may be weaned by RN/RT
- Flow must be weaned by provider order
  - RN/RT should assess readiness to wean flow every 4 hours, and prompt team to wean if appropriate
  - Teams should wean flow at least daily, unless team holds due to anticipated trajectory or patient severity
  - Flow should be weaned stepwise, from acute care max to min to off.
  - Trials off: Flow can be weaned from max flow to off if appropriate

### Escalation Therapies: Feeding Patients on HFNC

No strong evidence exists to guide feeding practices on HFNC.

**Recommendations:**
- Patients who wean to minimum acute care flow are eligible to resume oral feeds.
- Patients should only attempt oral feeding if clinically improving and if no known aspiration history
- First oral feeding should be supervised by an RN, SLP/OT, or provider
- Oral feeding should be stopped if associated with increased coughing, choking, or worsening respiratory distress.
- An NG tube should be placed and enteral feeds initiated for patients NPO for > 2 days.
Summary of Version Changes

- **Version 1.0 (10/10/2011):** Go live
- **Version 1.1 and 1.2 (07/20/2012):** Coprighted photos and diagrams removed
- **Version 2.0 (10/22/2012):** Updated to SpO2 monitoring recommendations
- **Version 3.0 (12/10/2013):** Go live of Bronchiolitis HFNC Pathway
- **Version 3.1 (12/13/2013):** Changes made to add contact hospitalist; correction to oral feeds to match training slide; wording change in trial of albuterol to match the orders
- **Version 3.2 (1/15/2014):** Changes to inclusion and exclusion criteria; changes to reflect medical hospitalist at ED 90 minute huddle; admit to medical hospitalist
- **Version 4.0 (2/5/2014):** Pathway document was divided into two documents and posted as Bronchiolitis Pathway and HFNC Pathway
- **Version 5.0 (10/1/2014):** Added citation page and link; removed “HFNC Test Your Knowledge” link; updated training slides L, M, and V. In the HFNC phase only: Removal of daily CBG while on HFNC; highlighting of ability to recheck PC02 after HFNC started for improved patients to meet floor admit criteria; PCO2 removed from inclusion criteria; composition of members of ED huddle; ability to admit to general medicine service; ability to trial patient on RA or low flow NC O2 after stable on HFNC at 2 lpm for 4 hours
- **Version 6.0 (1/30/2015):** HFNC Phase ONLY: Update to the pathway inclusion criteria to include severe respiratory distress; added ICU to floor transfer criteria and link to education slide in transfer criteria box
- **Version 7.0 (11/4/2015):** Periodic Review; updated literature search, recommendations and pathway tools; combined bronchiolitis and HFNC pathway documents
- **Version 8.0 (3/7/2016):** HFNC inclusion/exclusion criteria amended, HFNC huddle participants amended, changes to HFNC ED management for unchanged patients, HFNC restarting after weaning clarified
- **Version 9.0 (1/3/2017):** Process Improvement Change; optimization of secretion management, focusing on high-flow cannula use, and improving high-flow efficacy
- **Version 9.1 (2/27/17):** Title of first green box on HFNC Phase changed and grammar adjustment made in Inclusion Criteria
- **Version 10.0 (11/13/2017):** Removal of hospitalist involvement for HFNC initiation/huddle
- **Version 11.0 (12/14/2018):** Removal of respiratory score from admit criteria and change to “moderate to severe distress”
- **Version 12.0 (12/7/2020):** Periodic review go live with new formatting style and minor content changes: removal of respiratory score as an UC to ED transfer criterion, more stringent albuterol trial criteria, time range flexibility for inpatient suctioning for moderate and severe respiratory scores, addition of text to encourage NG over IV use, PRN PCP follow-up, and removal of antibiotic or steroid use as an exclusion criterion for HFNC use
- **Version 13.0 (3/22/2022):** Changed HFNC inclusion criteria from "severe respiratory distress or hypoxia" to "severe respiratory distress PLUS hypoxia" defined as <92% O2 saturation, added severe respiratory distress escalation algorithm
Approval & Citation

Approved by the CSW Bronchiolitis Pathway team for December 7, 2020, go-live

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Acute Care, Team Member  Missy Lein, MSN, RN, PCNS-BC
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CIS Informatician  Carlos Villavicencio, MD
CIS Analyst  Heather Marshall
Librarian  Sue Groshong, MLIS

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Operations Director  Jaleh Shafii, MS, RN, CPHQ

Retrieval Website:  https://www.seattlechildrens.org/pdf/bronchiolitis-pathway.pdf

Evidence Ratings

This pathway was developed through local consensus based on published evidence and expert opinion as part of Clinical Standard Work at Seattle Children’s. Pathway teams include representatives from Medical, Subspecialty, and/or Surgical Services, Nursing, Pharmacy, Clinical Effectiveness, and other services as appropriate.

When possible, we used the GRADE method of rating evidence quality. Evidence is first assessed as to whether it is from randomized trial or cohort studies. The rating is then adjusted in the following manner (from: Guyatt G et al. J Clin Epidemiol. 2011;4:383-94, Hultcrantz M et al. J Clin Epidemiol. 2017;87:4-13.):

Quality ratings are **downgraded** if studies:
- Have serious limitations
- Have inconsistent results
- If evidence does not directly address clinical questions
- If estimates are imprecise OR
- If it is felt that there is substantial publication bias

Quality ratings are **upgraded** if it is felt that:
- The effect size is large
- If studies are designed in a way that confounding would likely underreport the magnitude of the effect OR
- If a dose-response gradient is evident

**Certainty of Evidence**
- 🌟🌟🌟🌟 High: The authors have a lot of confidence that the true effect is similar to the estimated effect
- 🌟🌟🌟 Moderate: The authors believe that the true effect is probably close to the estimated effect
- 🌟🌟🌟🌟 Low: The true effect might be markedly different from the estimated effect
- 🌟🌟🌟🌟🌟 Very low: The true effect is probably markedly different from the estimated effect

**Guideline:** Recommendation is from a published guideline that used methodology deemed acceptable by the team

**Expert Opinion:** Based on available evidence that does not meet GRADE criteria (for example, case-control studies)
Literature Search Methods
For this update, we revised the search strategies in line with current Library practices. Literature searches were conducted in July 2020 to target synthesized literature on bronchiolitis for 2015 to current and limited to English. The search was executed in Ovid Medline, Embase, Cochrane Database of Systematic Review (CDSR), and Turning Research into Practice database (TRIP).

Screening and data extraction were completed using DistillerSR (Evidence Partners, Ottawa, Canada). Two reviewers independently screened abstracts and included guidelines and systematic reviews that addressed optimal diagnosis, treatment, and prognosis of patients who meet pathway inclusion/exclusion criteria. One reviewer screened full text and extracted data and a second reviewer quality checked the results. Differences were resolved by consensus.

Literature Search Results
The searches of the 4 databases (see Electronic searches) retrieved 497 records.

Once duplicates had been removed, we had a total of 376 records. We excluded 332 records based on titles and abstracts. We obtained the full text of the remaining 44 records and excluded 30.

We combined these studies with those previously identified for prior versions of this pathway, and for this update we have included a total 14 new studies. The flow diagram summarizes the study selection process.

<table>
<thead>
<tr>
<th>Identification</th>
<th>Additional records identified through other sources (n=0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Records identified through database searching (n=497)</td>
<td>Records after duplicates removed (n=376)</td>
</tr>
<tr>
<td>Records screened (n=376)</td>
<td>Records excluded (n=332)</td>
</tr>
<tr>
<td>Articles excluded (n=30)</td>
<td>Did not answer clinical question (n=6)</td>
</tr>
<tr>
<td></td>
<td>Did not meet quality threshold (n=16)</td>
</tr>
<tr>
<td></td>
<td>Outdated relative to other included study (n=8)</td>
</tr>
<tr>
<td>Studies included in pathway (n=14)</td>
<td></td>
</tr>
</tbody>
</table>

Flow diagram adapted from Moher D et al. BMJ 2009;339:bmj.b2535
Bibliography

Included Studies

Medical Disclaimer

Medicine is an ever-changing science. As new research and clinical experience broaden our knowledge, changes in treatment and drug therapy are required.

The authors have checked with sources believed to be reliable in their efforts to provide information that is complete and generally in accord with the standards accepted at the time of publication.

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