

# Bronchiolitis: Pediatric

## Respiratory

### Clinical Decision Tools for RNs with Additional Authorized Practice [RN(AAP)s]

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## Background

Bronchiolitis is typically defined as the first episode of wheezing in infants  $\leq 24$  months of age (Lubberdink, 2016). It is a viral illness of the lower respiratory tract in the terminal bronchiolar epithelial cells most commonly occurring in late fall and winter months (Lubberdink, 2016). Edema, increased mucus production, and accumulation of cellular debris lead to tachypnea, bronchospasm, and obstruction of these small airways (Brashers & Huether, 2019; Lubberdink, 2016). Respiratory syncytial virus (RSV) is the leading cause of bronchiolitis but other common pathogens include rhinovirus, parainfluenza virus, influenza virus, coronavirus, and bacterial pathogens (rare) (Brashers & Huether, 2019; Lubberdink, 2016).

## Immediate Consultation Requirements

The RN(AAP) should seek immediate consultation from a physician/NP when any of the following circumstances exist:

- moderate to severe disease (refer to *Classification*);
- infants less than six months of age;
- preterm infants up to one year of age;
- irritability, anxiety, and difficulty speaking;
- decreased mental alertness;
- inspiratory stridor (may suggest croup, foreign body, or other upper airway disease);
- pallor or central cyanosis;
- tachypnea and tachycardia;
- increased work of breathing/nasal flaring;
- grunting, tripod, or sniffing position;
- retractions (subcostal, substernal, intercostal, suprasternal notch (tracheal tug), supraclavicular);
- accessory muscle use (especially sternocleidomastoid muscles);
- breath sounds faint or absent (because of lack of air entry), severely ill children may not have wheezes or readily audible breath sounds as they are unable to move air;

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- marked expiratory wheezes;
- prolonged expiratory phase; and
- oxygen saturation (SpO<sub>2</sub>) ≤ 94% on room air (Interprofessional Advisory Group [IPAG], personal communication, October 14, 2019).

### Classification of Bronchiolitis

Mild	Moderate	Severe
<ul style="list-style-type: none"><li>• no distress noted in appearance and behaviour,</li><li>• respiratory rate is within normal limits for age,</li><li>• no increase or minimal increase work of breathing,</li><li>• oral intake is as per normal,</li><li>• spO<sub>2</sub> ≥ 94% on room air while awake with no oxygen requirements,</li><li>• no apneic episodes,</li><li>• nasal congestion/rhinorrhea frequently present,</li><li>• low grade fever frequently present,</li><li>• cough absent or mild, and/or</li><li>• clear breath sounds.</li></ul>	<ul style="list-style-type: none"><li>• appears ill, fussy, or anxious;</li><li>• respiratory rate is increased;</li><li>• increased work of breathing with accessory muscle use and/or intercostal retractions;</li><li>• starting to have difficulty with feeding or reduced feeding;</li><li>• mild hypoxemia with spO<sub>2</sub> ≤ 94% but ≥ 90% corrected by administration of less than 1.5 L of nasal prong oxygen (O<sub>2</sub>);</li><li>• may have brief episodes of apnea;</li><li>• cough is present; and/or</li><li>• auscultation reveals wheezes and crackles.</li></ul>	<ul style="list-style-type: none"><li>• appears ill, lethargic, or inconsolable;</li><li>• marked increase or decrease in respiratory rate;</li><li>• work of breathing reveals marked chest wall retraction, tracheal tug, nasal flaring, head bobbing, and grunting;</li><li>• poor or not feeding;</li><li>• hypoxemia with spO<sub>2</sub> ≤ 90% requiring more than 1.5 L of O<sub>2</sub> via nasal prongs;</li><li>• may have frequent episodes of apnea;</li><li>• decreased air entry or "silent chest", or significant crackles, wheezing; and/or</li><li>• severe cough.</li></ul>

(Brashers & Huether, 2019)

## Predisposing and Risk Factors

Conditions and risk factors associated with the development of bronchiolitis include:

- prematurity,
- low birth weight,
- ≤ 12 weeks of age,
- pre-existing pulmonary or cardiac disease,
- congenital anomalies of the respiratory tract,
- immune deficiency,
- attends daycare,
- household crowding or other children in the home, and

- second and thirdhand smoke (tobacco and wood, smoke residue on clothing, carpets and objects) (Brashers & Huether, 2019).

## **Health History and Physical Exam**

### **Subjective Findings**

The circumstances of the presenting complaint should be determined. These include:

- birth history concerns (prematurity, low birth weight),
- immunization status,
- previous health status (reactive airway disease, apnea), and
- medications (previous antibiotic use) (Brashers & Huether, 2019).

Infants and children with bronchiolitis typically present with symptoms of an upper respiratory tract infection, followed by progression to symptoms of lower respiratory tract infection at two to three days, peaking around day five (Lubberdink, 2016).

### **Objective Findings**

The signs and symptoms of bronchiolitis may include:

- fever;
- irritability;
- anxiety;
- coryza;
- decreased mental alertness;
- increased work of breathing as evidenced by nasal flaring, retractions (substernal, intercostal, suprasternal notch, supraclavicular), grunting, tachypnea, or decreased oxygen saturation levels;
- prolonged expiratory phase;
- expiratory wheezing;
- lung fields hyper-resonant to percussion;
- widespread, end-inspiratory, and early expiratory crackles;
- decreased air entry; and/or
- abdominal distention (from air swallowing) (Brashers & Huether, 2019).

Infants and children with bronchiolitis may present with these associated findings:

- conjunctivitis,
- sinusitis,
- otitis media (common finding in 50-60% of infants with bronchiolitis), and
- signs of dehydration (secondary to increased fluid needs from fever/tachypnea and decreased oral intake) (Brashers & Huether, 2019).

## Differential Diagnosis

The following should be considered as part of the differential diagnosis:

- pneumonia (bacterial, viral, or aspiration),
- croup,
- upper respiratory viral infection,
- foreign body aspiration,
- asthma,
- allergic reaction,
- inhaled noxious materials (e.g., chemicals, fumes, toxins),
- laryngotracheomalacia (congenital softening of the tissues of the larynx),
- cystic fibrosis,
- mediastinal mass,
- tracheoesophageal fistula,
- gastroesophageal reflux disease (GERD), or
- chronic or congenital pulmonary/cardiac disease (Canadian Paediatric Society, 2018; Lubberdink, 2016).

## Making the Diagnosis

Bronchiolitis typically presents as seasonal respiratory illness in children less than three years of age with rhinitis, cough, fever, tachypnea, wheezing, and increased respiratory effort (Brashers & Huether, 2019). Clinicians should diagnose bronchiolitis and assess disease severity based on history and physical exam (Brashers & Huether, 2019; Lubberdink, 2016).

## Investigations and Diagnostic Tests

Bronchiolitis is diagnosed based on symptom presentation and physical assessment. X-rays, blood work, and naso-pharyngeal swabs are not necessary to confirm the diagnosis (Canadian Paediatric Society, 2018).

## Management and Interventions

### Goals of Treatment

The primary goals of immediate treatment are to relieve symptoms with supportive care which includes ensuring adequate hydration and oxygenation, early identification of respiratory compromise, preventing complications, and treating associated bacterial infection (e.g., otitis media) (Brashers & Huether, 2019).

Treatment options are determined by the severity of the disease (Brashers & Huether, 2019). Bronchiolitis severity is defined as mild, moderate, and severe based on respiratory rate, work of breathing, mental status, oxygen requirements, breath sounds, and cough (Brashers & Huether, 2019). Mild bronchiolitis requires no specific treatment other than supportive care and can usually

be treated in the outpatient setting (Brashers & Huether, 2019). Moderate and severe bronchiolitis requires hospitalization for close monitoring (Brashers & Huether, 2019). Furthermore, the use of bronchodilators, inhaled corticosteroids, hypertonic saline, and antibiotics is not recommended (Brashers & Huether, 2019; Plint & Translating Emergency Knowledge for Kids [TREKK], 2017).

## Non-Pharmacological Interventions

The RN(AAP) should recommend, as appropriate, the following non-pharmacological options:

- ensure adequate fluid intake to prevent dehydration, and
- use of normal saline nose drops for nasal congestion followed by gentle suctioning (Plint & TREKK, 2017).

## Pharmacological Interventions

The pharmacological interventions recommended for the treatment of bronchiolitis are in accordance with the *RxFiles Drug Comparison Charts (RxFiles Academic Detailing Program, 2021)* and *Bronchiolitis: Recommendations for Diagnosis, Monitoring and Management of Children One to 24 Months of Age (Canadian Paediatric Society, 2018)*.

### Analgesics and Antipyretics

	Drug	Dose	Route	Frequency	Duration
<b>Pediatric</b>					
	Acetaminophen	10-15 mg/kg/dose (maximum dose 75 mg/kg/day)	p.o.	q4-6h prn	5-7 days
AND/ OR	Ibuprofen	5-10 mg/kg/dose (maximum dose 40 mg/kg/day)	p.o.	q6-8h prn	5-7 days

## Client and Caregiver Education

The RN(AAP) provides client and caregiver education as follows:

- Counsel about appropriate use of medications, such as purpose, dose, frequency, and side effects.
- Explain the symptoms of the illness, and expected progression to improvement.
- Advise symptoms such as cough can last up to three weeks.
- Recommend routine childhood vaccinations and annual influenza vaccine according to guidelines.
- Advise elimination of secondhand smoke exposure.
- Advise that if at any time, the child's condition worsens or the parent is concerned they should seek immediate medical attention. Signs and symptoms of disease progression include:

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difficulty breathing, pale or blue-tinged skin, severe coughing spells, drooling or difficulty swallowing, inability to speak or cry due to difficulty taking a breath, a whistling sound with breathing or noisy high pitched breathing while sitting or resting, and/or sucking in of the skin around the ribs and top of the sternum with breathing (Brashers & Huether, 2019; Plint & TREKK, 2017).

## Monitoring and Follow-Up

The RN(AAP) should follow-up in 24-48 hours (sooner if symptoms become worse) and confirm that the client is feeding well, remains hydrated, and has no signs of respiratory distress.

## Complications

The following complications may be associated with bronchiolitis:

### Acute

- dehydration,
- febrile seizures,
- prolonged apneic spells (risk for premature infants, neonates, and infants with previous history of observed apnea),
- otitis media, and/or
- respiratory failure (Lubberdink, 2016).

### Chronic

- bronchiolitis obliterans (Lubberdink, 2016)

## Referral

Refer to a physician/NP if the client presentation is consistent with the *Immediate Consultation Requirements* section and for clients who do not respond to supportive treatment (IPAG, personal communication, October 14, 2019).

## References

- Brashers, V., & Huether, S. (2019). Alterations of pulmonary function in children. In K. McCance & S. Huether (Eds.), *Pathophysiology: The biologic basis for disease in adults and children* (8th ed., pp. 1202-1227). Elsevier.
- Canadian Paediatric Society. (2018). Bronchiolitis: Recommendations for diagnosis, monitoring and management of children one to 24 months of age. <https://www.cps.ca/en/documents/position/bronchiolitis>
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- RxFiles Academic Detailing Program. (2021). *RxFiles: Drug comparison charts*. (13<sup>th</sup> ed.). Saskatoon, SK: Saskatoon Health Region.

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