

## DEFINITION

Bronchiolitis is typically defined as the first episode of wheezing in infants < 24 months of age. It is a viral illness of the lower respiratory tract that causes tachypnea, bronchospasm, and mucous production with no other explanation.

## IMMEDIATE CONSULTATION REQUIRED IN THE FOLLOWING SITUATIONS

- Irritability, anxiety, difficulty speaking
- Infants < 6 months of age, unless extremely mild
- Preterm infants up to 1 year of age
- Decreased mental alertness
- Inspiratory stridor (suggests foreign body)
- Pallor or central cyanosis
- Increased work of breathing/nasal flaring
- Retractions (substernal, intercostal, sternal notch, supraclavicular)
- Grunting, tripod, or sniffing position
- Accessory muscle use (especially sternocleidomastoid muscles)
- Breath sounds faint or absent (because of lack of air entry)
- Marked expiratory wheezes, prolonged expiratory phase
- Low oxygen saturation (SpO<sub>2</sub>) < 95% on room air
- Toxic appearing child: Toxic appearing infants and children may be pale or cyanotic and are often lethargic or inconsolably irritable. In addition, they may have tachypnea and tachycardia with poor capillary refill.
- Severely ill children may not have wheezes or readily audible breath sounds as they are unable to move air, "silent chest". These children are at high risk for respiratory arrest.

## CAUSES

*Respiratory syncytial virus* (RSV) is the leading cause of bronchiolitis but other common pathogens include:

- Rhinovirus
- Parainfluenza virus
- Influenza virus
- Coronavirus
- Bacterial pathogens (rare)

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**PREDISPOSING AND RISK FACTORS**

- Prematurity
- Low birth weight
- < 12 weeks of age
- Pre-existing pulmonary or cardiac disease
- Congenital anomalies of the respiratory tract
- Household crowding
- Second and third hand smoke (tobacco and wood, smoke residue on clothing, carpets and objects)

**HISTORY**

- Birth history (prematurity)
- Immunization status
- Previous health status (asthma, reactive airway disease, apnea)
- Medications (previous antibiotic use)

**Prodrome:**

- History of 1-4 days of upper respiratory tract infection
- Fever (38.5°-39°C oral)
- Rhinitis
- Sneezing
- Coughing
- Anorexia (poor feeding)
- Irritability

**Gradual onset of:**

- Wheezing
- Increased, tight cough
- Low-grade fever may or may not be present

**May progress to symptoms of respiratory distress:**

- Irritability, anxiety
- Decreased mental alertness
- Increased work of breathing
- Audible wheezing/rattling with respiration

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- Increased respirations

**PHYSICAL FINDINGS**

- Irritability, anxiety
- Decreased mental alertness
- Increased work of breathing
  - Nasal flaring
  - Retractions (substernal, intercostal, sternal notch, supraclavicular)
  - Grunting
- Expiratory wheezing
- Hyper-resonant to percussion
- May have a prolonged expiratory phase
- Widespread, fine, end-inspiratory, and early expiratory crackles
- Coarse crackles
- Decreased air entry

**Associated Findings**

- Pharyngitis
- Sinusitis
- Otitis media (common finding in 50-60% of infants with bronchiolitis)
- Signs of dehydration (secondary to increased fluid needs from fever/tachypnea and decreased oral intake)

**DIFFERENTIAL DIAGNOSIS**

- First episode of wheezing in a child < 24 months of age
- Pneumonia
- Foreign body aspiration
- Asthma
- Inhaled noxious materials (e.g., chemicals, fumes, toxins)
- Gastroesophageal reflux disease (GERD)
- Chronic or congenital pulmonary/cardiac disease

**COMPLICATIONS**

Bronchiolitis usually resolves without complication in healthy infants; however, those with prematurity or underlying cardiopulmonary disease are at risk for more severe

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disease and requirement for hospitalized care. With the exception of otitis media, comorbid bacterial infection is rare.

**Acute**

- Dehydration
- Febrile seizures
- Prolonged apneic spells (risk for premature infants, neonates, and in infants with previous history of observed apnea)
- Respiratory failure

**Chronic**

- Bronchiolitis obliterans

**INVESTIGATIONS AND DIAGNOSTIC TESTS**

- Bronchiolitis is diagnosed based on symptom presentation. X-rays are not necessary to confirm the diagnosis.
- Pulse oximetry

**MAKING THE DIAGNOSIS**

Typical bronchiolitis presents as seasonal respiratory illness in children < 2 years of age with:

- Fever
- Tachypnea
- Wheezing
- Increased respiratory effort

Clinicians should diagnose bronchiolitis and assess disease severity based on history and physical exam and should not routinely order laboratory and radiologic studies for diagnosis.

**MANAGEMENT AND INTERVENTIONS**

**Goals of Treatment**

- Relieve symptoms
- Early identification of respiratory compromise

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- Prevent complications
- Treat associated bacterial infection (otitis media)

Bronchiolitis severity

Mild:

- Appearance and behavior: normal
- Respiratory rate: normal
- Work of breathing: minimal
- Feeds: normal
- SpO<sub>2</sub> > 93% on room air
- Apnea: nil
- Nasal congestion/rhinorrhea
- Low grade fever
- Harsh cough
- Wheeze

Moderate:

Requires hospitalization for close monitoring:

- Appears ill, lethargic
- Appearance and behavior: some irritability
- Respiratory rate: increased respiratory rate
- Work of breathing: moderate chest wall retraction, tracheal tug, nasal flaring
- Feeds: starting to have difficulty with feeding or reduced feeding
- SpO<sub>2</sub>: mild hypoxemia corrected by administration of nasal prong oxygen (O<sub>2</sub>)
- Apnea: may have brief episodes of apnea

Severe:

Requires hospitalization for close monitoring:

- Appearance and behavior: increasing irritability and fatigue
- Appears ill, lethargic
- Respiratory rate: marked increase or decrease in respiratory rate
- Work of breathing: marked chest wall retraction, tracheal tug, nasal flaring
- Feeds: poor or not feeding
- SpO<sub>2</sub>: hypoxemia requiring high flow O<sub>2</sub>
- Apnea: may have frequent episodes of apnea
- Significantly decreased air entry or "silent chest"

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**Appropriate Consultation**

Consult a physician/RN(NP) for any child with mild symptoms who is at increased risk:

- Prematurity
- Low birth weight (< 2500 grams)
- < 6 months of age
- Pre-existing pulmonary or cardiac disease
- Congenital anomalies of the respiratory tract
- Not tolerating food
- Cannot be observed closely in the home for signs of respiratory distress by a reliable caregiver
- Does not have close proximity or reliable means of transportation to health care facility

**Non-Pharmacological Interventions**

Exercise clinical judgment when assessing the ability of parents/family to care for the child at home (e.g., caregiver fatigue). Provide the following instructions:

- Explain the symptoms of the illness, expected progression to improvement, and signs and symptoms of respiratory distress requiring return to the health centre
- Position a sleeping child in a propped-up position
- Ensure adequate fluid intake to prevent dehydration
- Monitor closely for signs of respiratory distress
- Use normal saline nose drops for nasal congestion

**Pharmacological Interventions**

Antipyretic and analgesic for fever:

- Acetaminophen (Tylenol) 15 mg/kg orally or rectally q4-6h prn (maximum dose 75 mg/kg/day)  
Or
- Ibuprofen (Motrin) 10 mg/kg orally q6-8h prn (maximum dose 40 mg/kg/day)

**Note:** Metered dose inhaler should be used with a spacer (this has equal efficacy to nebulization).

Bronchodilator for wheezing - when acute bronchiolitis is suspected, give a trial dose of the following:

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- Salbutamol (Ventolin) 0.15 mg/kg (minimum dose: 2.5 mg) per metered-dose inhaler **every 20 minutes for 3 doses then 0.15-0.3 mg/kg (not to exceed 10 mg) q1-4h prn or 0.5 mg/kg/hour by continuous nebulization**
- Ipratropium (Atrovent) 250-500 mcg (0.25-0.5 mg) **every 20 minutes for 3 doses by continuous nebulization**
- Children > 12 years of age - Ipratropium (Atrovent) 500 mcg (0.5 mg) **every 30 minutes for 3 doses by continuous nebulization**
- If a child is acute and requires the above “stacked nebulization”, they should be referred out for further monitoring or at minimum require consultation with a physician/RN(NP).
- Steroids are not routinely recommended except in children with clearly defined reactive airway disease or confirmed asthma.
- **If there is no improvement in respiratory rate and effort between 15 to 30 minutes after initiation of inhalation therapy, contact a physician/RN(NP) regarding ongoing therapy and consider transportation to hospital.**

Adjuvant Therapy

Give O<sub>2</sub> if there is any evidence of respiratory distress (e.g., increased work of breathing, decreased SpO<sub>2</sub>):

- 6-10 L/min or more by mask if SpO<sub>2</sub> < 90% or for comfort measures
- Keep SpO<sub>2</sub> > 97%
- IV fluids only if signs of dehydration and unable to tolerate oral fluids

Antimicrobial Therapy

- Antibiotics are not indicated unless there is evidence of otitis media (see SRNA CDT Otitis Media Pediatric) or evidence of secondary bacterial infection such as clinical deterioration with or without sepsis.

**Client and Caregiver Education**

If, at any time, a child develops features of worsening or severe croup, the parent should seek **immediate** medical attention. This includes:

- Difficulty breathing
- Pale or blue-tinged skin
- Severe coughing spells
- Drooling or difficulty swallowing

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- 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
- Sucking in of the skin around the ribs and top of the sternum with breathing

**Associated Illness**

- If there is a finding of pediatric otitis media upon examination, initiate antimicrobial therapy according to recommendations in the SRNA CDT Otitis Media Pediatric.
- Counsel parent/caregiver about the appropriate use of medications (dose, frequency, compliance, etc.)

**Monitoring and Follow-Up**

- Follow-up in 24-48 hours (sooner if symptoms become worse)
- Feeding well, able to maintain hydration
- Absence of symptoms of respiratory distress
- Does not appear acutely ill
- Saline drops for nasal congestion and nasal bulb suction as needed

**Referral**

For moderate to severe bronchiolitis, refer to a physician/RN(NP) if one or more of the following is present:

- Progressive respiratory distress
- Episodes of cyanosis with apnea
- Pre-existing respiratory or cardiac disease or congenital abnormalities
- Decreased SpO<sub>2</sub>
- Inability to tolerate feeding
- Underlying illness (e.g., lung disease, congenital heart disease, neuromuscular weakness, or immune deficiency)
- Prematurity or low birth weight
- < 6 months of age
- Cannot be watched carefully at home for signs of respiratory distress

**Prevention/Health Promotion**

Measures to reduce the risk of bronchiolitis include:



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- Influenza vaccine according to guidelines
- Elimination of secondhand smoke exposure

**DOCUMENTATION**

- As per employer policy

**REFERENCES**

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