

Current Concepts in the Evaluation and Management of Bronchiolitis

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KEYWORDS

- Bronchiolitis • Respiratory syncytial virus • Viral infection • Pediatrics • Evaluation • Management

KEY POINTS

- Bronchiolitis is a lower respiratory tract illness caused by viral infection in children 2 years of age and younger, frequently associated with wheezing.
- It is a common cause of hospitalization, particularly in patients with risk factors for serious disease.
- Care is generally supportive with a focus on safely doing less.
- Many therapies have been shown to have no significant effect on hospitalization rates, length of stay, or duration of symptoms.

OVERVIEW

Bronchiolitis is a common lower respiratory tract illness caused by viral infection in children 2 years of age and younger. Bronchiolitis is characterized by inflammation and increased mucus production, leading to a spectrum of respiratory symptoms including rhinitis, tachypnea, and increased work of breathing. Diagnostic criteria vary across countries.¹ In North America, the American Academy of Pediatrics (AAP) defined bronchiolitis as “a constellation of clinical symptoms and signs including a viral upper respiratory prodrome followed by increased respiratory effort and wheezing.”² Older children can have wheezing induced by viral infection but not fit the classic picture of bronchiolitis, making differentiating bronchiolitis from viral-induced wheeze in these patients challenging.²

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Bronchiolitis is the most common cause of hospital admission in children 12 months old and younger, accounting for 16% to 18% of hospitalizations yearly and costing approximately \$1.73 billion.^{3,4} It most commonly affects infants and young children, with a peak incidence in infants less than 6 months of age.^{4,5} Approximately 2% to 3% of children with bronchiolitis require hospitalization.⁶ The most commonly identified causative viral pathogen is respiratory syncytial virus (RSV), which is found in 50% to 80% of cases.^{3,7} Other common viral etiologies include human enterovirus/rhinovirus (16%–18%), influenza (10%–15%), human metapneumovirus (3%–19%), and parainfluenza virus (1%–7%).^{7–10} Up to 10% to 30% of bronchiolitis cases result from coinfection with multiple viruses.¹⁰ The peak season for RSV and most other viruses is during the winter months in the United States (December to March), with some regional variation in areas with a warmer climate.³

Several risk factors can predispose children to more severe disease from bronchiolitis (**Box 1**). Infants with a history of preterm birth (<37 weeks gestation) and infants less than 12 weeks of age are at increased risk for severe disease. Infants and young children who are immunocompromised, have congenital cardiac disease, or chronic lung disease of prematurity are also at increased risk. Other congenital/genetic abnormalities may put infants at risk, including: cystic fibrosis, Down syndrome, cerebral palsy, or other congenital abnormalities.^{5,11} Other potential risk factors for disease severity include in utero and postnatal cigarette smoke exposure or duration of exclusive breast feeding.^{12–14}

PATHOPHYSIOLOGY

Viruses commonly causing bronchiolitis usually affect only the upper respiratory tract or nasal mucus membranes, leading to nasal congestion and upper respiratory symptoms. However, in 30% to 40% of infected infants, the lower respiratory tract will become affected.¹⁵ This lower airway inflammation leads to shedding of the epithelial layers in the small airways, airway edema, and ciliary dysfunction. The resulting collection of necrotic cells and mucus in the airways can lead to varying degrees of obstruction, atelectasis, and pulmonary ventilation/perfusion mismatch, causing hypoxemia.²

Bronchospasm through smooth muscle constriction is a minor pathophysiological component of bronchiolitis, which may explain the limited effects of bronchodilators in symptomatic treatment.² Additionally, tissue inflammation is minimal; the primary driver of symptoms is debris accumulation in the smaller airways, which likely explains why corticosteroids and epinephrine provide little benefit for children with bronchiolitis.^{16,17}

Box 1

Risk factors for severe bronchiolitis

- Age less than 12 weeks
- History of prematurity (birth <37 weeks gestation)
- Hemodynamically significant cardiac disease
- Chronic lung disease of prematurity
- Immunodeficiency (eg, hypogammaglobulinemia)
- Genetic/chromosomal abnormalities (eg, Down syndrome, cystic fibrosis)
- Other congenital anomalies (eg, spina bifida, anencephaly)
- Other high-risk chronic conditions (eg, cancer, chronic kidney disease)
- In-utero smoke exposure

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