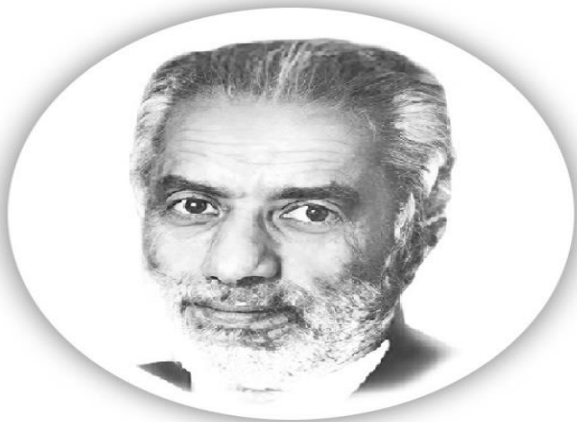




OPTIMIZING PEDIATRIC BRONCHIOLITIS

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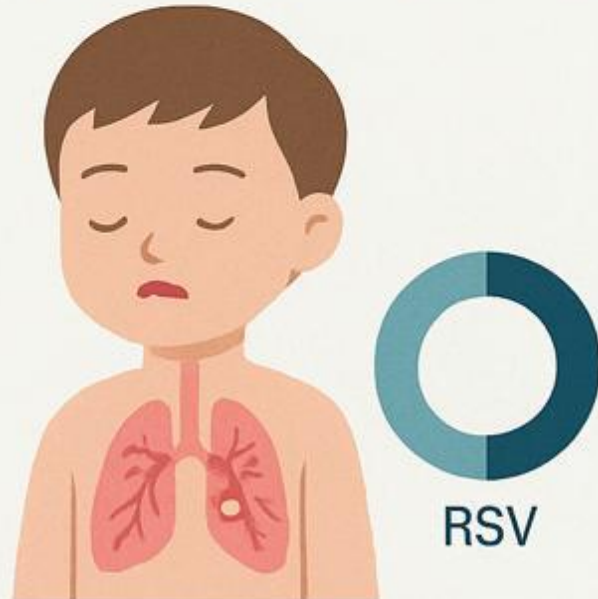
June 15, 2025



Introduction to Bronchiolitis

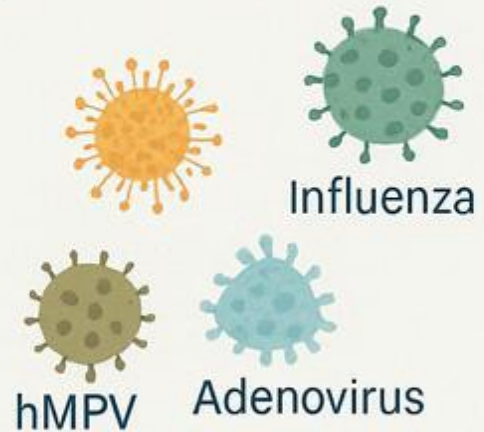
Definition

Bronchiolitis is an acute viral lower respiratory tract infection affecting children under 2 years, characterized by inflammation, edema, and ~ mucus obstruction of the bronchioles, leading to wheezing and respiratory distress



Epidemiology

- Primarily caused by respiratory syncytial virus (RSV, 60–80% of case)
- + human metapneumovirus (hMPV)
- Rhinovirus
- Adenovirus
- Parainfluenza viruses
- Coinfection occurs in 10–30% of hospitalized cases
- It's the leading cause in hospitalization in infants, with 2–3% of cases requiring admission, peaking in winter months



INTRODUCTION TO BRONCHIOLITIS

RISK FACTORS FOR SEVERE DISEASE



Prematurity (<29 weeks gestation)



Chronic lung disease



Congenital heart disease



Immunodeficiency



Young age (<3 months old)



Environmental exposures:

- Tobacco smoke
- Crowded living conditions

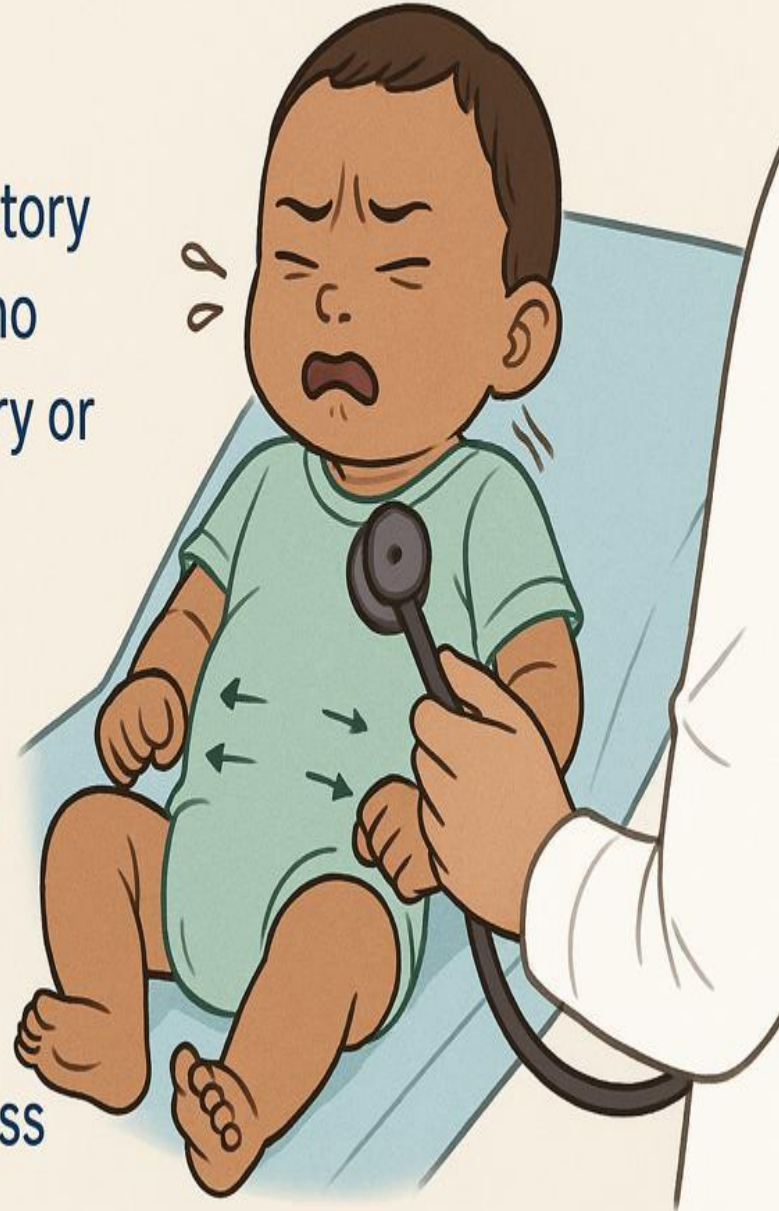
DIAGNOSIS

- **Clinical Diagnosis:**

Diagnosis is based on history and physical exam, with no routine need for laboratory or imaging tests.

- **Key features include:**

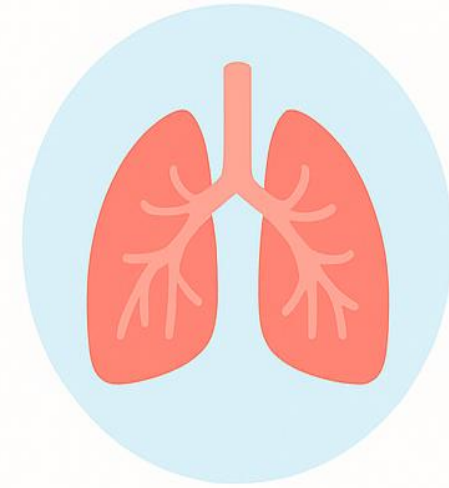
a 2-3-day viral prodrome (fever, cough, rhinorrhea) followed by tachypnea, wheezing, crackles, and signs of respiratory distress



Diagnosis

Differential Diagnosis:

- asthma
(more likely >18 months)
- foreign body aspiration
- gastroesophageal reflux



Young infants (<2 months) may present with apnea

Diagnosis

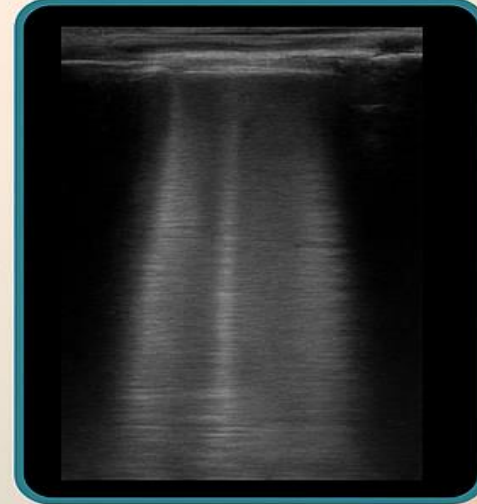
Diagnostic Tests:

- Viral testing (e.g., RSV PCR) is not routinely recommended unless needed for infection control (e.g., hospital cohorting)
- Chest X-rays increase antibiotic overuse (10x likelihood) and are discouraged
- Lung ultrasound shows promise for severity assessment but requires further validation.



Diagnostic Tests

Test	Utility
Routine tests	Not recommended (AAP, NICE)
Viral testing (RSV PCR)	For hospital cohorting, not routine
Chest X-ray	Avoid due to 10× increased antibiotic overuse
Lung ultrasound	Emerging for severity prediction validation ongoing



References: Kendig and Wilmott's *Disorders of the Respiratory Tract in Children* (10th Ed.), Neison Textbook of Pediatrics (22nd Ed. 2025) Italian Guidelines, 2023)
Baslle V, et al. (2022). *Pediatr Pulmonol.*doi.10.1002/ppul.25714

MANAGEMENT STRATEGIES

SUPPORTIVE CARE



Oxygen Therapy

- Administer for $\text{SpO}_2 < 90\text{-}92\%$.
- Use nasal cannula for mild hypoxemia; high-flow nasal cannula (HFNC) is increasingly used for moderate-severe cases to reduce escalation to intensive care.



Hydration

- Oral or nasogastric (NG) feeding for mild-moderate distress. Intravenous (IV) fluids if respiratory rate $>60\text{-}70$ breaths/min or aspiration risk.
- NG and IV are equally effective; NG may reduce placement attempts



Nasal Suctioning

- Gentle, superficial suctioning to relieve nasal obstruction.

Supportive Care – Nasal Suctioning

Gentle, superficial suctioning to clear nasal obstruction

Deep suctioning: Avoid prolongs hospital stay



Breast milk encouraged

RSV-neutrizing antibodies



Kending and Wilmott's *Disorders of the Respiratory Tract in Children* (10th Ed.)
Nelson Textbook of Pediatrics (22nd Ed. 2025)
UCSF Consensus, 2024

Supportive Care – Hydration

- **Oral/NG hydration:**
Mild-moderate cases
- **IV hydration:** RR >60–70/min or aspiration risk
- **2025 uIV:** Equally effective; NG reduces attempts

NG	IV
+ Non-invasive	- Invasive
- Aspiration risk	+ No aspiration risk
+ Shorter hospital stays	- Longer hospital stays



References: Kendig and Wilmott's *Disorders of the Respiratory Tract in Children* (10th Ed., 2023)
Nelson Textbook of Pediatrics (22nd Ed. 2025)
UCSF Consensus, 2024

Supportive Care– Oxygen Therapy

Oxygen	
For SpO ₂ <90–92% (NICE 2021, AAP 2014)	
Nasal cannula Mild cases	
High-flow nasal cannula (HFNC) Moderate-severe, reduces ICU escalation	

MANAGEMENT STRATEGIES

• Pharmacological Interventions:



Bronchodilators

Albuterol/salbutamol show no consistent benefit in hospitalization rates or length of stay and are not recommended due to adverse effects (e.g., tachycardia).

Corticosteroids

No evidence supports use in otherwise healthy children. A Canadian trial suggests potential benefit of combined epinephrine and dexamethasone, but results were non-significant post-adjustment.



Hypertonic Saline (3%)

Mixed evidence; some studies report reduced hospital stay, but others show no benefit and risk of bronchospasm. Not routinely recommended



Antibiotics

Ineffective for viral bronchiolitis and increase harm. Only indicated for confirmed secondary bacterial infection (rare).



MANAGEMENT STRATEGIES

Respiratory Support for Severe Cases:

- **Non-Invasive Ventilation**

Continuous positive airway pressure (CPAP) or bilevel positive airway pressure (BiPAP) for impending respiratory failure.



- **Mechanical Ventilation**

Needed in <1% of cases for respiratory failure
Surfactant or immune globulin therapies lack evidence



- **Mortality:** Low in developed countries (0.2-7%), higher in high-risk groups or at high altitudes (>2500m)



Preventive Measures



Vaccination

No pediatric RSV vaccine is available, but maternal RSV vaccination trials aim to provide passive immunity to infants. Influenza vaccination is recommended for children ≥ 6 months and caregivers.



Prophylaxis

Palivizumab is used for high-risk infants (e.g., preterm < 29 weeks, chronic lung disease, congenital heart disease) during RSV season.



Infection Control

Hand hygiene, avoiding infected contacts, and breastfeeding (containing RSV-neutralizing antibodies) reduce transmission

Preventive Measures – Vaccines

- **Pediatric RSV vaccine:**
None available: trials ongoing
- **Maternal RSV vaccine:**
2023 trials show reduced infant LRTI
- **Influenza vaccine:**
Recommended for children ≥ 6 months, caregivers
- **2024 Update:** Nirsevimab for RSV prevention in infants



RSV Vaccine Development



Kendig and Wilmott's *Disorders of the Respiratory Tract in Children* (10th Ed., 2023)
Nelson Textbook of Pediatrics (22nd Ed, 2025)
Hammitt LL, et. al. (2023), N Engl J Med.
[doi.10.1056/NEJMoa2216480](https://doi.org/10.1056/NEJMoa2216480)

RECENT ADVANCES



Lung Ultrasound

Emerging as a radiation-free tool to predict severity, hospital admission, and respiratory support needs. Multicenter trials are needed for routine use



HFNC Trials

Studies explore early HFNC to prevent ICU escalation, showing promise in moderate-severe cases



De-Implementation

Educational interventions reduce non-evidence-based treatments (e.g., bronchodilators, steroids), improving high-value care

Recent Advances – Psychological Impacts

2025 Update:

Severe bronchiolitis linked to lower IQ, attention deficits

Parental anxiety

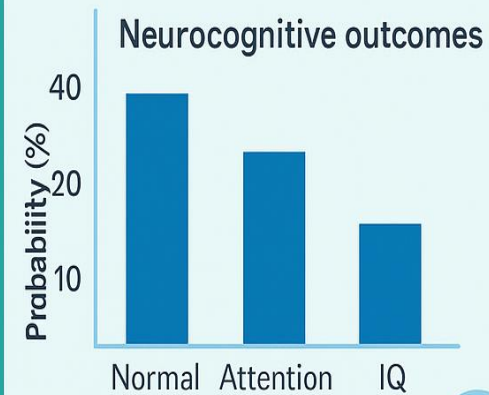
Increased due to neurocognitive risks

Kendig's 2023

Calls for long-term follow-up studies

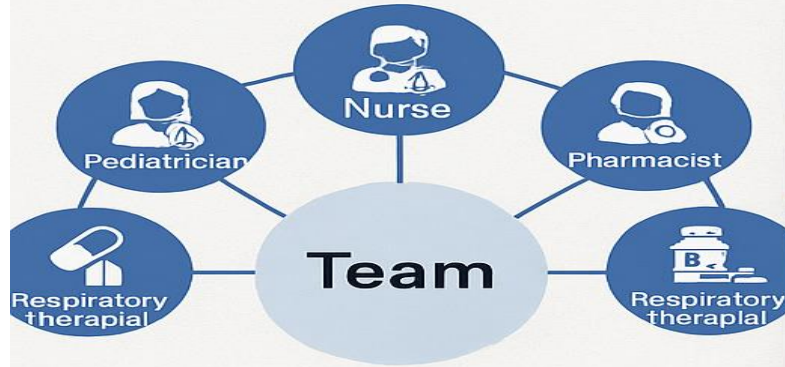
Recommendation

Screen for psychological effects post-ICU



Soni P. et al, (2025), *Front Pediatr*, doi.10.3389/fped.2025.1536571

Interprofessional Team Approach



Goals

- Optimize supportive care
- Educate families, avoid unnecessary treatments
- 2025 Update: Team training reduces treatment variability

Caregiver education

- Hydration, fever, recognizing deterioration



Kendig and Wilmott's *Disorders of the Respiratory Tract in Children* (10th Ed., 2023)

Nelson Textbook of Pediatrics (22nd Ed., 2025)

CPS Guidelines, 2023

Prognosis and Follow-Up



- **Natural Course:** Symptoms typically resolve in 7–14 days; cough may persist 2–3 weeks. Severe cases (10–15% of hospitalizations) may require ICU care.
- **Long-Term Outcomes:** RSV bronchiolitis is linked to recurrent wheezing and asthma, especially with rhinovirus coinfection.
- **Discharge Criteria:** Improved breathing, adequate oral intake, and off supplemental oxygen for ≥ 6 hours. Educate caregivers on recovery and warning signs (e.g., apnea, cyanosis).

CONCLUSION



Supportive care is cornerstone
Bronchiolitis management



Avoid non-evidence-based treatments Broncho-
dilators, steroids



Emerging tools
Lung ultrasound, HFNC, nirsevimab



Interprofessional approach and
prevention enhance outcomes

Thank you for your attention

