

Bronchiolitis in Infants and Children

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Case: 4 month old

- https://youtu.be/TUWk4t_RTg4
- <https://emdally.cooperhealth.org/content/back-basics-pediatric-respiratory-distress>

Objectives	Overview	Overview of bronchiolitis
	Review	Review the diagnosis and management based upon current AAP guidelines
	Discuss	Discuss areas for future research

Bronchiolitis

Definition

- Viral infection and inflammation of the small airways (bronchioles) with typical presentation

Diagnosis

- Purely clinical
- Less than 2 years of age
- URI with
- Signs of middle respiratory tract disease

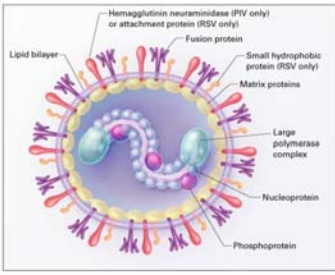
Bronchiolitis

- Scope
 - Exposure
 - Hospitalization
 - Cost
- Causes
 - RSV
 - Parainfluenza
 - Influenza
 - Human Metapneumovirus
 - Rhinovirus
 - Mycoplasma

Seasonal variation

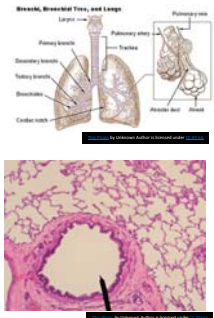
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Respiratory Syncytial Virus (RSV)



The diagram shows a cross-section of the Respiratory Syncytial Virus (RSV) particle. It features a lipid bilayer outer shell with several surface proteins: Hemagglutinin (RSV only) or attachment protein (RSV only), Fusion protein, Small hydrophobic protein (RSV only), and Matrix proteins. Inside the shell is the large polymerase complex and nucleoprotein. The genome is composed of phosphoprotein.

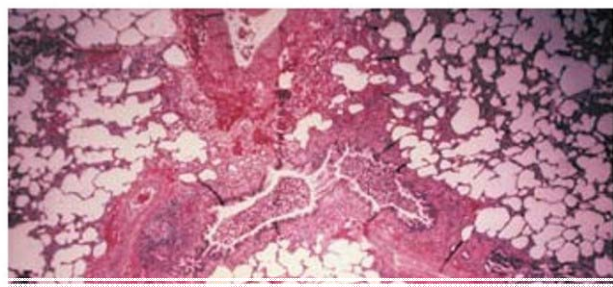
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The top part shows anatomical diagrams of the bronchial tree, labeling the trachea, primary bronchi, secondary bronchi, tertiary bronchi, bronchioles, and alveolar ducts. Below is a histological image of a bronchiole showing the characteristic ciliated columnar epithelium and the surrounding connective tissue.

Pathophysiology

- Infection of bronchiolar epithelial cells
- Edema, cell damage/ sloughing, obstruction
- Mucous production/ smooth muscle reactivity



A histological section showing bronchiolitis in an infant with RSV. The image displays thickened bronchiolar walls with significant inflammation, including hyperplasia of the bronchiolar epithelium and the presence of multinucleated giant cells.

Bronchiolitis in an infant with RSV
Hall C. N Engl J Med 2001;344:1917-1928

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Clinical Presentation

- Symptoms occur 5-7 days after exposure
- Parents report rhinorrhea, cough, wheeze
 - +/- fever, vomiting, decreased po, fussiness
- Young infants- apnea
- Older children/ adults- URI symptoms, sore throat, cough



Diagnosis and Management

- Bronchiolitis is a clinical diagnosis
- little utility for laboratory or radiologic studies
- use of viral testing



Bronchiolitis: Do's and Don'ts



DO

- **DO:** Support hydration
- **DO:** Pediatric Respiratory Score (PRS)
 - q4hrs routinely, AND
 - Before and after any intervention to assess efficacy
- **DO:** Second-Hand-Smoke and Smoking Cessation counseling by RT
- **DO:** Use hand sanitizer

DON'T

- **DON'T** obtain RVPs!
 - Diagnosis and isolation based on CLINICAL SYMPTOMS
- **DON'T** give albuterol
- **DON'T** give epinephrine
- **DON'T** give steroids
- **DON'T** give antibiotics

Adapted from: Paladini SL, et al., Clinical Practice Guideline: The Diagnosis, Management, and Prevention of Bronchiolitis. Pediatrics 2014; 134:e1472-e1502.

The More That Changes, The More It Stays The Same

Nelson's Textbook of Pediatrics 9th Edition, 1969
Bronchiolitis

- "The white blood count is usually within normal limits."
- "Treatment is symptomatic."
- "Patients with dyspnea, whether cyanotic or not should receive oxygen"
- "...oral intake of fluids must often be supplemented by parenteral fluids."
- "...antimicrobial agents have no therapeutic value."
- "Nor is there evidence that the use of corticosteroids is useful in bronchiolitis"
- "Bronchodilating drugs are of no value;..."
- "When bronchial asthma is considered a diagnostic possibility, trial of a single small dose of hypodermically administered epinephrine may be tried. If there is no response to this therapy in a short time, no additional epinephrine or other bronchodilators should be administered."

Outpatient Management

Counsel parents on disease course

- Signs/ symptoms of respiratory distress
- No utility of bronchodilators/ steroids

Ensure ability to feed orally

- Nasal suctioning before feeds
- Signs/ symptoms of dehydration

Bacterial Infections and Bronchiolitis

Acute Otitis Media

- Very common- 50-60%
- Usual organisms
- Treat according to accepted guidelines

Serious Bacterial Infections

- Risk is low but not absent
- Rates of 0-10%
- Meningitis very rare
- UTI most common
- Question of asymptomatic bacteruria

Severe Disease	Risk Factors for Severe Disease
<ul style="list-style-type: none">• Respiratory distress• Apnea• Need for iv hydration• Need for mechanical ventilation	<ul style="list-style-type: none">• Age less than 12 weeks• History of prematurity• Underlying cardiopulmonary disease• Underlying immune deficiency

Assessing Risk

Indications for Hospitalization

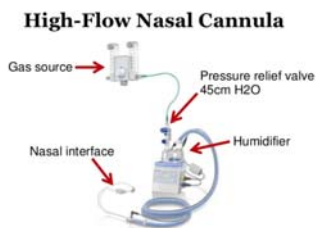
- Respiratory distress or respiratory difficulties requiring close monitoring
- Hypoxia- consistently <90%
- Severe symptoms interfering with feeding and /or dehydration
- Apnea
- Infant with risk factors for severe disease
- Unstable social situation and/ or lack of outpatient support and follow-up

Diagnosis and Management

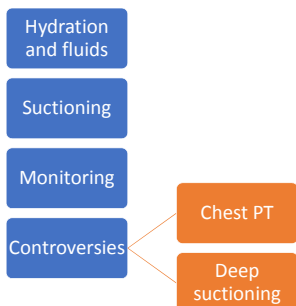
- Bronchiolitis is a clinical diagnosis
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Inpatient Management

- Oxygenation
 - Goal to keep saturations 90% or higher
 - Nasal cannula
 - High flow nasal cannula



Inpatient Management



Inpatient Management- Ribavirin

- Multiple studies with small sample size
 - Variable quality
- Several show modest improvements
- Very cumbersome delivery
- Expensive
- Potentially toxic to providers
- Indicated for severely immune compromised patients

Tried and Failed

- Bronchodilators**
 - Beta agonists
 - Albuterol
 - Alpha agonists
 - Racemic epi
 - Hypertonic saline
- Other**
 - Corticosteroids
 - Monteleukast
 - Antibiotics

Prevention


- Palivizumab
- Decreasing risks
- Vaccine

Prevention- Palivizumab

- Palivizumab
 - Monoclonal anti-RSV antibody
 - Offers passive immunity
 - Effectiveness
 - Cost
- Infants with the following risk factors should receive up to 5 doses of palivizumab in their first year
 - Infants born at 29 0/7 weeks or less
 - Infants with symptomatic chronic lung disease
 - Infants with hemodynamically significant heart disease
- When given prophylaxis with palivizumab should be given in 5 monthly doses, at a dose of 15 mg/kg per dose intramuscularly

Prevention

- Hand hygiene
- Infants should not be exposed to passive smoking
 - Providers should inquire about and counsel caregivers re risks
- Breastfeeding is recommended to decrease a child's risk of having lower respiratory tract disease



RSV vaccine

Historical Problems

Future Directions

ONLY ONE THING IS CERTAIN...

WINTER IS COMING.

HOUSE OF STARK

Preparing for the season

Burden to Healthcare Systems

- Office Visits
- EMS Calls
- Hospitalizations
- Morbidity and Mortality

What may help

- Clinical Pathway Adherence Inpatient ED
- Seasonal staffing
- Observation Units
- Home Oxygen

Future Studies

- Algorithms to predict course/ severity
- Nasogastric hydration
- Tonicity of IV fluids
- Incidence of true AOM
- Deep suctioning
- Monitoring oxygen saturation
- Use of home O2
- Oxygen for high altitude
- High flow nasal cannula
- RSV vaccine and antivirals

Suggested Reading

- Clinical Practice Guideline: The Diagnosis, Management, and Prevention of Bronchiolitis Shawn L. Ralston, Allan S. Lieberthal, et al. Pediatrics Nov 2014, 134 (5) e1474-e1502; DOI: 10.1542/peds.2014-2742
- Viral bronchiolitis Todd A. Florin, Dr; Amy C Plint MD, and Joseph J Zorc Prof. Lancet, The, 2017-01-14, Volume 389, Issue 10065, Pages 211-224

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- Mersine A. Bryan, MD, Arti D. Desai, MD, MSPH, Lauren Wilson, MD, Davene R. Wright, PhD, Rita Mangione-Smith, MD, MPH, Association of Bronchiolitis Clinical Pathway Adherence With Length of Stay and Costs PEDIATRICS Volume 139, number 3, March 2017; e2 0163452
