

Bronchiolitis: Controversies in Management

Steven M. Selbst, MD

Professor of Pediatrics

Vice-Chair for Education

Pediatric Residency Program Director

Attending Physician

Division of Emergency Medicine

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Epidemiology

- ~ 100,000 Admissions / Year
 - Most common cause < 1 yr old
- Cost \$1.73 billion (2009)
- 90% of RSV infections are in < 2 yrs old
- Severe adverse events are uncommon
 - ICU care, mechanical ventilation
 - Less than 100 deaths/year

Epidemiology

- Risk factors for severe disease
 - Congenital heart disease
 - Chronic lung disease of prematurity
 - History of prematurity (<37 weeks)
 - Immunodeficiency
 - Young age (<12 weeks)
- * Probably not related to specific virus

Epidemiology

- Infectious agents:
 - Respiratory Syncytial Virus (RSV) (50-80%)
 - Parainfluenza Virus
 - Adenovirus
 - Rhinovirus
 - Influenza
 - *Mycoplasma pneumoniae*
 - Human metapneumovirus

Clinical Presentation

- Nasal discharge
- Persistent cough
- Tachypnea
- Increased work of breathing (retractions, grunting, nasal flaring)
- Crackles and wheezing
- Fever (1/3 infants) early in illness
- Median duration 2 weeks (3 weeks, 10-20%)



CLINICAL PRACTICE GUIDELINE

Clinical Practice Guideline: The Diagnosis, Management, and Prevention of Bronchiolitis

abstract

FREE

This guideline is a revision of the clinical practice guideline, “Diagnosis and Management of Bronchiolitis,” published by the American Academy of Pediatrics in 2006. The guideline applies to children from 1 through 23 months of age. Other exclusions are noted. Each key action statement indicates level of evidence, benefit-harm relationship, and level of recommendation. Key action statements are as follows: *Pediatrics* 2014;134:e1474–e1502

Shawn L. Ralston, MD, FAAP, Allan S. Lieberthal, MD, FAAP, H. Cody Meissner, MD, FAAP, Brian K. Alverson, MD, FAAP, Jill E. Baley, MD, FAAP, Anne M. Gadomski, MD, MPH, FAAP, David W. Johnson, MD, FAAP, Michael J. Light, MD, FAAP, Nizar F. Maraqa, MD, FAAP, Eneida A. Mendonca, MD, PhD, FAAP, FACMI, Kieran J. Phelan, MD, MSc, Joseph J. Zorc, MD, MSCE, FAAP, Danette Stanko-Lopp, MA, MPH, Mark A. Brown, MD, Ian Nathanson, MD, FAAP, Elizabeth Rosenblum, MD, Stephen Sayles III, MD, FACEP, and Sinsi Hernandez-Cancio, JD

KEY WORDS

bronchiolitis, infants, children, respiratory syncytial virus, evidence-based, guideline

| Diagnosis

- Assess for Risk Factors
 - Age < 12 weeks
 - Prematurity
 - Underlying cardiopulmonary disease
 - Immunodeficiency

Diagnosis

- No routine studies
- Reserve x-rays for severe disease (ICU), suspected pneumothorax
 - Atelectasis may indicate severe disease
(Shaw, et al 1991)
 - X-rays lead to use of antibiotics

2014 AAP Guidelines (Moderate Recommendation)

Important Questions for Management

- Do any of the commonly used therapies...
 - Improve short term clinical outcomes?
 - Affect hospitalization rates?
 - Offer improvement compared with placebo?

Bronchodilator Therapy

Beta agonists (albuterol)

Used for years to treat those who wheeze (asthma)

Cochrane Review (Gadomski 2014)

- No benefit in clinical course
- Adverse effects, cost outweigh benefits

Bronchodilator Therapy

*Do not administer albuterol
– Not even a trial!

2014 AAP Guidelines
(Strong Recommendation)

Nebulized Epinephrine

- Epinephrine vs. Placebo (Outpatient)
 - 3 studies, 10 outcomes assessed
 - 3 outcomes favored epinephrine:
 - All modest
 - RR and O₂ saturation at 30 min
 - Change in clinical score at 60 min
 - No change in admission rates
 - But slightly favored epinephrine

Nebulized Epinephrine

- Meta-analysis Review (Hartling, 2011)
 - Inpatients- no evidence of improvement (LOS)
 - Outpatients- more controversial
 - May reduce hospitalization compared to placebo at ED visit

Nebulized Epinephrine

- Summary:
 - Evidence lacking to support for inpatients
 - Modest benefits for outpatients
 - Compared with albuterol and placebo
 - No safe delivery system for home use
- *Do not administer epinephrine

2014 AAP Guidelines

(Strong Recommendation)

Nebulized Hypertonic Saline

- Why?
 - Improves mucociliary clearance
 - Osmotic movement of H₂O into airway
 - Decreases interstitial edema
 - Decreases viscosity of mucus
 - Works in asthma, CF
 - *May administer hypertonic saline (inpatient)
- 2014 AAP Guidelines (Weak Recommendation)

Nebulized Hypertonic Saline

- Double blind controlled trial (Silver, 2015)
 - Inpatient (~ 100 patients/group)
 - Compared 3% vs. 0.9% saline
 - No difference in LOS
 - No change in readmission rates
 - No adverse events

Nebulized Hypertonic Saline

- Systematic review (Zhang, 2015)
- 24 trials, 3200 patients
- Compared 3% vs. 0.9% saline
 - Inpatient
 - Shorter LOS
 - No adverse events
 - Outpatient
 - Reduced risk for hospitalization by 20%

Corticosteroids

- Why?
 - Limit edema
 - Limit inflammatory cascade
 - Works with others who wheeze (asthma)
 - Works with airway edema (croup, anaphylaxis)

Corticosteroids

- Meta-analysis / Cochrane Review (Fernandes, 2013)
 - 17 studies; total N = 2596
 - No difference in admissions compared to placebo
 - No difference in LOS for inpatients

*Do not administer systemic corticosteroids

2014 AAP Guidelines (Strong Recommendation)

Oxygen

- “Oxygen is vitally important in bronchiolitis; there is little evidence that any other treatment is useful.” Reynolds & Cooke (1963)

*May choose to NOT administer oxygen if
O2 sat >90%

*May choose to NOT use continuous
pulse oximetry

2014 AAP Guidelines (Weak Recommendations)

Oxygen- Why not?

- Transient hypoxemia not associated with complications
- Transient hypoxemia common in normal children
- O₂ saturation poor predictor of distress
- Routine O₂ sat monitoring correlates with prolonged hospitalization
- Intermittent O₂ saturation monitoring as good as continuous

High Flow Nasal Cannula

- Heated, humidified circuit blended O₂
- Delivers larger volume of air and O₂
- Flow enhances washout of CO₂
- Decreased inspiratory resistance (NP stenting)
- Decreases work of breathing
- No adverse effects- Not well studied
- Consider trial for significant distress
- **No recommendation by AAP guidelines**

What Else?

- *Should not administer antibiotics
 - 25% admitted patients have atelectasis
 - Bacterial pneumonia is unlikely
- *Administer IV fluids if unable to drink

2014 AAP Guidelines
(Strong recommendations)

Nasal Suction

- Suctioning the nose (not deep suction) may provide temporary relief
- May improve O2 saturation

Moschino, *Arch Dis Child* 2016; 101 :114

No recommendation by AAP Guidelines

Summary

- Bronchodilators -Nope
- Nebulized Epinephrine-Nope
- Corticosteroids-Nope
- Hypertonic saline-Maybe
- Oxygen- Maybe- if really low O2 Sat
- High Flow Nasal Cannula-Maybe

Summary- Our Approach

- Suction the nose
- PO trial, observe 1 hour (mild-mod)
- Supplemental oxygen (if low O2 Sat)
- IV fluids as needed
- Trial of HFNC (moderate-severe distress)
- Trial of bronchodilators (older child, previous wheezing, family hx wheezing)

Summary- Our Approach

- Limit testing, x-rays
- Consider urine culture in young febrile infants (<60 days old)

Summary- Our Approach

- Admit to hospital
 - Baby in distress
 - Young infants, < 3 months
 - Not drinking well
 - Need for oxygen (< 92% or 90%?)
 - Social concerns

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