Advanced Pediatric Emergency Medicine Assembly

March 23-26 2015
New York, NY

Bronchiolitis: What’s New and What Not to Do

Bronchiolitis is a respiratory disease in infants and in children that is typically diagnosed by clinical findings. Recommendations for diagnosis and management have been previously promulgated by the American Academy of Pediatrics Subcommittee on Diagnosis and Management of Bronchiolitis. These guidelines have been updated. This expert lecturer will discuss controversies in care management (e.g. Levels to define hypoxemia) and risk factors of the patient with bronchiolitis (e.g. an ED visit the week prior, maternal smoking, etc…) and evidence-based guidelines for admission.

OBJECTIVES

- Describe the diagnosis and management of bronchiolitis in the ED
- Discuss updated recommendations in the AAP 2014 Bronchiolitis Guidelines and apply these guidelines to clinical practice
- Discuss risk factors for worsening disease, apnea and respiratory distress, admission criteria, and its integration into an ED care pathway

3/26/2015
8:45 AM-9:15 AM
Grand Ballroom
TH-21

DISCLOSURES:
(+) No significant financial relationships to disclose
Disclosures

- I have no actual or potential conflict of interest in relation to this program.
- I also assume responsibility for ensuring the scientific validity, objectivity, and completeness of the content of my presentation.
Objectives

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Case: 2 month-old infant

- A mother brings in her 2 month-old infant with respiratory distress.
  - Appearance – infant is awake but decreased activity;
    Work of Breathing – retractions in all fields; Circulation – color is cyanotic around the mouth.
  - T 38°C, HR 180; RR 70; Pulse ox 87% on room air.
    Decreased breath sounds and wheezing in all fields.
Case: 2 month-old infant

- **What is your assessment?**
  - Respiratory distress; early respiratory failure

- **What are your management priorities?**
  - Would you try nebulized epinephrine?
  - Albuterol?
  - Give steroids?
  - Give antibiotics?
  - Use CPAP?
  - Suction?
  - Hydration?
  - Admit?

Bronchiolitis What’s New?

- Recommendations for diagnosis and management have been previously promulgated by the American Academy of Pediatrics Subcommittee on Diagnosis and Management of Bronchiolitis.
- Updated 2014!!!
Bronchiolitis

- Lower Respiratory Tract Infection (LRTI)
  - Viral URI + inflammation of small airways/bronchioles (wheezing) + airway obstruction (rales, collapse and/or trapping) → increased work of breathing + hypoxia
  - Primarily effects children between 0-2 years of age; peak incidence 2-8 months
  - The leading cause of infant hospitalization

Microbiology

- Respiratory Syncytial Virus (60-75%)
- Rhinovirus
- Influenza A and B Virus
- Parainfluenza Virus
- Adenovirus
- Human Metapneumovirus
- Coronavirus
- Human Bocavirus

Microbiology

<table>
<thead>
<tr>
<th>Illness</th>
<th>Dominant virus</th>
<th>Co-infection rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bronchiolitis</td>
<td>RSV</td>
<td>41%</td>
</tr>
<tr>
<td>Acute Wheezing</td>
<td>HRV</td>
<td>43%</td>
</tr>
<tr>
<td>Pneumonia &lt;12 mos</td>
<td>RSV, HMPV</td>
<td>33%</td>
</tr>
<tr>
<td>Pneumonia &gt;12 mos</td>
<td>HRV, HboV</td>
<td>27%</td>
</tr>
</tbody>
</table>


AAP 2014 Bronchiolitis Guidelines: Diagnosis

- Clinicians should diagnose bronchiolitis and assess disease severity on the basis of history and physical examination.
- Clinicians should assess risk factors for severe disease when making decisions on evaluation and management.

(Evidence Quality: B; Recommendation Strength: Strong Recommendation)

https://www.youtube.com/watch?v=kI1p1wFNoBFk
Infants at Increased Risk for Severe Disease

- <12 weeks of age
- History of prematurity (<37 weeks gestational age)
- Congenital anatomic defects of the airway (e.g., laryngotracheomalacia)
- Cardiovascular disease
- Immunodeficiency
- Neurologic disease
- Ill or toxic appearing
- SaO2 < 95%
- Gestational age < 34 weeks
- RR > 70 breaths/min
- Atelectasis on chest radiograph [other authors find no correlation]
- Age < 3 months

Respiratory failure in 2-7% of hospitalized infants

Bronchiolitis and Viral Testing

- Rarely alters management – may be used for cohorting when hospitalizing patients
- Antigen or PCR tests of nasal washings provide rapid and accurate (sensitivity 87-91%, specificity 96-100%) detection of RSV
- RT-PCR assays are now commercially available for RSV.
  - The sensitivity of these assays often exceeds the sensitivity of virus isolation and antigen detections methods.
- The specimen required is a nasopharyngeal aspirate collected in a suction trap with 2ml viral transport media.
AAP 2014 Bronchiolitis Guidelines: Pulse Oximetry and Oxygen Therapy

- Clinicians may choose to monitor with continuous pulse oximetry and not to administer supplemental oxygen if the oxyhemoglobin saturation exceeds 90% in infants and children with a diagnosis of bronchiolitis

(Evidence Quality: D; Recommendation Strength: Weak Recommendation [based on low level evidence and reasoning from first principles]).

Consider oxygen therapy <93%; absolute <90%

AAP 2014 Bronchiolitis Guidelines: Chest Radiography

- When clinicians diagnose bronchiolitis on the basis of history and physical examination, radiographic or laboratory studies should not be obtained routinely.

(Evidence Quality: B; Recommendation Strength: Moderate Recommendation).

Consider in really sick kids; admissions!
AAP 2014 Bronchiolitis Guidelines: Albuterol and Epinephrine

- Clinicians should not administer albuterol (or salbutamol) or epinephrine to infants and children with a diagnosis of bronchiolitis.
  - May have short term improvement in symptoms yet no change in disease resolution, need for hospitalization or LOS.

(Evidence Quality: B; Recommendation Strength: Strong Recommendation).

In infants with bronchiolitis it does not change clinical course and brings with it adverse events (tremors and tachycardia) and additional costs; tough to not try it in sick infants.

Bronchodilators Revisited

- Is there a subset that can be treated with β- agonists?
  - Cochrane review no clear evidence that β- agonists work in children < 2 years of age with recurrent wheezing
  - Results cannot be extrapolated to children with severe disease – however critical care studies have yet to reveal a significant benefit.

Epinephrine

- 19 RCT with 2256 infants
  - Found no improvement in LOS or in outcomes
  - One placebo controlled trial showed possible increased LOS with epinephrine
  - Role of epi in outpatients is controversial – Canadian Bronchiolitis Epinephrine Steroid Trial
    - 800 infants – over 7 days showed reduced admission rates with epi+steroids [this finding disappears when adjusting for multiple comparisons]
  
  
  

AAP 2014 Bronchiolitis Guidelines: Corticosteroids

- Clinicians should not administer corticosteroids in infants with bronchiolitis in any setting.

  (Evidence Quality: A; Recommendation Strength: Strong Recommendation)

  
AAP 2014 Bronchiolitis Guidelines: Hypertonic Saline

- Nebulized hypertonic saline should not be administered to infants with a diagnosis of bronchiolitis in the emergency department.
  
  (Evidence Quality: B; Recommendation Strength: Moderate Recommendation)

- Clinicians may administer nebulized nebulized hypertonic saline to hospitalized infants.
  
  (Evidence Quality: B; Recommendation Strength: Weak Recommendation)

Silver AH. Randomized controlled trial of efficacy of nebulized 3% saline without bronchodilators For infants admitted for bronchiolitis: preliminary data (abstract – PAS May 3-6, 2014)

Hypertonic Saline

- Cochrane Review 2013: 11 RCT with 1090 infants
  
  - 3% nebulized saline versus NS: No change in admission rates (with 3 treatments); No adverse events
  
  - Wu, et al: JAMA-Peds 2014: Hypertonic saline given to children with bronchiolitis in the ED decreases hospital admissions. "We can detect no significant difference in Respiratory Distress Assessment Instrument score or length of stay between the HS and NS groups."

  - Fiorin, et al: JAMA-Peds 2014: 62 infants randomized to HS or NS in the ED - Based on these results and the existing evidence, administration of a single dose of 3% HS does not appear to be indicated to treat bronchiolitis in the acute care setting.


AAP 2014 Bronchiolitis Guidelines: Chest Physiotherapy

- Clinicians should not use chest physiotherapy for infants and children with a diagnosis of bronchiolitis
  (Evidence Quality: B; Recommendation Strength: Moderate Recommendation).
  Conflicting data on suctioning – some show benefit others LOS increased


AAP 2014 Bronchiolitis Guidelines: Antibiotics

- Clinicians should not administer antibacterial medications to infants and children with a diagnosis of bronchiolitis unless there is a concomitant bacterial infection, or a strong suspicion of one.
  (Evidence Quality: B; Recommendation Strength: Strong Recommendation)

- In hospitalized infants <90 days rates of SBI extremely rare; UTI 1-3%

- In ED, UTI, 1.9-5.7% - none with meningitis – cautions with neonates
Antibiotics

- 5 RCT with 543 infants
  - No decrease in admission or LOS
  - No improvement in respiratory distress, wheezing, SaO₂ or fever
  - No evidence that reduces persistent cough or wheezing

  **Possible benefit in hospitalized infants with respiratory failure**


AAP 2014 Bronchiolitis Guidelines: Hydration

- Clinicians should administer nasogastric or intravenous fluids for infants with a diagnosis of bronchiolitis who cannot maintain hydration orally

  (Evidence Quality: X; Recommendation Strength: Strong Recommendation)

  - When respiratory rate >60 feeding may be compromised – also decreased PO intake associated with pulse ox <95%.
  - NG tube is an option to intravenous therapy – if use IV DO NOT use hypotonic fluids (risk of hyponatremia with hypotonic fluids)


**Heliox**

- Significantly reduces clinical scores of non-intubated patients at 1 hour (Clinical significance?)
- No reduction in intubation rate, length of mechanical ventilation or LOS
- Nasal cannula heliox therapy is ineffective
- No adverse events


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**Nasal CPAP**

- Recent Cochrane Database Syst Rev: “The effect of CPAP in children with acute bronchiolitis is uncertain due to the limited evidence available. Larger trials with adequate power are needed to evaluate the effect of CPAP in children with acute bronchiolitis”.
- The effect of CPAP on the need for mechanical ventilation in children with acute bronchiolitis was uncertain (two RCTs, 50 participants; risk ratio (RR) 0.19, 95% CI 0.01 to 3.63; low quality evidence).
- Fewer complications compared to intubation
- Need more studies to determine effectiveness in improving outcome.

AAP 2014 Bronchiolitis Guidelines: 
Palivizumab (Synagis)

- **Palivizumab (Synagis)**
  - Do not administer to normal infants with gestational age 29 weeks or greater  
    (Evidence Quality: B; Recommendation Strength: Strong Recommendation)

- **Administer during 1st year of life if:**
  - Congenital heart disease (moderate to severe pulmonary hypertension, cyanotic heart disease congestive heart failure from CHD)
  - Chronic lung disease of prematurity (<32 weeks and requires O2 for first 28 days of life)
  - 5 monthly doses (15/kg/dose) during RSV season  
    (Evidence Quality: B; Recommendation Strength: Moderate Recommendation)

AAP 2014 Bronchiolitis Guidelines: Other Recommendations

- **Good hand hygiene using alcohol-based rubs for hand decontamination when caring for children with bronchiolitis.**

- **Ask about a history of smoking in the home. Counsel caregivers about exposing child to environmental tobacco smoke.** *

- **Encourage exclusive breast feeding for at least 6 months.**

- **Educate families on evidence-based diagnosis, treatment, and prevention – encouraged shared-decision making.**  
  (Evidence Quality: B-C; Recommendation Strength: Moderate-Strong* Recommendation)
Bronchiolitis: What To Do?

- Supportive treatment commonly recommended
  - Rehydration
  - Supplemental oxygen (SaO₂ < 90%)
- Caretakers need to be counseled about the usual protracted clinical course of bronchiolitis and encourage continued breast feeding and avoid tobacco.
- Consider antibiotics if abnormal CXR, and viral testing for *really sick infants*.
- Unclear role of CPAP or heat humidified high flow nasal cannula.

Bronchiolitis: What Not To Do?

- Wide practice variation
- Therapies no longer recommended:
  - Albuterol or epinephrine
  - Nasal suctioning
  - Routine chest radiography
  - Routine viral testing
  - Routine antibiotic administration
  - Heliox
  - Chest physiotherapy
Bronchiolitis: What Not To Do Revisted?

- CXR – NOT routinely – consider on any patient with respiratory distress to assess for other causes (pneumonia, FB)

- Virologic testing – tough call here – may opt to get on patients with co-morbid disease and < 3 months of age as would admit
  - Consider a part of evaluation for young infants < 3 months with a fever, immunodeficiency, CLD, CHD

Conclusions:

- Unclear benefit of most therapies for bronchiolitis!
  - Routine virologic testing not recommended
  - Routine chest radiography not recommended
  - Beta agonists and corticosteroids not recommended
  - Antibiotic therapy only if co-infection
  - A number of controversies still exist especially with use of hypertonic saline, antibiotics, CPAP – is albuterol and epi gone?

- Future research should focus on characterization of infants most likely to benefit from given interventions.
Case: 2 month-old infant

- A mother brings in her 2 month-old infant with respiratory distress.
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Case: 2 month-old infant

- What is your assessment?
  - Assessment:
    - Respiratory distress; early respiratory failure

- What are your management priorities?
  - Management:
    - Monitor and supplemental oxygen
    - IV fluids, obtain UA and CXR
    - Still unclear about albuterol therapy/heat humidified nasal cannula?
    - Treat with antibiotics if infection found or requires airway management
    - Unclear role of CPAP or hypertonic saline unless admitted
Questions?

To-do...
#1 Get Real
(new)