Bronchiolitis, Croup and Otitis Media

Updates on Common Pediatric Respiratory Infections

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Outline/Objectives

- Bronchiolitis
  - Use diagnostic testing appropriately in suspected bronchiolitis
  - Decide which treatments are most likely to help a patient with bronchiolitis
  - Develop an approach to deciding when to admit
- Croup
  - Decide when to use steroids for children with croup
  - Differentiate croup from bacterial upper airway infections
- Otitis Media
  - Identify patients who can be managed with observation rather than antibiotics

Case Presentation #1

- Phalocrocorax (Phil) is a 3 month old boy, brought with fever, runny nose and difficulty breathing
- VS: T = 38.5, RR 45, O2 sat: 92% on RA
- Exam: alert and awake, copious rhinorrhea, mild retractions and diffuse coarse wheezes on exam
The most appropriate diagnostic test at this time is:

A. Chest Xray  
B. Nasal wash for RSV  
C. CBC  
D. All of the above  
E. None of the above

2006 AAP Guideline Recommendations: Diagnosis

- “Clinicians should diagnose bronchiolitis and assess disease severity on the basis of history and physical examination”
- “Clinicians should not routinely order laboratory and radiologic studies for diagnosis”
- Evidence: Systematic review (Bordley, 2004):
  - Routine RSV testing, CXR and CBC have not been shown to reliably affect clinical management or outcomes, or predict severity of disease.

AAP Practice Guidelines: 2006

- Evidence-based guidelines for diagnosis and management of bronchiolitis
  - Endorsed by AAFP, ACCP, ATS
- Highlights for FCM providers:
  - Diagnostic testing
  - Treatment:
    - Bronchodilators
    - Steroids
  - Indications for supplemental O₂

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When is there a role for RSV/other viral testing?

Recommendations: Viral Testing

- Rapid viral testing recommended when the results will change management
  - Eg: clinical diagnosis is not possible, concern for apnea in a neonate < 46 wks
  - Cohorting for admissions
- Fever without a source?
  - Clinical/laboratory diagnosis of bronchiolitis equally reassuring for SBI/UTI
  - Infants at high risk for UTI should be tested for UTI

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    - Steroids
  - Indications for supplemental O2

2006 AAP Guideline Recommendations: Treatment

- Mainstays of treatment are supportive
  - Oxygen, fluids and nasal/airway clearance.
  - “Bronchodilators [and corticosteroids] should not be used routinely in the management of bronchiolitis”
  - “A carefully monitored trial of α-adrenergic or β-adrenergic medication is an option... should be continued only if there is a documented positive clinical response”
Additional Considerations:

- Steroids more likely to benefit sicker patients and asthmatics
- Hypertonic saline
  - Small RCTs suggest improved short-term response to albuterol/epi when administered with 3% saline
  - Should NOT be used without bronchodilator!

Case Continued

- Phil shows no response to a trial dose of albuterol
- He remains smiley and is tolerating po’s well
- However, his O2 sat is noted to intermittently drop to 89% on RA
- Is hospitalization for supplemental oxygen recommended for this infant?

Recommendations: Disposition for Infants with Bronchiolitis

- Consider supplemental O2 in those with sats persistently < 90%
  - Home O2 an option for infants in whom persistent hypoxia is only indication for admission (Bajaj, 2006)
- An observation period is recommended, when possible, before disposition
  - Minimize excess admissions/need for re-admission

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Phoebastria (Phoebe) is a 16 mo girl who presents to the ED at 3am with fever, cough and difficulty breathing. She has had a cold and cough for 2 days, then woke up “unable to breath” and making a “funny noise” at 2am. Improved a bit on the way to the ED.

**Exam**
- T = 38.9, O2 sat 99%, RR 40, HR 160
- Frightened but alert, looking around, non-toxic with supple neck
- Rhinorrhea, no drooling, post OP exam deferred
- Clear lungs, moderate retractions and a slight squeak heard on each inspiration

**The most appropriate next step in this child is**
- A. Lateral neck film
- B. Admit for IV antibiotics
- C. Direct visualization of the epiglottis
- D. Racemic epinephrine and systemic steroids
- E. Intubate to protect the airway

**Background: Croup**
- Affects 1-6% of children, usually during 2nd year of life
- Clinical diagnosis:
  - Viral prodrome, “barky” cough and stridor
- Standard treatments have included:
  - Racemic epinephrine
  - Mist (humidified air)
  - Systemic corticosteroids
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**Evidence: Mist Therapy**
- Standard of therapy for “mild” croup
- RCT’s have failed to show superiority over placebo
- No longer recommended in guidelines for croup management

**Evidence: Corticosteroids**
- Proven efficacy in moderate/severe croup
  - Reduced symptoms, hospitalizations, epi use
  - Dexamethasone: 0.6mg/kg well-studied, smaller doses may be equally effective
  - IM and oral routes equal in efficacy
- Efficacy in mild croup
  - 2004 RCT found decreased symptom duration, parental stress and lost sleep

**Recommendations: Croup**
- Trial of mist therapy OK for mild cases
- Racemic epinephrine if:
  - Stridor at rest
  - Severe upper airway obstruction
- D/C after steroids AND 3-4 h of observation
- Oral corticosteroids:
  - Moderate croup and any time epi is given
  - May be beneficial in mild cases as well
The most appropriate next step in this child is

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B. Admit for IV antibiotics  
C. Direct visualization of the epiglottis  
D. Racemic epinephrine and systemic steroids  
E. Intubate to protect the airway

Case Continued?

- You give Phoebe nebulized epinephrine, but her respiratory distress is worsening  
- She is now fatigued, with cool extremities and an O2 sat of 94%  
- *What else could this be?*

Causes of life-threatening upper airway obstruction

- Infectious:  
  - Epiglottitis  
  - Tracheitis  
  - Retropharyngeal abscess/cellulitis  
- Non-infectious  
  - Foreign body aspiration  
  - Anaphylaxis

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Epiglottitis

- Dramatic decline since Hib vaccination (1990)
- Causes: S. pneumonia, S. aureas > Hib
- Diagnosis:
  - Clinical: Toxic, rapid progression, stridor, drooling
  - Lateral neck film: thumbprint sign
  - Direct visualization only in controlled setting
- Treatment: airway support and antibiotics

Tracheitis

- Has replaced epiglottitis as most common life-threatening upper airway infection
  - 3 X greater than croup and epiglottitis combined
  - S. aureus most common cause
- Clinical Diagnosis
  - Toxic, stridor, purulent secretions on oropharynx
  - Direct visualization via bronchoscopy
- Treatment: Airway support and antibiotics

Lateral Neck

- Normal lateral neck
- Epiglottitis

Retropharyngeal Abscess

- Pathophysiology:
  - Spread from nearby structures (GAS, Staph, viridans strep, anaerobes)
- Diagnosis:
  - Clinical: Fever, neck swelling/pain, decreased ROM, drooling
  - Radiologic: Lateral neck plain film, CT
- Treatment:
  - Airway support and antibiotics
  - +/- surgical drainage (25-50%)
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Case Presentation #3

- Spheniscus (Sphen), an 8 mo old boy, has 3 days of runny nose, 2 d of fever to 39 and fussiness
- He is well-hydrated and well-appearing, but on exam the R eardrum is erythematous, bulging and opaque
- Mom says he received amoxicillin for AOM 6 weeks ago

In addition to pain and fever control, what is the best initial treatment option for Sphen?

A. Observe without antibiotics
B. Amoxicillin 40-50mg/kg/day
C. Amoxicillin 80-90mg/kg/day
D. Augmentin, since he has recurrent/persistent AOM
E. Azithromycin, since he has recurrent/persistent OM
Background: Otitis Media and Antibiotics

- Long history of management without antibiotics outside of U.S.
- Potential benefits of observation
  - Fewer side effects
  - Reduce bacterial resistance
- Potential benefits of treatment:
  - Shorter duration of illness
  - Fewer complications

Evidence: Clinical Cure

- The majority of children with AOM do well, whether or not they get antibiotics
- Antibiotics DO improve rates of cure
  - Randomized trial in UK:
    - 70% vs 86% improved at 3 days
  - AHRQ meta-analysis:
    - 12.3% lower clinical failure with antibiotics (NNT=8)
    - 1 day shorter symptoms in 5-14% of children (NNT 7-20)
- Greatest difference found in children with more severe illness and younger age

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Evidence: Complications

- Rates have decreased in the post-antibiotic era
- Complications higher in countries which do not treat with antibiotics
  - BUT rates of mastoiditis VERY low (NNT>4000)
- Most complicated cases treated with prior antibiotics
- Overall, little evidence supports use of antibiotics to reduce complications from AOM
**2004 AAP/AAFP Clinical Guideline:**

1. Consider diagnostic certainty in management
2. Assess and treat pain in all children
3. Consider observation without antibiotics in selected children
4. Specific antibiotics for initial/resistant infection
5. Reduction of risk factors

**Recommendations: Initial Management of AOM**

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Diagnostic Certainty

- Acute onset
- Middle Ear Effusion (MEE)
- Middle Ear Inflammation (MEI)

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**Case continued**

- Based on Sphen’s age (6 mo to 2 years), high fever and certain diagnosis, you decide to treat him with antibiotics
- *What is the best initial choice for antibiotics?*

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**Microbiology of AOM post-PCV-7**

- H. influenzae 20-30%
- H. catarrhalis 1-10%
- S. pneumoniae 30-40% [10% high-PRSP]
- Virus/No growth 40-75%

**Recommendations: Initial Antibiotic Choice**

- High-dose Amoxicillin (80-90 mg/kg/day)
  - Achieves MIC effective against most PRSP
  - Estimated microbiologic cure in ~80% of AOM
- Severe illness: Consider amox/clav
- For PCN-allergic:
  - Cefdinir, cefpodoxime, cefuroxime, ceftriaxone
  - Erythro/sulfa, hi-dose azithromycin
In addition to pain and fever control, what is the best initial treatment option for Sphen?

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D. Augmentin, since he has recurrent/persistent AOM  
E. Azithromycin, since he has recurrent/persistent OM

Microbiology of Recurrent/Persistent AOM

Persistence of initial organism most likely in early recurrences (< 14 days)

Recommendations: Treatment of Recurrent/Persistent OM

- Amox/clav will achieve clinical cure in majority
- Other options
  1. 3 doses of ceftriaxone
  2. Gatifloxacin: (10mg/kg/day X 10 days)
     - Arthropathy has not been demonstrated
  3. Hi-dose azithromycin (20mg/kg/day X 3 days)

Case Continued

- You discharge Sphen with a prescription for high-dose amoxicillin for 10 days, and ibuprofen for pain and fever
- 3 days later he returns with persistent fever, fussiness. He is non-toxic, no new findings on exam.
- What should we treat Sphen with now?
**Key Points: Bronchiolitis**

- **Clinical diagnosis**: viral testing only in select cases
- Mainstays of treatment are **supportive**
  - *Pts with asthma more likely to benefit from bronchodilators, steroids*
- Supplemental O₂ recommended when O₂ sats **persistently < 90%**
  - Observation may lead to more selective disposition of patients

**Key Points: Croup**

- **Systemic steroids** should be given to all children receiving racemic epi
  - May also have benefit in mild croup
- In the ill-appearing child
  - Consider tracheitis, epiglottitis, RPA
  - Lateral neck film may help, but management for all: **airway support and broad-spectrum antibiotics**

**Key Points: Otitis Media**

- Observation without antibiotics an option for certain patients, with good follow-up
- **High-dose amox** is first-line antibiotic for uncomplicated AOM requiring treatment
- For recurrent/resistant disease (<14 days) H. influenza most likely pathogen