Bronchiolitis: Clinical Pearls to Accompany Concept Map

What Is Bronchiolitis? What Causes it?

- *Bronchiolitis* literally means inflammation of the bronchioles, the small airways in the lungs. Histologically and radiographically, patients with bronchiolitis have evidence of inflammation in their bronchioles, with resultant respiratory distress and hypoxemia.
- Bronchiolitis is broadly defined as a syndrome **occurring in children <2 years of age** characterized by **upper** respiratory symptoms (eg, rhinorrhea) followed by **lower** respiratory infection with inflammation, with resultant **wheezing** and/or **crackles** (rales).
- Airways inflammation --> edema, mucus plugging, and epithelial sloughing --> airway obstruction and atelectasis
- Almost always due to a virus, most commonly **RSV** followed by **rhinovirus**, though many others are possible (human metapneumovirus, influenza virus, adenovirus, coronavirus, human bocavirus, parainfluenza virus type 3 [types 1 and 2 more commonly cause croup])
- Worst during the winter months (November-April) as this is when RSV is most common

What Are Critical Parts of the Physical Exam in a Patient with Bronchiolitis?

- **Vitals**: RR (tachypnea?), T (fever?), SpO2 (<90-92% merits hospitalization)
- **General Appearance**: tachypneic but happy? In moderate respiratory distress at rest? Somnolent and toxic appearing?
- **Respiratory exam**: appearance is of utmost appearance, more than auscultation -- work of breathing?
    - **Mild** respiratory distress = intermittent belly breathing with subtle subcostal retractions, you're questioning whether there is actually increased WOB at all
    - **Moderate** respiratory distress = clearly visible subcostal/intercostal retractions, belly breathing, nasal flaring
    - **Severe** respiratory distress = all of the above plus supraclavicular retractions with tracheal tugging and grunting (auto-PEEP), sense of "crap, I'm concerned about this kid..."
    - **Auscultation** may reveal any number of sounds: wheezing, rales, crackles...
- **Cardiovascular exam**: perfusion (re: need for fluid resuscitation)? Loud murmur (as to suggest cardiac cause of tachypnea)?

What Workup is Necessary?

- **CXR**: consider only for fever with focality in lung exam
    - CXR findings with bronchiolitis: peribronchial thickening, hyperinflation, +/- atelectasis
- **VBG**: generally only to assess for marked CO_2 retention necessitating positive pressure ventilation in infants with severe respiratory distress
- **CBC**: often obtained if labs are being drawn but generally of little clinical value
- **Viral testing**: not necessary given that it's a clinical diagnosis, but may help reassure parents there is a "cause" if positive
- **Chemistry**: useful if concern regarding hydration status

What Are Indications for Hospitalization?

- OVERALL, clinical gestalt is most important. Factors that speak to more severe disease (and therefore should prompt careful consideration of admission) include:
    - witnessed apnea
        - Apnea is NOT associated with particular pathogen (despite common belief that is associated with RSV)
    - <37 wk gestational age & <48 wk post-menstrual age
        - Premature infants and those < 48 weeks are at greater risk of apnea
    - age <1 mo (due to risk of tiring out)
    - SaO_2 persistently <92% in RA with moderately increased WOB, or <90% regardless of WOB
    - RR >70 for <1 yr, >60 for >1 yr
    - severely increased work of breathing
    - inability to tolerate PO intake

How Can We Distinguish Bronchiolitis from Other Respiratory Illnesses?

- **Pneumonia -** more pronounced focality on lung exam (though this is notoriously unreliable), fever, infiltrate on CXR
- **Asthma** - usually older (2 yo or above), albuterol-responsive wheeze, personal and family history of atopy
- **Reactive Airway Disease** - a confusing title inconsistently applied to patients with bronchiolitis who appear somewhat albuterol-responsive and/or are given steroids upon ED discharge, particularly those with multiple episodes of viral-induced wheeze
- **Pneumothorax** - asymmetric breath sounds with diminished (to absent, depending on size) air entry on side of pneumothorax, +/- tracheal deviation and JVD if tension physiology is present

What Therapies Work for Bronchiolitis? What Therapies Don't?

- **Suctioning of nares** - to relieve obstruction. "Deep" nasopharyngeal suctioning can worsen airway edema and worsen the disease course unnecessarily.
- **Oxygen** - as needed to maintain SaO_2 >90%. **High flow Nasal Cannula** has received lots of attention but the most recent studies don't seem to show much benefit.
- **PPV** (CPAP, BiPAP, intubation) - as needed for progressive hypercarbic respiratory failure (elevated PCO_2)
- **Albuterol** - sometimes helpful for those with a more RAD-type presentation with recurrent wheeze, though not generally indicated
- **Supportive care** - careful attention to fluid balance, I/Os, supplemental IVF as needed
- **Nebulized hypertonic saline** - not helpful
- **Glucocorticoids** - not helpful (consider if dc from the ED with older child with recurrent viral wheeze - e.g., 22 mo w/ 3rd episode of RSV-associated wheeze)
- **Prevention**:

- Palivizumab (or Synagis): monoclonal antibody against RSV is approved for preterm infants with chronic lung disease or significant congenital heart disease in order to prevent severe hospitalizations

Resources:

1. BCH Clinical Pathway on Bronchiolitis
2. UpToDate pages: *Bronchiolitis in infants and children: Clinical features and diagnosis* and *Bronchiolitis in infants and children: Treatment, outcome, and prevention*