COMMUNITY ACQUIRED PNEUMONIA IN CHILDREN
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INTRODUCTION
• Pneumonia is a common and serious infection in children; 34-40 cases/1000 per year in Europe/North America
• Pneumonia is the leading cause of pediatric death in the developing world
• Defined as parenchymal infiltrates on chest radiograph with fever and/or respiratory symptoms

CAUSES
• Important common pathogens
  o Respiratory viruses (respiratory syncytial virus, influenza, parainfluenza, adenovirus) in preschool children
  o Mycoplasma pneumoniae in school-age children
  o Chlamydia trachomatis in infants 2-4 months.
• Bacteria are the major cause of severe or complicated pneumonias
  o S. pneumoniae, S. aureus, H. influenzae (type b and nontypable); also S. pyogenes, gram-negative enterics
• C. pneumoniae infections often asymptomatic, but appear to cause a substantial fraction of pneumonia cases among school age children and adolescents
• Role of cytomegalovirus, Ureaplasma urealyticum, and Pneumocystis carinii in healthy children is controversial
• Combined infections are common in hospitalized children, with 41% having both bacterial and viral potential etiologies identified.

DIAGNOSIS
• Identifying individual pathogens may be important in severe disease (Table 3, page 432)
  o Most viruses: nasopharyngeal secretions using immunofluorescence, solid phase immunoassay, or PCR
  o Chlamydia pneumonia: nasopharyngeal secretions by culture or PCR assay
  o Mycoplasma pneumoniae: cold agglutinin titer of >1:128, or IgM antibody in serum late in the acute phase
    or early convalescence; also by PCR assay of secretions of throat or nasopharyngeal swab.
  o Bacteria: culture of sputum, blood or pleural fluid; significant rise in specific serum antibody titers
  o Fungi: serum IgM antibody or a significant rise in serum IgG antibody titers
  o Bordatella pertussis: best by PCR of nasopharyngeal secretions; may also be diagnosed by culture
  o Mycobacterium tuberculosis: culture of sputum or gastric aspirates, with or without PPD skin testing
• As a practical matter, cause usually established based on clinical and epidemiologic data, chest radiograph
  findings, and basic laboratory tests (CBC, ESR, levels of C-reactive protein)
• Signs/symptoms often similar in viral and bacterial pneumonias; much overlap between clinical entities, BUT:
  o Bacterial infections more likely to be associated with conjunctivitis and otitis media
  o Wheezing more likely to be associated with viral pneumonias, M. pneumoniae, or C. pneumoniae
  o Pleuritic chest pain or abdominal pain which suggests a bacterial etiology

TREATMENT
• Treatment decisions based on most likely cause, using a combination of age, clinical and epidemiologic factors,
  and chest radiograph
• Age groupings, important features, likely causes (viruses excluded), and usual initial recommended treatment:
  o Birth to 20 days
    ▪ Usually perinatally acquired
    ▪ Group B streptococci, gram-negative enteric bacteria
    ▪ Ampicillin and gentamicin; may consider adding cefotaxime
  o 3 weeks to 3 months
    ▪ Chlamydia trachomatis, S. pneumoniae, Bordatella pertussis, S. aureus
    ▪ If afebrile and eligible for outpatient management: oral azithromycin (or other macrolide)
    ▪ If febrile: cefotaxime; may consider adding azithromycin
  o 4 months to 4 years
    ▪ S. pneumoniae, H. influenzae, Mycoplasma pneumoniae, M. tuberculosis
    ▪ Amoxicillin or ampicillin; may consider adding cefotaxime
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- 4 to 15 years
  - *Mycoplasma pneumoniae, Chlamydia pneumoniae, S. pneumoniae, M. tuberculosis*
  - *M. Pneumoniae* and *C. Pneumoniae* cannot be distinguished from bacterial pneumonia on chest x-ray; often characterized by cough, low-grade fever, and sometimes wheezing
  - *M. Pneumoniae* is the most common cause of pneumonia among children aged 5-15.
  - Outpatient: Macrolide (erythromycin, clarithromycin, or azithromycin); if > 8 years may use doxycycline
  - Inpatient (with suspected bacterial cause): add ampicillin or cefotaxime.

- Knowledge of local antimicrobial susceptibility patterns may result in different initial choices
- When *S. aureus* is suspected oxacillin or vancomycin should be used
- When penicillin-resistant *S. pneumoniae* is suspected, consider 2nd or 3rd generation cephalosporin
- Use of the pneumococcal vaccine (prevention) has reduced the rates of pneumococcal pneumonia

CONCLUSIONS

- Pediatric pneumonia has been refractory to efforts to reduce its incidence and severity or improve the prognosis
- Diagnosis and treatment of the patient is dependent on evaluation of the likelihood of pathogen based on presenting factors, age, season, and local epidemiology.
- Regional consensus guidelines for management and treatment should be developed, refined, and used by practitioners