

Northwestern Medicine-West Region Pediatric Pneumonia Treatment Guideline Summary

Background¹

- AAP references IDSA guidelines for the management of community-acquired pneumonia (CAP) in pediatric patients
- In the US, community-acquired pneumonia is the leading cause of death in children under the age of 5 years old
- Common pathogens in children in order of prevalence include:
 - < 5 years old: RSV, Parainfluenza virus, Influenza A/B, Rhinovirus, Adenovirus, *S. pneumoniae*, *M. pneumoniae*, *H. influenzae*, *C. pneumoniae*
 - ≥ 5 years old: *M. pneumoniae*, *C. pneumoniae*, *S. pneumoniae*, Rhinovirus, Adenovirus, Influenza A/B
- This guideline includes normally healthy infants and children ages > 3 months; it specifically excludes neonates and young infants, immunocompromised children, those receiving home mechanical ventilation, and those with chronic conditions or underlying lung disease (e.g., cystic fibrosis).

Determining the need for hospitalization²

- Children and infants with moderate to severe CAP (characterized by respiratory distress and hypoxia), suspected CAP caused by resistant pathogens (i.e. CA-MRSA), <3-6 months of age, or not able to comply with antibiotic therapy as an outpatient should be hospitalized

Diagnosis of pediatric CAP^{1,2}

- Common signs and symptoms of CAP in children are fever, tachypnea, labored breathing, crackles, wheezing, low activity level and dehydration
- Tachypnea is the most significant sign of CAP in children (threshold is approximately 40-50 breaths per minute)
- Laboratory and Imaging tests
 - Laboratory tests including CBC and acute-phase reactants such as ESR, CRP, and PCT need not be performed in all patients and should not be used as sole determinant to distinguish between viral and bacterial pneumonia. They may be performed in patients with more severe disease in which they will be useful to monitor ongoing improvement in the course of the disease process.
 - Outpatient blood cultures should only be obtained in children who do not show improvement or have symptom progression after initiation of antibiotics. Blood cultures should be obtained in children who require hospitalization for suspected moderate to severe CAP.
 - Rapid diagnostic tests for respiratory viruses including influenza and RSV should be performed to help rule-out bacterial sources of infection.
 - Chest radiograph is not necessary for confirmation of suspected CAP in patients well enough to be treated as outpatients, but should be obtained (posteroanterior and lateral) in patients with hypoxemia or significant respiratory distress or those who failed initial antibiotic therapy. Chest radiographs should also be obtained in patients admitted to the hospital for treatment of CAP.
 - Urinary antigen detection tests are not recommended for diagnosis of pneumococcal pneumonia in children due to high rates of false-positive tests.

Treatment recommendations²

- **Since viral pathogens are responsible for most cases of CAP in pre-school aged children (under 3 years old), antibiotics are not routinely recommended**
- Directed therapy is recommended once culture results are obtained
- Younger children with bacterial pneumonia are more likely to have *S. pneumoniae*, while older, school-age children are more likely to have atypical pneumonia. Empiric therapy doesn't necessarily have to include coverage for both.

Empiric Therapy			
	Suspected bacterial pneumonia	Suspected atypical pneumonia	Suspected influenza pneumonia
Outpatient			
<5 years old	Amoxicillin 45 mg/kg q12h x 7-10 days* Alternatives: Cefprozil 15mg/kg BID* -Cefdinir 7mg/kg BID (max 300mg/dose)*	Azithromycin 10 mg/kg daily on day 1 then 5 mg/kg/day days 2-5	Oseltamivir x 5 days ≤ 15kg: 30mg BID >15-≤23kg: 45mg BID >23-≤40kg: 60mg BID >40kg: 75mg BID

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	-Clindamycin 13mg/kg q8h*		
≥5 - 18	Amoxicillin 45 mg/kg q12h (max 4 g/day) x 7-10 days* <u>Alternatives:</u> Cefprozil 15 mg/kg q12h* (500mg per day max if < 12yo) -Cefdinir 7mg/kg q12h* (max 600mg/day) -Clindamycin 13mg/kg q8h* -Last line: Levofloxacin 8-10mg/kg once daily*	Azithromycin 10 mg/kg daily on day 1 then 5 mg/kg daily days 2-5	Oseltamivir (see above; ≥13 yo, see adult dose)
Inpatient			
Fully immunized	Ampicillin 50-75mg/kg IV q6h (max 12g/day)* <u>Alternatives:</u> Ceftriaxone 50 to 100 mg/kg/day IV/IM divided q12-24 hours* (max 2g/day) -Cefotaxime 50 mg/kg IV divided q8h* Add vancomycin 40-60mg/kg/day divided q6-8h for suspected CA-MRSA* OR Clindamycin 40mg/kg/day divided q8h*	Azithromycin 10 mg/kg IV daily for at least 2 days, then 5 mg/kg daily to complete 5 days course (in addition to beta-lactam if unsure of atypical pathogen infection) <u>Alternatives:</u> Doxycycline 1-2mg/kg q12h if ≥7 years old (max 200mg/day); levofloxacin if macrolides are not tolerated and child has reached growth maturity	Oseltamivir (see dosing above)
Not fully immunized, areas of PCN resistance to S. pneumococcus, failed amoxicillin therapy, moderate to large effusions, ICU, life-threatening infections (ie. empyema)**	-Ceftriaxone 50-100mg/kg/day IV divided q12-24h (max 2g/day)** -Cefotaxime 150mg/kg/day divided q8h** <u>Alternative:</u> Levofloxacin if beta-lactam allergy and > 12 yo** Add vancomycin 40-60mg/kg/day divided q6-8h for CA-MRSA** OR Clindamycin 40mg/kg/day divided q6-8h**	-Azithromycin 10 mg/kg IV daily for at least 2 days, then 5 mg/kg PO once daily to complete 5 days course (in addition to beta-lactam if not sure infection is due to atypical pathogen)** <u>Alternative:</u> Levofloxacin if macrolides are not tolerated and > 12 yo** S. aureus: Add vancomycin 40-60mg/kg/day divided q6-8h**	Oseltamivir (see dosing above)

*Duration: Shortest effective duration of antibiotics is recommended. Duration of 5-10 days is recommended, unless CA-MRSA which requires longer duration of therapy (7-14 days)^{1,2}

**ID consult recommended for all complicated and severe pneumonia for appropriate choice and duration of therapy

References:

1. Stuckey-Schrock K, Hayes B, George B. Community-acquired pneumonia in children. *Am Fam Physician* 2012; 86(7):661-67.
2. Bradley J, Byington C, Shah S, et al. The management of community-acquired pneumonia in infants and children older than 3 months of age: clinical practice guidelines by the Pediatric Infectious Diseases Society and the Infectious Diseases Society of America. *Clin Infect Dis* 2011; 53(7):617-630.
3. Lexicomp Online, Hudson, Ohio: Lexi-Comp, Inc.; 2015; Accessed July 10, 2015, and August 4, 2015.