

AAP Section on Emergency Medicine Committee on Quality Transformation

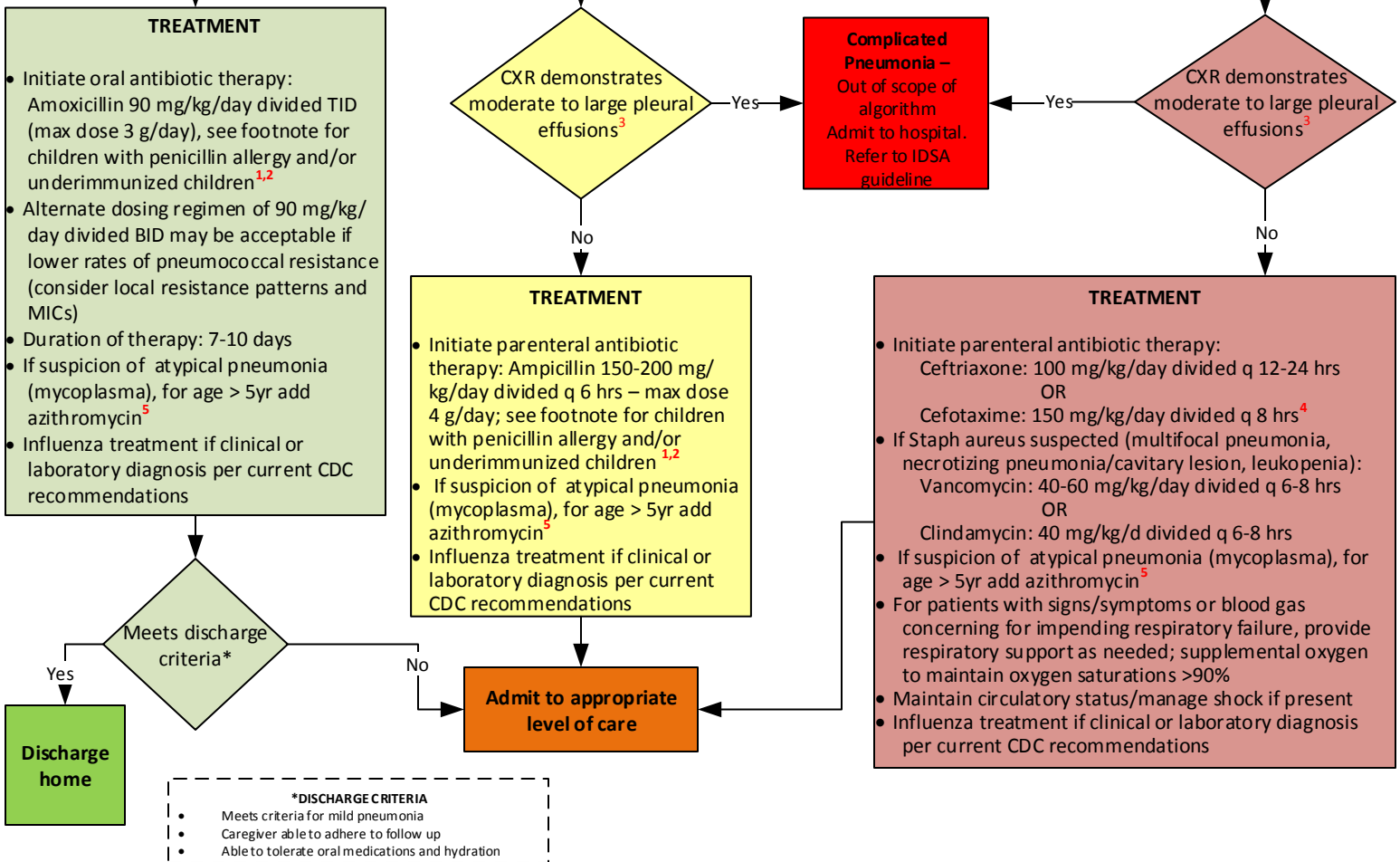
Clinical Algorithm for Emergency Department Evaluation and Management of Pediatric Community Acquired Pneumonia

Overview
 Definition of community acquired pneumonia (CAP) is complicated by lack of gold standard as clinical and radiographic findings may be discordant. This algorithm applies to children whom the clinician has diagnosed uncomplicated CAP by clinical or imaging findings. Base antibiotic choice and dosing on local resistance patterns and MICs of prevalent bacterial organisms causing pneumonia (*S. pneumoniae*, Group A *Streptococcus*, *S. aureus*, *H. influenzae*, *M. pneumoniae*, *C. pneumoniae*). This algorithm was developed through the efforts of the American Academy of Pediatrics Section on Emergency Medicine in the interest of advancing pediatric healthcare. Ultimately, the patient's physician must determine the most appropriate care.

Scope Emergency Department (ED) Setting
Includes Patients 3-months to 18-years of age with community acquired pneumonia (include patients with asthma or reactive airways disease)
Excludes Immunocompromised, tracheostomy/ventilator dependent, or children with chronic conditions such as cystic fibrosis
 Suspected hospital-acquired pneumonia or aspiration pneumonia

Assessment			
	MILD (meets ALL criteria below)	MODERATE (meets ANY criteria below)	SEVERE (meets ANY criteria below)
Oxygenation	Oxygen saturation $\geq 90\%$ on room air	Oxygen saturation persistently $< 90\%$ on room air	Oxygen saturation $\leq 92\%$ despite supplemental oxygen on 50% FiO ₂ ; apnea, bradypnea or hypercarbia
Work of Breathing	None or minimal (i.e., no grunting, flaring, retractions, apnea)	Increased /moderate respiratory distress (i.e., grunting, retractions, nasal flaring)	Need for mechanical ventilation or non-invasive positive pressure ventilation; severe respiratory distress or concern for impending respiratory failure
Hydration	Able to tolerate fluids and medication	Signs of dehydration; persistent vomiting; inability to take oral medications	Systemic signs of inadequate perfusion, including fluid refractory shock, hypotension, sustained tachycardia, need for pharmacologic support of blood pressure or perfusion
Appearance	Not significantly ill or toxic appearing	Ill-appearing	Toxic or septic appearing and/or altered mental status

Diagnostics			
	MILD	MODERATE	SEVERE
Labs	CBC and inflammatory markers NOT routinely indicated	CBC and inflammatory markers NOT routinely indicated	Obtain CBC/differential Consider inflammatory markers (ESR, CRP), lactate, VBG, and BMP
Cultures	Blood cultures NOT routinely indicated	Blood culture NOT routinely indicated unless complicated pneumonia or underimmunized child	Obtain blood and sputum culture (if able to expectorate)
Imaging	Not routinely indicated; consider CXR in those with diagnostic uncertainty or concern for complications.	Obtain AP and lateral chest x-ray; consider bedside ultrasound as adjunct diagnostic tool if ultrasound credentialed provider is present.	Obtain AP and lateral chest x-ray; consider bedside ultrasound as adjunct diagnostic tool if ultrasound credentialed provider is present.
Viral testing	Influenza treatment if clinical or laboratory diagnosis per current CDC recommendations- www.cdc.gov/flu/professionals/		



Footnotes:
 1 – If penicillin allergy, administer cephalosporin (oral cefpodoxime, cefuroxime, or cefprozil; parenteral ceftriaxone or cefotaxime)
 If severe penicillin allergy: oral levofloxacin (16-20 mg/kg/day divided q 12 hr (age 6 mos- 5 yrs) or 8-10 mg/kg/day (age 5-16 yrs) once daily (max daily dose 750 mg); clindamycin (40 mg/kg/day divided q 8 hr- max dose 600 mg), or linezolid
 2 – In underimmunized children: oral amoxicillin-clavulanate or parenteral 3rd generation cephalosporin (ceftriaxone, cefotaxime)
 3 – Effusion > 10 mm rim or $> 1/4$ hemi-thorax opacified
 4 – If severe penicillin allergy: Levofloxacin OR Clindamycin OR Linezolid
 5- Azithromycin: IV-10 mg/kg (max dose 500 mg) day 1 and 2, then transition to oral; Oral-10 mg/kg (max dose 500 mg) once on day 1, then 5 mg/kg (max dose 250 mg) once daily on days 2-5

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Community Acquired Pneumonia

C A U S E S	Birth – 20 days	3 weeks – 3 months	3 months – 5 years	5 years – Adolescent
	<u>Common: Perinatal acquired</u> Group B. streptococcus Listeria monocytogenes Gram negativr rods E. coli Klebsiella pneumonia <u>Less common</u> Nontypable H. influenza Enterococci Staph aureus C. trachomatis (after 2 weeks)	<u>Common</u> <ul style="list-style-type: none"> S. pneumoniae S. aureus H. influenza Viruses: RSV, parainfluenza, influenza, H1N1 <u>Less Common</u> <ul style="list-style-type: none"> C. trachomatis (after 2 weeks) Bordetella pertussis Perinatal acquired still possible	<u>Common</u> <ul style="list-style-type: none"> Viruses: RSV, parainfluenza, influenza S. pneumo S. pyogenes S. aureus <u>Less Common</u> <ul style="list-style-type: none"> M. Pneumonia C. Pneumonia 	<u>Common</u> <ul style="list-style-type: none"> M. pneumonia C. pneumonia S. pneumonia S. pyogenes Viruses: influenza
T R E A T M E N T S	Inpatient: Ampicillin IV plus Gentamicin IV w or w/o Cefotaxime IV Outpatient: None	Inpatient <ul style="list-style-type: none"> Cefotaxime IV (< 4-6 weeks) or Ceftriaxone plus Azithromycin 10mg/kg If concern for MRSA Vancomycin Consider antivirals if concern for influenza Outpatient <ul style="list-style-type: none"> < 3 month consider admission Amoxicillin 80-90mg/kg divided BID x 10 days If pcn allergy: Consider Cephalosporin and/or Azithromycin Follow-up 24 – 48 hours		Inpatient <ul style="list-style-type: none"> Ceftriaxone IV plus Azithromycin Consider antivirals for influenza Outpatient Azithromycin Antivirals if high risk Follow-up 24 – 48 hours

<u>Suggested Admission Criteria:</u>			
SpO ₂ ≤ 93%	Moderate to severe respiratory distress	Failed outpatient treatment	Age < 3 months
Severe dehydration	Not tolerating POs	Unsafe home environment	Pleural effusion/empyema

Cincinnati Children's Hospital Medical Center. Evidence based care guideline for community acquired pneumonia in children 60 days through 17 years of age. Cincinnati (OH): Cincinnati Children's Hospital Medical Center. Jul. 2006.
 Tsolia et al. Etiology of community-acquired pneumonia in hospitalized school-age children: evidence for high prevalence of viral infections. *Clin Infect Dis.* Sep 1 2004;39(5):681-6.
 Bradley 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.* Oct 2011;53(7):e25-76