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
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

TREATMENT

Initiate oral antibiotic therapy: Amoxicillin 90 mg/kg/day divided TID (max dose 3 g/day), see footnote for children with penicillin allergy and/or underimmunized children12

If suspicion of atypical pneumonia (mycoplasma), for age > 5 yr add azithromycin5

Influenza treatment if clinical or laboratory diagnosis per current CDC recommendations

Complicated Pneumonia – Out of scope of algorithm. Refer to local guidelines for guidelines

MILD
(meets ALL criteria below)

Oxygenation
Oxygen saturation ≥85% on room air

Work of Breathing
No or minimal (i.e., no grunting, retractions, apnea)

Hydration
Able to tolerate fluids and medication

Assessment

MILD Moderate (meets ANY criteria below)

Oxygenation
Oxygen saturation persistently <90% on room air

Work of Breathing
Increased/moderate respiratory distress (i.e., grunting, retractions, nasal flaring)

Hydration
Signs of dehydraion; persistent vomiting; inability to take oral medications

MODEST
(meets ANY criteria below)

Oxygenation
Oxygen saturation ≤92% despite supplemental oxygen on 50% FIO2; apnea, bradypnea or hypercarbia

Work of Breathing
Need for mechanical ventilation or non-invasive positive pressure ventilation; severe respiratory distress or concern for impending respiratory failure

Hydration
Systemic signs of inadequate perfusion, including fluid refractory shock, hypotension, sustained tachycardia, need for pharmacologic support of blood pressure or perfusion

SEVERE
(meets ANY criteria below)

Oxygenation
Oxygen saturation <50% on room air

Work of Breathing
Increased moderate to severe respiratory distress (i.e., grunting, retractions, nasal flaring)

Hydration
Signs of dehydraion; persistent vomiting; inability to take oral medications

Viral testing

Diagnostic

MILD
(meets ANY criteria below)

Oxygenation
Oxygen saturation ≥85% on room air

Work of Breathing
No or minimal (i.e., no grunting, retractions, apnea)

Hydration
Able to tolerate fluids and medication

Assessment

MILD Moderate (meets ANY criteria below)

Oxygenation
Oxygen saturation persistently <90% on room air

Work of Breathing
Increased/moderate respiratory distress (i.e., grunting, retractions, nasal flaring)

Hydration
Signs of dehydraion; persistent vomiting; inability to take oral medications

MODEST
(meets ANY criteria below)

Oxygenation
Oxygen saturation ≤92% despite supplemental oxygen on 50% FIO2; apnea, bradypnea or hypercarbia

Work of Breathing
Need for mechanical ventilation or non-invasive positive pressure ventilation; severe respiratory distress or concern for impending respiratory failure

Hydration
Systemic signs of inadequate perfusion, including fluid refractory shock, hypotension, sustained tachycardia, need for pharmacologic support of blood pressure or perfusion

SEVERE
(meets ANY criteria below)

Oxygenation
Oxygen saturation <50% on room air

Work of Breathing
Increased moderate to severe respiratory distress (i.e., grunting, retractions, nasal flaring)

Hydration
Signs of dehydraion; persistent vomiting; inability to take oral medications

Viral testing

Notes:

1 – If penicillin allergy, administer cephalosporin (oral cefpodoxime, cefuroxime, or cefprozil; parenteral ceftriaxone or cefotaxime)

If severe penicillin allergy: oral levofloxacin (if 10-20 mg/kg/day divided q 6 hrs) (age 6-5 yrs) or 8-10 mg/kg/day (age 5-16 yrs) once daily (max daily dose 750 mg); ciprofloxacin (if <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/r or >3/4 hemothorax opacified

4 – If severe penicillin allergy: Levofloxacin OR Clarithromycin 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

Footnotes:

LABS

CBC and inflammatory markers NOT routinely indicated

Blood cultures NOT routinely indicated

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.

Classes

LABS

CBC and inflammatory markers NOT routinely indicated

Blood cultures NOT routinely indicated

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.

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

Footnotes:

1 – If penicillin allergy, administer cephalosporin (oral cefpodoxime, cefuroxime, or cefprozil; parenteral ceftriaxone or cefotaxime)

If severe penicillin allergy: oral levofloxacin (if 10-20 mg/kg/day divided q 6 hrs) (age 6-5 yrs) or 8-10 mg/kg/day (age 5-16 yrs) once daily (max daily dose 750 mg); ciprofloxacin (if <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/r or >3/4 hemothorax opacified

4 – If severe penicillin allergy: Levofloxacin OR Clarithromycin 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

References:

AAP Section on Emergency Medicine Committee on Quality Transformation Clinical Algorithm for Emergency Department Evaluation and Management of Pediatric Community Acquired Pneumonia

Todd Florin, MD MSCE
Scott A Champion, MD MPH
Anne Stack, MD
Mark Neuman, MD, MPH
Boston Children's Hospital

Scott A Champion, MD MPH
Champion Children's Healthcare of Atlanta

Reference Material: http://s3.bk/ovvwncng

Community-Acquired Pneumonia Control expert team

Streufert Jan, MD, MPH, FAAP | Champion Children’s Healthcare of Atlanta
Anne Back, MD, Co-Chairman Boston Children’s Hospital
Scott A. Champion, MD MPH, Champion Children’s Healthcare of Atlanta
Katherine Mandeville, MD, University of New Mexico School of Medicine
Andrea McCormick, MD, MS Medical College of Wisconsin
Paul C. Muller, MD, MPH, Children’s Hospital of the King’s Daughters
Mark Neuman, MD, MPH, Boston Children’s Hospital
Joseph Zorc, MD, Children’s Hospital of Philadelphia

This work supported by the Evidence Based Outcomes Center at Texas Children’s Hospital and the EMMIC Innovation Improvement Center with guidance and development support by Shreeda Porter RN, MSN & Christine Proiola, MPH

Note: This algorithm does not represent AAP policy and was not reviewed or approved by the AAP Board of Directors.