Complicated Pneumonia Clinical Practice Guideline
Patients ≥ 2 Months -18 Years Of Age
With Signs And Symptoms Of Community Acquired Pneumonia (Viral And Bacterial)

### Complicated Pneumonia
- Presence of Moderate to Large Effusion or Empyema on CXR

### Plan of Care
- **Free Flowing Fluid?**
  - **NO**
  - **YES**

#### Free Flowing Fluid?
- **NO**
  - **Repeat CXR**
  - **Consider repeating CRP**
  - **CKR worsening**
  - **Consider US or CT Chest**
  - **US/ CT positive:** Persistent fluid collection with loculations/septations
  - **Return to Surgery for VATs**

#### YES
- **Consider removing Chest Tube:**
  - Drainage is decreased
  - No air leak – if there is an air leak, consider water seal for 4-6 hrs before removing
  - Repeat CRP may not be needed unless respiratory distress develops

#### Consider advancing to ORAL Antibiotics:
- Improving Fever Curve
- Tolerating PO Fluids
- Decreasing Oxygen Requirements
- Chest Tube Removed

#### Discharge Home:
- Mebrile or if febrile - CRP trending down
- Chest Tube removed
- Off Oxygen
- No Respiratory Distress
- Tolerating PO fluids

### Diagnostic Testing
- **CRP:** Acute-phase reactants, such as the C-reactive protein (CRP) concentration, should not be used as the sole determinant to distinguish between viral and bacterial causes of CAP
- **Consider:**
  - Respiratory Viral Panel (RVP): Identification of virus does not exclude other infectious etiologies
  - Sputum Culture: If patient is able to produce sputum, consider sputum culture
  - Chest CT Scan: Indicated only in patients with
    - Large body habitus
    - US findings discrepant with clinical findings
    - Presence or location of lung abscess may impact surgical decision making
- **Routine Chest X-Ray & Daily labs are not recommended**
- The PICU patient may warrant more frequent diagnostic testing due to the severity of their illness

### Consider PICU Admission
- **FiO2>40%,**
- **PCO2 >55,**
- **PEWS ≥ 5,**
- **Fluid Refractory Shock**
- **PICU physicians may place Chest Tube without surgery consult**

### Bronchodilator Use
- The use of albuterol and other bronchodilators is not routinely indicated, except in the case of acute wheezing or if a significant history of asthma is present

### Fibrinolysis With tPA
- **tPA: 4mg tPA/40ml Saline every day X 3days through Chest Tube**
- **First dose is at time of Chest Tube insertion, then daily**
- **Dwell time of tPA is 1 hour. Clamp for 1 hour after TPA.**
- **Use a 12-14 French Pig Tail to instill tPA**

### Consults
- **Consider Consults for:**
  - **Nutrition:** If unable to tolerate oral feeding
  - **Pulmonology:** If invasive intervention and for follow-up after discharge
  - **Infectious Disease:** Guidance on length of therapy and transition to oral antibiotics

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1. Definition
   - **Moderate effusion**
     - 1-2 cm rim of fluid or > ½ but less than ½ hemithorax opacified on Chest X-ray (CXR), upright preferred
   - **Large effusion**
     - > ½ hemithorax opacified on CXR, upright preferred

2. Exclusion Criteria
   - Immunocompromised
   - Cystic Fibrosis
   - Sickle Cell
   - Infants <2 Months Of Age
   - Nosocomially Acquired Pneumonia (>48 hrs)
   - Medically Complex Patients
   - Suspected Aspiration Pneumonia

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**CAUTION:** This pathway is a general guideline and does not represent a professional care standard governing providers’ obligation to patients. Ultimately the patient’s physician must determine the most appropriate care. © 2016 Children’s Healthcare of Atlanta, Inc.
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For influenza treatment recommendations please refer to CDC Guidelines

### Complicated Pneumonia Medication Chart

<table>
<thead>
<tr>
<th>Illness</th>
<th>Drug</th>
<th>Dose and Schedule</th>
<th>Max Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate Illness</td>
<td>Ceftriaxone +/- Clindamycin&lt;sup&gt;B&lt;/sup&gt;</td>
<td>75 mg/kg/dose q 24hr IV</td>
<td>2000 mg/dose</td>
</tr>
<tr>
<td>Moderate Illness with Penicillin Allergy&lt;sup&gt;C&lt;/sup&gt;</td>
<td>Levofloxacin +/- Clindamycin&lt;sup&gt;B&lt;/sup&gt;</td>
<td>40 mg/kg/day q 8hr IV 30 mg/kg/day q 8hr PO</td>
<td>900 mg/dose (IV) 600 mg/dose (PO)</td>
</tr>
<tr>
<td>Severe Illness</td>
<td>Ceftriaxone AND Vancomycin</td>
<td>75 mg/kg/dose q 24hr IV</td>
<td>2000 mg/dose</td>
</tr>
<tr>
<td>Severe Illness with Penicillin Allergy&lt;sup&gt;C&lt;/sup&gt;</td>
<td>Levofloxacin AND Vancomycin</td>
<td>10 mg/kg IV/PO</td>
<td>500 mg/dose</td>
</tr>
<tr>
<td>Moderate Illness</td>
<td>Ceftriaxone AND Vancomycin</td>
<td>20 mg/kg q 8hr IV&lt;sup&gt;D&lt;/sup&gt;</td>
<td>1250 mg/dose</td>
</tr>
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<td>Severe Illness with Penicillin Allergy&lt;sup&gt;C&lt;/sup&gt;</td>
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<td>1250 mg/dose</td>
</tr>
<tr>
<td>For Atypical Pathogen Coverage Add&lt;sup&gt;E&lt;/sup&gt;</td>
<td>Azithromycin</td>
<td>10 mg/kg IV/PO x 1 then 5 mg/kg daily x 4 days</td>
<td>500mg/dose</td>
</tr>
</tbody>
</table>

<sup>A</sup> Known susceptibility should always be used to guide therapy

<sup>B</sup> Consider adding clindamycin in patient with presence of loculations, septations, or empyema

*Note: CA-MRSA susceptibility to clindamycin ~90% per the CHOA antibiogram and clindamycin penetration into lung tissue is superior to vancomycin. In patients with severe disease, vancomycin is preferred due to increased spectrum of activity.*

<sup>C</sup> Type 1 penicillin allergy defined by urticaria or anaphylaxis

<sup>D</sup> Vancomycin Trough levels and dosing adjustment to be managed by Pharmacokinetics Service

<sup>E</sup> If patient on levofloxacin, atypical pathogens are covered and an addition of azithromycin is not needed

- Do not escalate antibiotic coverage due to persistent fever alone, as fever is expected for 48-72 hours even after starting appropriate antibiotic therapy. Consider further workup prior to alteration of antibiotics.
- Patients should be treated for at least 7 days after resolution of fever
- Consider ID consult to help guide length of therapy and to offer guidance for transition to oral therapy

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