TITLE: COMMUNITY-ACQUIRED PNEUMONIA (CAP) EMPIRIC MANAGEMENT OF ADULT PATIENTS AND IV TO PO CONVERSION

GUIDELINES:

- These guidelines serve to aid clinicians in the diagnostic work-up, assessment of severity of illness, empiric antibiotic treatment, and follow-up of adult patients with community-acquired pneumonia (CAP).
- These guidelines have been developed based on published literature including the most recent CAP guidelines and expert clinical opinions.\(^1\)\(^2\) The recommendations serve as a guide and clinicians are encouraged to use clinical judgment to manage all cases.

PURPOSE:

To develop guidelines for the use of appropriate antibiotics for adult patients with CAP and guidance on IV to PO conversion.

APPLICABILITY:

Prescribers and pharmacists

PROCEDURE:

1. Initial approach (See algorithm)
   
   A. Diagnostic studies
   B. Patient stratification
      1) Pneumonia PORT Severity Index
      2) Patients with asthma have increased risk of complications and may warrant hospital admission.
   C. Need for hospitalization
      1) In general, patients in risk Class I and II may be managed as outpatients. Outpatient management of patients in risk Class III may be considered after assessment of patient’s clinical condition, follow-up, and home environment.
   D. Need for admission to an intensive care unit

2. Empiric antibiotic therapy (See algorithm)
   
   A. Outpatient therapy
   B. Inpatient antibiotic therapy
      1) Risk factors
a. Initial therapy should be individualized where appropriate based on antibiotic history, recent hospitalization, immune status, and culture history.

2) Non-ICU admission
3) ICU-admission

C. Every effort should be made to initiate antibiotic therapy as soon as possible
D. Antibiotic therapy should always be targeted to culture and susceptibility data when available**

3. IV to PO Conversion (See algorithm)

A. Recommendations for oral conversion are provided based on initial IV therapy. The choice of oral antibiotics may be influenced by results of microbiologic studies, favoring more-narrow spectrum agents when possible.
B. Recommendations have been made to convert intravenous ceftriaxone, a third generation cephalosporin, to oral cefuroxime, a second-generation cephalosporin. Intravenous ceftriaxone has no definitive oral equivalent and conversion to cefuroxime (Ceftin) should be adequate following initial therapy with ceftriaxone. If a specific pathogen is identified, therapy should be modified accordingly.

4. Discharge (See algorithm)

A. Prior to discharge, all patients should be screened for influenza vaccination during influenza season, pneumococcal vaccination, and the need for smoking cessation counseling.3-5 (A list of steps taken to carry out the policy. A “How To” guideline for executing the policy.)

5. Algorithm
NewYork-Presbyterian Hospital
Sites: All Centers
Guideline: Medication Use Manual
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Guidelines for the Empiric Management of Adult Patients with Community-Acquired Pneumonia (CAP) and IV to PO Conversion

- Pneumonia diagnosed by radiograph and symptoms
  - Initiate diagnostic work-up
  - Initiate appropriate empiric antibiotic therapy (see drug therapy algorithm)

  - Pneumonia PORT Severity Index Score
    - Risk Class I/II: Pneumonia Severity Index < 78 points
    - Consider treatment as outpatient
    - Azithromycin 500 mg PO x 1, then 250 mg PO daily x 4 days
    - Or Doxycycline 100 mg PO q12h x 7-10 days
    - Or Levofloxacin 500 mg PO daily x 7-10 days

  - Risk Class III: Pneumonia Severity Index 71-90 points
    - Consider hospitalization (may be treated as outpatient after evaluation of other factors including home environment and follow-up)

  - Risk Class IV/ V: Pneumonia Severity Index ≥ 91 points
    - Admit to hospital
    - Evaluate admission to ICU for severe pneumonia

- Evaluate empiric antibiotic therapy
  - Evaluate results of microbiology and diagnostic tests
  - Modify antibiotic therapy if necessary

- Evaluate patient for IV to PO conversion

Severe pneumonia
- Major criteria (need one):
  - Need for mechanical ventilation
  - Septic shock with need for pressors
- Minor criteria (need at least three):
  - Respiratory rate ≥ 30 breaths/min
  - Multibar disease
  - PaO2/FiO2 ratio ≤ 250
  - Confusion/delirium
  - Leukopenia (WBC < 4000 cells/mm³)
  - Thrombocytopenia (platelets < 100,000 cells/mm³)
  - Hypothermia (temp < 36°C)
  - Hypotension requiring aggressive fluid resuscitation

Criteria for IV to PO conversion
- Clinical improvement in pulmonary signs and symptoms
- Able to tolerate or consistent improvement in fever over a 24-hour period
- WBC count normalizing
- Infection being treated does not require IV therapy (e.g. endocarditis, meningitis)
- GI absorption likely normal
  - (absence of vomiting or abnormal GI anatomy)
  - Able to receive oral dosage form either orally or via tube (concomitant oral or via tube administration of other meds)

Discharge from hospital with oral antibiotic if necessary to complete a course of therapy

LAST UPDATED 05-6-11
Empiric Antibiotic Therapy Options for CAP and Recommendations for PO Conversion

- Modification of antibiotic therapy may be necessary in patients with antibiotics in the past month, history of resistant pathogens (especially PCN-R S. pneumoniae), recently hospitalized, or severely immunocompromised
- In immunocompromised patients (HIV+, solid organ transplant recipients, etc.), consider other causes of pneumonia (e.g., viral, PCP, TB, etc.)
- All doses provided are for ~70 kg adults with normal renal and hepatic function

**NON-ICU ADMISSION**

<table>
<thead>
<tr>
<th>Option</th>
<th>PO Conversion</th>
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<tbody>
<tr>
<td>Ceftriaxone 1 g IV daily 1</td>
<td>Levofloxacin 500 mg IV daily 4,5</td>
</tr>
<tr>
<td>+ one of the following: Azithromycin 500 mg PO x 1, then 250 mg PO daily x 4 more days</td>
<td></td>
</tr>
<tr>
<td>or Doxycycline 100 mg PO Q12h</td>
<td></td>
</tr>
<tr>
<td>Cefuroxime (Cefin) 500 mg PO Q12h (7 days total) 2,4,5</td>
<td>Levofloxacin 500 mg PO daily (7 days total) 3,4,5</td>
</tr>
<tr>
<td>and/or</td>
<td></td>
</tr>
<tr>
<td>Azithromycin 250 mg PO daily (5 days total) 2,4,5</td>
<td>Levofloxacin 500 mg PO daily (7 days total) 3,4,5</td>
</tr>
<tr>
<td>or Doxycycline 100 mg PO Q12h (7 days total) 2,4,5</td>
<td>Levofloxacin 500 mg PO daily (7 days total) 3,4,5</td>
</tr>
<tr>
<td>or Levofloxacin 500 mg PO daily (7 days total) 3,4,5</td>
<td>Levofloxacin 500 mg PO daily (7 days total) 3,4,5</td>
</tr>
</tbody>
</table>

1. In the absence of meningitis, penicillin-susceptible and -intermediate S. pneumoniae (MIC ≤ 4 mcg/mL) may be treated with amoxicillin 2 g IV Q8h or penicillin 3.0-4.0 million units Q4-6h or ceftriaxone 1 g IV daily for 7 days followed by amoxicillin 1 g PO Q8h
2. In the absence of meningitis, oral conversion to levofloxacin is recommended if penicillin-resistant S. pneumoniae (MIC ≥ 8 mcg/mL) is isolated
3. Oral administration of levofloxacin and doxycycline require separation from concomitant administration of Mg2+, Ca2+, A+K+ - containing products, sucrose, calcium supplements, and iron products due to absorption of the levofloxacin and doxycycline limiting oral bioavailability. Separate administration times of these products from oral levofloxacin and doxycycline by about 2 hours
4. Routine anaerobic coverage is not specifically needed in the majority of CAP cases. If a true aspiration pneumonia is suspected (pneumonia syndrome in patients with a history of loss of consciousness as a result of alcohol/blood overdose or after seizures in patients with concomitant physical disease or neurologic disorder), then consider the need for improved anti-anaerobic coverage. Piperacillin/tazobactam 4.5 g IV Q6h + Azithromycin 500 mg PO x 1, then 250 mg PO daily OR for beta-lactam allergy, Levofloxacin 500 mg IV daily + Clindamycin 600 mg IV Q6h. Documentation in the medical record should indicate the need for this coverage due to aspiration and risk of multi-drug resistant organisms.

**ICU ADMISSION**

- Initial antibiotic therapy should be individualized where appropriate based on recent hospitalization, prior antibiotic history, immunocompromised state, recent positive cultures, etc.
- Antibiotic therapy should be guided by culture and susceptibility results when available
- Once admitted to a general patient care area, patients initially admitted to the ICU may be switched to oral therapy (as above) and treated for 7-10 days total. In these patients, oral azithromycin should be continued at a dose of 500 mg daily for a total of 7-10 days.

**Suspect Pseudomonas aeruginosa:**

<table>
<thead>
<tr>
<th>Option</th>
<th>Beta-lactam (penicillin) allergy:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceftriaxone 1 g IV daily 6</td>
<td>Levofloxacin 500 mg IV daily 5,6</td>
</tr>
<tr>
<td>+ Azithromycin 500 mg IV daily 7</td>
<td></td>
</tr>
<tr>
<td>or Tobramycin IV 7,8</td>
<td></td>
</tr>
<tr>
<td>Piperacillin/tazobactam 4.5 g IV Q6h 9</td>
<td></td>
</tr>
<tr>
<td>+ Levofloxacin 750 mg IV daily 5,6</td>
<td></td>
</tr>
</tbody>
</table>

5. Routine anaerobic coverage is not specifically needed in the majority of CAP cases. If true aspiration pneumonia is suspected (pneumonia syndrome in patients with a history of loss of consciousness as a result of alcohol/blood overdose or after seizures in patients with concomitant physical disease or neurologic disorder), then consider the need for improved anti-anaerobic coverage. No additional coverage is necessary in patients receiving piperacillin/tazobactam, but the addition of Clindamycin 600 mg IV Q8h OR Metronidazole 500 mg IV Q8h is necessary for patients with beta-lactam allergy. Documentation in the medical record should indicate the need for this coverage due to aspiration and risk of multi-drug resistant organisms.
6. Piperacillin/tazobactam, levofloxacin, tobramycin, aztreonam, ceftazidime, and amoxicillin/clavulanic acid require dose adjustment in patients with renal dysfunction
7. Tobramycin IV dosing based on weight and renal function. Use extended-interval (once-daily) dosing where appropriate. See NYP aminoglycoside dosing guidelines for criteria and details.
RESPONSIBILITY:

Joint Subcommittee on Anti-Infective Use

REFERENCES:


POLICY/GUIDELINE DATES:

Issued: October 2004
Reviewed: May 2010
Revised: April 2010
Medical Board Approval: June 2010