

**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:

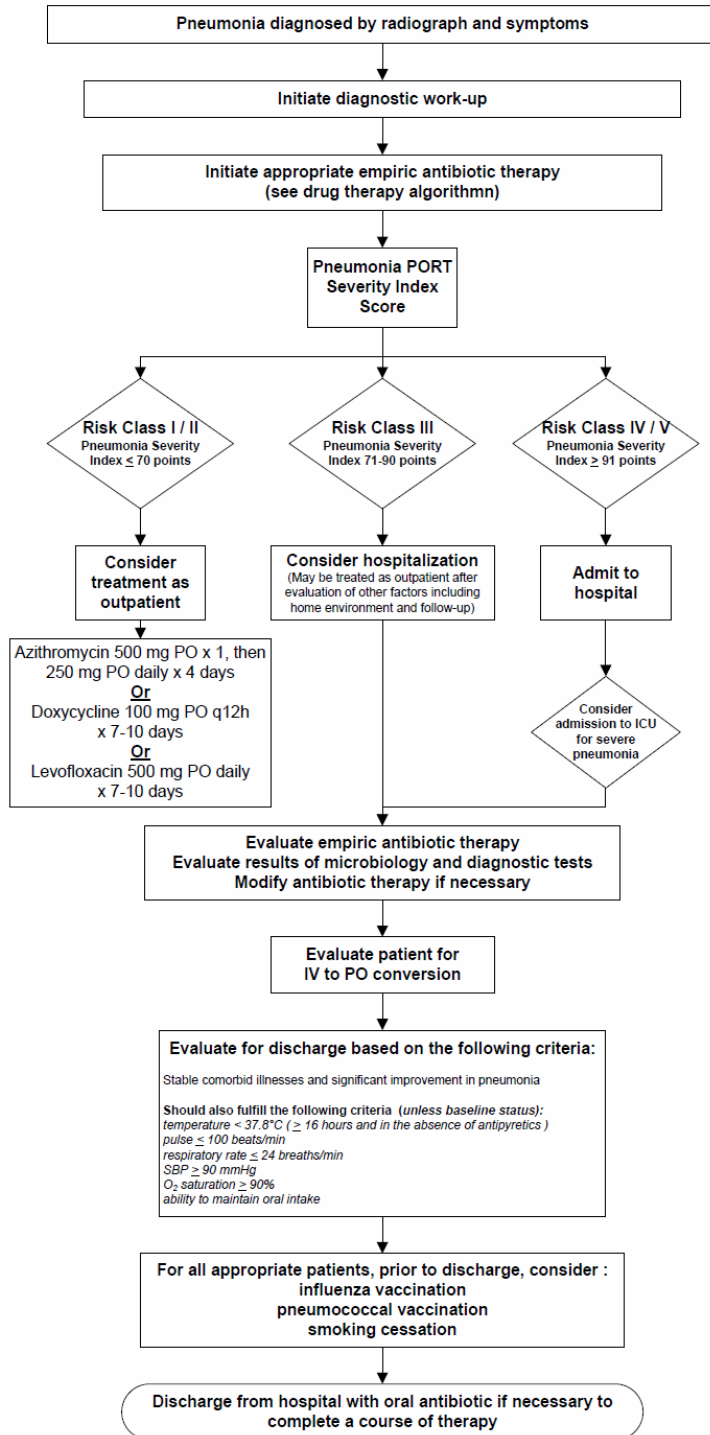
Prescribers and pharmacists

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
 Guidelines for the Empiric Management of Adult Patients with Community-Acquired Pneumonia (CAP) and IV to PO Conversion**



Typical diagnostic work-up

- Vital signs
 - Chest x-ray (PA and lateral)
 - Complete blood count (CBC) with differential
 - Basic metabolic panel
 - Hepatic profile
 - Pulse oximetry and/or ABG
- In addition, the following are recommended for Risk Class III-V and should be considered for Risk Class I-II:*

- Blood cultures x 2
- Sputum for Gram's stain and culture (if possible)

Additional diagnostics to consider:

- Legionella urinary antigen
- S. pneumoniae urinary antigen (at CUMC only)
- HIV test
- EKG

- Immunocompromised (including HIV):*
- Consider other causes of pneumonia (e.g. fungal, viral, TB, PCP) and other diagnostics

- Influenza season:*
- Nasopharyngeal swab for influenza and RSV

- Special circumstances:*
- e.g. SARS, bioterrorism

Pneumonia PORT Severity Index Score

Characteristic	Points
Age (years)	
Male	Age =
Female	Age - 10 =
Nursing Home resident	+10
Co-existing illness	
Neoplasm	+30
Liver disease	+20
Congestive heart failure	+10
Cerebrovascular disease	+10
Renal disease	+10
Physical exam findings	
Altered mental status	+20
Respiratory rate ≥ 30 breaths/min	+20
Systolic BP < 90 mmHg	+20
Temp < 35°C or ≥ 40°C	+15
Heart rate ≥ 125 beats/min	+10
Lab and X-ray findings	
Arterial pH < 7.35	+30
BUN ≥ 30 mg/dL	+20
Na < 130 mEq/L	+20
Glucose ≥ 250 mg/dL	+10
Hct < 30%	+10
PO ₂ < 60 mmHg or O ₂ saturation < 90%	+10
Pleural effusion	+10
TOTAL SCORE	<input type="text"/>

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
 - Multilobar disease
 - PaO₂/FIO₂ ratio ≤ 250
 - Confusion/disorientation
 - Uremia (BUN ≥ 20 mg/dL)
 - Leukopenia (WBC < 4000 cells/mm³)
 - Thrombocytopenia (platelets < 100,000 cells/mm³)
 - Hypothermia (temp < 36°C)
 - Hypotension requiring aggressive fluid resuscitation

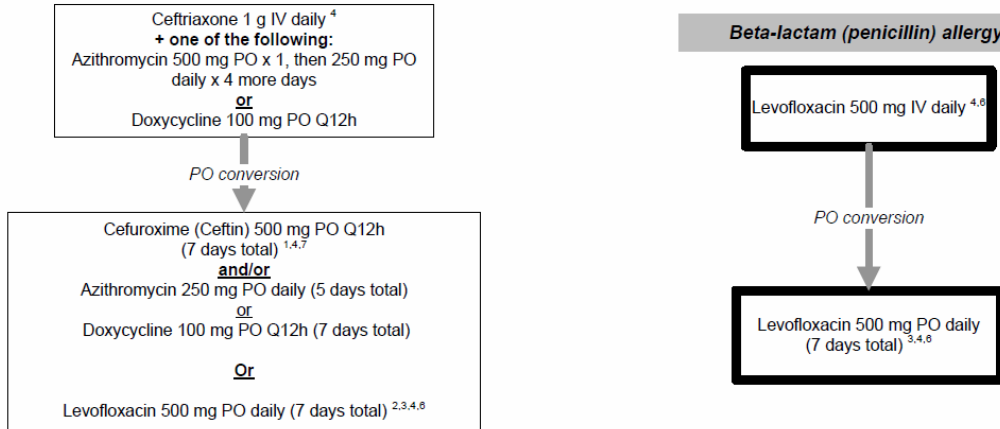
Criteria for IV to PO conversion

- Clinical improvement in pulmonary signs and symptoms
- Afebrile 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)
- Ability to receive oral dosage form either orally or via tube (concomitant oral or via tube administration of other meds)

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



1. In the absence of meningitis, penicillin-susceptible and -intermediate *S. pneumoniae* (MIC ≤ 4 mcg/mL) may be treated with ampicillin 2 g IV Q4-6h or PCN G IV 3-4 million units Q4-6h or ceftriaxone 1 g IV daily all followed by amoxicillin 1 g PO Q8h

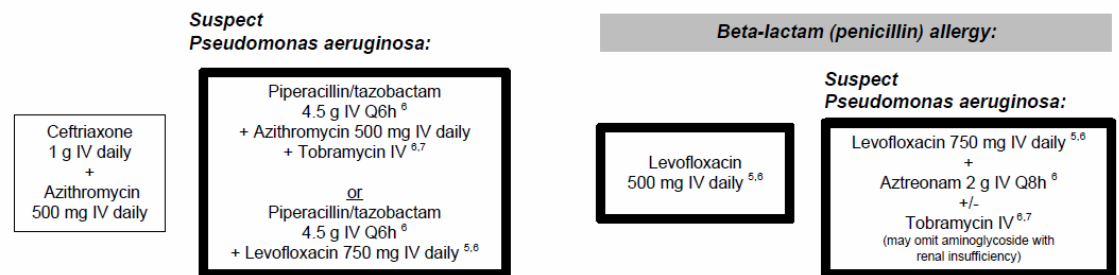
2. In the absence of meningitis, oral conversion to levofloxacin is recommended if penicillin-resistant *S. pneumoniae* (MIC ≥ 8 mcg/mL) is isolated

3. Oral administration of levofloxacin and doxycycline requires separation from concomitant administration of Mg+2-, Ca+2-, Al+3 - containing antacids, sucralfate, calcium supplements, and iron products due to adsorption of the levofloxacin and doxycycline limiting its 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 (pleuropulmonary syndrome in patients with a history of loss of consciousness as a result of alcohol/drug overdose or after seizures in patients with concomitant gingival disease or esophageal motility disorders), then consider the need for improved anti-anaerobic coverage: Piperacillin/tazobactam 4.5 g IV Q8h + Azithromycin 500 mg PO x1, then 250 mg daily OR for beta lactam allergy, Levofloxacin 500 mg IV daily + Clindamycin 600 mg IV Q8h. Documentation in the medical record should indicate the need for this coverage due to aspiration and risk of multi-drug resistant organisms.

ICU ADMISSION⁵

- 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.



5. Routine anaerobic coverage is not specifically needed in the majority of CAP cases. If a true aspiration pneumonia is suspected (pleuropulmonary syndrome in patients with a history of loss of consciousness as a result of alcohol/drug overdose or after seizures in patients with concomitant gingival disease or esophageal motility disorders), 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, cefuroxime, cefotaxime, 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:

1. Mandell LA, Wunderink RG, Anzueto A, et al. Infectious Diseases Society of America/American Thoracic Society consensus guidelines on the management of community-acquired pneumonia in adults. *Clin Infect Dis* 2007; 44 suppl 2: S27-72.
2. Niederman MS, Mandell LA, Anzueto A, et al. Guidelines for the management of adults with community-acquired pneumonia. Diagnosis, assessment of severity, antimicrobial therapy, and prevention. *Am J Respir Crit Care Med* 2001 Jun; 163(7): 1730-54.
3. Centers for Disease Control. Influenza (Flu). <http://www.cdc.gov/flu/>
4. Centers for Disease Control. Adult immunization schedule. <http://www.cdc.gov/vaccines/recs/schedules/adult-schedule.htm>
5. Centers for Disease Control. Prevention of Pneumococcal Disease: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* April 04, 1997; 46(RR-08); 1-24.

POLICY/GUIDELINE DATES:

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