Montefiore

Montefiore Respiratory Infection Guidelines

(Revised 2023, includes CAP, HAP/VAP, aspiration, lung abscess/empyema, COPD exacerbations; adapted from IDSA/ATS or NYS, CDC, NIH guidelines)

General notes:

- "De-label" penicillin allergy when possible and update medical record if patient able to tolerate beta-lactams
- Reassess patient condition daily and switch to PO whenever possible
- Do NOT "restart the antibiotic clock at discharge," 5 days for CAP = 5 days, not 5 MORE days after discharge

Highlights:

- No role for routine steroids (outside of severe cases requiring ICU admission)
- Obtain respiratory and blood cultures ONLY in severe disease and those who receive empiric MRSA or *Pseudomonas aeruginosa* coverage
- Procalcitonin is not recommended to determine need for initial therapy but can assist in monitoring response to treatment
- MRSA nasal swab is recommended to guide de-escalation when empiric MRSA coverage is started
- Routine follow up X-rays not recommended for bacterial PNA
- COVID-19 guidelines not included here, please visit https://www.covid19treatmentguidelines.nih.gov/therapeutic-management/

Risk factors for MRSA or *P. aeruginosa* (obtain nasal MRSA PCR; respiratory culture and nasal influenza/RSV swab as indicated; note that *S. aureus* PNA was observed in COVID-19 patients at MMC as a complication of prolonged intubation; if COVID-19 suspected, obtain SARS-CoV-2 PCR):

- Prior isolation of either on cultures
- Hospitalization AND treatment with IV antibiotics in prior 90 days
- IVDU (specifically MRSA)
- Pneumonia associated with influenza (specifically S. aureus and Streptococci)

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Treatment

Outpatient CAP: non-severe, no risk factors for antibiotic resistant pathogens (e.g. MRSA, *P. aeruginosa*). Pathogens: *Streptococci, Haemophilus*, atypicals like *Mycoplasma, Legionella* (esp. warmer months)

- Amoxicillin 1g three times daily, OR
- Doxycycline 100mg twice daily
- Azithromycin 500mg on day 1, then 250mg daily for remaining course (ONLY recommended in areas with macrolide resistance <25%) – *Note MMC microbiology laboratory does not routinely test for S. pneumoniae susceptibilities vs. macrolides*

Inpatient CAP: non-severe, no risk factors for antibiotic resistant pathogens (e.g., MRSA, *P. aeruginosa*). Pathogens: see above.

- Combination beta-lactam (ceftriaxone 1-2g IV daily) with a macrolide (azithromycin 500mg PO daily) OR doxycycline 100mg PO twice daily (if contraindication to macrolide or quinolone); **OR**
- Monotherapy with respiratory fluoroquinolone (levofloxacin 750mg) *especially if anaphylaxis to beta-lactams*
    - 750mg dose recommended for those with normal renal function (CrCl >50mL/min) in order to maximize concentration-dependent killing properties of fluoroquinolones; elderly patients and those with diminished renal function may require lower dose
- Azithromycin IV and Levofloxacin IV/PO dose of 750mg require ID/stewardship approval *on initiation*

Inpatient severe CAP but no risk factors for MRSA or *P. aeruginosa*

- Combination beta-lactam (ceftriaxone 1-2g IV daily) with a macrolide (azithromycin 500mg IV daily); **OR**
- Combination beta-lactam plus a respiratory fluoroquinolone (levofloxacin 750mg PO daily if CrCl >50mL/min (or equivalent dose adjusted for renal function)); *lower quality of evidence than bullet 1*

Inpatient severe CAP with risk factors for MRSA (see above)

- Ceftriaxone 1-2g IV daily + Azithromycin 500mg IV daily + Vancomycin 15-20mg/kg IV (or linezolid 600mg IV every 12 hours, or ceftaroline 600mg IV every 12 hours)
- ID/stewardship approval is required for vancomycin IV beyond 72 hours and azithromycin IV. ID consult is required for PO/IV linezolid or ceftaroline *on initiation*

- Severe allergy to penicillin: Levofloxacin 750mg IV daily if CrCl >50mL/min (or equivalent dose adjusted for renal function) + Vancomycin 15-20mg/kg IV

Inpatient severe CAP/HAP/VAP with risk factors for *P. aeruginosa* (see above)

- Piperacillin/tazobactam 4.5g every 8 hours extended infusion over 4 hours if CrCl >20mL/min (or equivalent dose adjusted for renal function) **OR** Cefepime 2g every 8 hours if CrCl >60mL/min (or equivalent dose adjusted for renal function)
    - *If in ICU, extended infusion of piperacillin/tazobactam and cefepime is recommended*
- Severe allergy to penicillin: Levofloxacin 750mg IV daily if CrCl >50mL/min (or equivalent dose adjusted for renal function) + Vancomycin 15-20mg/kg IV +/- Tobramycin 7mg/kg IV ideal body weight (for added Pseudomonal coverage)
- *Contact ID/Stewardship if prior history of multidrug resistant Pseudomonas*

Inpatient severe CAP/HAP/VAP with septic shock, ARDS +/- ECMO, unknown organism; compromised host

- Add azithromycin 500mg IV to above regimen to cover atypicals (*Legionella, Mycoplasma* spp.)
- If urine *Legionella* Ag (for serogroup 1) is negative, azithromycin IV can be continued for other *Legionella* and *Mycoplasma* species at discretion of ID consult

Inpatient severe pneumonia w/ lung abscess or empyema

- ID consult strongly advised for assistance with work up and treatment; may contact antimicrobial stewardship for initial recommendations
- Pathogens can include *S. aureus, Streptococcal* species, *Haemophilus* species, Gram negatives, anaerobes, or Mycobacteria

Aspiration pneumonia (cover oral *Streptococcus* and other oral flora):

- Regimens: ampicillin/sulbactam 3g IV every 6 hours; amoxicillin/clavulanate 875mg/125mg PO twice daily if CrCl >30mL/min (or equivalent dose adjusted for renal function); clindamycin 300-600mg PO/IV every 6-8 hours

COPD Exacerbations

- **Suggested work-up:** chest X-ray, sputum culture if bacterial infection suspected, influenza/RSV PCR if in season, SARS-CoV-2 PCR
- **GOLD Criteria for antibiotics:**
    - Sputum purulence and either increased sputum volume or dyspnea **OR**

- Severe disease requiring positive pressure ventilation

- **Mild (treated with short acting bronchodilators only):**
  - No antibiotics recommended
- **Moderate (treated with short acting bronchodilators plus antibiotics and/or corticosteroids):**
  - Doxycycline 100mg twice daily **OR** Azithromycin 500mg daily
- **Severe (requiring hospitalization or emergency room visit):**
  - **No risk factors for *P. aeruginosa:***
    - **PO:** Amoxicillin/clavulanate 875mg/125mg twice daily if CrCl >30mL/min (or equivalent dose adjusted for renal function), **OR** cefdinir 300mg twice daily, **OR** Levofloxacin 750mg daily (severe PCN allergy) if CrCl >50mL/min (or equivalent dose adjusted for renal function)
    - **IV**: Ampicillin/sulbactam 3g every 6 hours, **OR** Ceftriaxone 1-2g daily, **OR** Levofloxacin 750mg daily (severe PCN allergy) if CrCl >50mL/min (or equivalent dose adjusted for renal function)
  - **Risk factors for *P. aeruginosa*:** chronic colonization or prior isolate of *P. aeruginosa* (particularly within the past 12 months), very severe COPD (FEV_1 <30% predicted), bronchiectasis on chest imaging, intravenous broad-spectrum antibiotic use within the past 3 months, chronic systemic glucocorticoid use
    - **PO:** Levofloxacin 750mg daily if CrCl >50mL/min (or equivalent dose adjusted for renal function)

      IV: Piperacillin/tazobactam 4.5g every 8 hours extended infusion over 4 hours if CrCl >20mL/min (or equivalent dose adjusted for renal function), **OR** Cefepime 2g every 8 hours if CrCl >60mL/min (or equivalent dose adjusted for renal function), **OR** Levofloxacin 750mg daily if CrCl >50mL/min (or equivalent dose adjusted for renal function) (severe PCN allergy)

Duration of Antibiotics

	Duration	Comments
CAP (not *Legionella,* MRSA, or *Pseudomonas*)	5 days	None
CAP with *Legionella,* MRSA, or *Pseudomonas*	*Legionella* – 7-21 days *MRSA and P. aeruginosa* – 7 days or more, may depend on host factors and other complications	ID consult advised for work up and treatment recommendation
Aspiration pneumonitis	3-5 days	Some cases may not require antibiotics (chemical pneumonitis)
HAP/VAP	7 days	Includes treatment of MDROs

Empyema or lung abscess	~3-4 weeks of treatment (IV or PO) and possible need for reimaging to confirm adequate improvement	ID consult advised for antibiotic selection/duration, esp. for XDR organisms; refer to OPAT upon discharge
COPD exacerbation	5-7 days	None

Oral Step-down Options

Suspect *P. aeruginosa*	**Suspect MRSA**	**Ampicillin-sulbactam or ceftriaxone started**
• Levofloxacin 750mg PO daily if CrCl >50mL/min (or equivalent dose adjusted for renal function)	• Doxycycline 100mg PO twice daily • Linezolid 600mg twice daily	• Amoxicillin/clavulanate 875mg/125mg PO twice daily if CrCl >30mL/min (or equivalent dose adjusted for renal function) • Cefdinir 300mg PO twice daily

Levofloxacin Dosing Table

Creatinine Clearance (mL/min)	**Dose***
>50	750mg IV/PO daily
20-49	750mg IV/PO q48h
10-19	750mg IV/PO x 1, then 500mg q48h
HD	750mg IV/PO x 1, then 500mg after each HD
CVVH	750mg IV/PO q48h

*** 750mg dose requires ID/antimicrobial stewardship approval**