SJMHS Inpatient Guidelines for the Treatment of Pneumonia

Diagnosis of Pneumonia requires ≥ 2 clinical signs/symptoms and at least one radiographic criteria, as listed below:

≥ 2 Clinical Signs or Symptoms **PLUS** **Radiographic Criteria (CXR or CT)**

- Cough
- Sputum
- Dyspnea or tachypnea
- les, crackles, etc.)
- a
- ,000/mcl or >15%

Definitely Positive

- Air space density/opacity/disease
- Bronchopneumonia
- Cavitation
- Ground glass
- Infection
- Infiltrate
- Loculations
- Nodular airspace disease
- Pleural effusion
- Pneumonia
- Tree in bud

Equivocal:

- "can
- "atel

HMS-Preferred empiric treatment for CAP includes:
- Ampicillin-Sulbactam PLUS Azithromycin, Clarithromycin, or Doxycycline

- Ceftriaxone or Cefotaxime PLUS Azithromycin, Clarithromycin, or Doxycycline

5 days of therapy for Uncomplicated CAP Patients

Infection	Antimicrobial Therapy§	Duration	ments

Community-acquired pneumonia (CAP)[1]
 	
With NO recent hospitalization (3 months) AND no prior respiratory isolation of *Pseudomonas aeruginosa* or MRSA (within 1 year)
	Ceftriaxone 1g IV Q24h
	PLUS
	Azithromycin 500 mg IV/PO X5 days **OR** doxycycline 100mg IV/PO Q12h (if macrolide intolerance/allergy)
		5 days initial duration*
		7 days for complicated pneumonia*
		
		Complicated pneumonia: structural lung disease, mod/severe COPD, confirmed staphylococcus or pseudomonas, and/or immunosupression[4]
		
		*Longer durations of therapy may be indicated, depending upon clinical response
			• Anaerobic coverage for aspiration pneumonia is not routinely warranted unless:
			  ○ Lung abscesses
			  ○ Empyema
			• Consider doxycycline as an alternative to azithromycin in patients at high risk for QTc prolongation
			  ○ QTc prolongation (>500ms)
			  ○ Hypokalemia
			  ○ Hypomagnesemia
			  ○ Significant bradycardia
			  ○ Uncompensated heart failure
			  ○ Patients receiving class IA or class III antiarrhythmic drugs
			• Non-severe CAP**: Do not routinely obtain respiratory OR blood cultures OR *Legionella* urinary antigens
			• Severe CAP**: Obtain respiratory culture AND blood cultures AND *Legionella* urinary antigens
			• Patients should be switched from IV to PO when they are hemodynamically stable, improving clinically, and able to tolerate PO medications.
			• Total duration (IV plus PO step down) described in previous column
			• Options for PO step down therapy should target isolated pathogen. Options for PO step-down if no sputum cultures drawn or

Severe CAP: any 1 of the major criteria or 3+ minor criteria M -S -I n M -(-V -I -Hypotension requiring aggressive fluid resuscitation -PaO2/FI02 ratio ≤250 -Multilobar infiltrates -Leukopenia (WBC <4,000) -Thrombocytopenia (Plt <100,000 uL) -Hypothermia (<36°C)	Patients with a documented TypeI IgE-mediated penicillin or cephalosporin allergy OR any legitimate cephalosporin allergy OR as PO therapy in patients tolerating PO: Levofloxacin 750 mg[1] IV/PO Q24h	5 days if afebrile with <2 signs of clinical instability on days 3-5 Signs of Clinical Instability: • Arterial O2 sat ≤ 90% • HR ≥ 100 bpm • RR ≥ 24 breaths/min • BP ≤ 90 mmHg • Altered mental status (vs. baseline)	

Alternative but HMS Non-Preferred treatment for patients with cephalosporin allergy, allergy to both macrolides and doxycycline/tetracycline, or severe pencillin allergy

Signs of clinical instability impacting determination for therapy duration

§ Prior to confirmation of pathogen

1. Refer to SJMHS antibiotic dosing tables for dose adjustments in renal dysfunction.

Reviewed/ Approved by: SJMH Antimicrobial Subcommittee: 2011; 10/2016, 9/2018; 1/2019; 9/2018, 4/2019; 7/2020 SJMH P & T Committee 2011; 12/2016; Last updated 9/2020
Contributors: Curtis Collins, PharmD, Anu Malani, MD

SJMHS Inpatient Guidelines for the Treatment of Pneumonia

Diagnosis of Pneumonia requires ≥ 2 clinical signs/symptoms and at least one radiographic criteria, as listed below:

≥ 2 Clinical Signs or Symptoms

- Cough
- Sputum
- Dyspnea or tachypnea
- Hypoxia
- Exam finding (i.e. rales, crackles, etc.)
- Fever or hypothermia
- WBC >10,000 or < 4,000/mcl or >15% bands

PLUS

Radiographic Criteria (CXR or CT)

Definitely Positive

- Air space density/opacity/disease
- Bronchopneumonia
- Cavitation
- Ground glass
- Infection
- Infiltrate
- Loculations
- Nodular airspace disease
- Pleural effusion
- Pneumonia
- Tree in bud

Equivocal:

- "cannot rule out pneumonia"
- "atelectasis vs. pneumonia"

Infection	Antimicrobial Therapy§	Duration	Comments
Community-acquired pneumonia (CAP)[1] **With NO recent hospitalization (3 months) AND no prior respiratory isolation of *Pseudomonas aeruginosa* or MRSA (within 1 year)** **Severe CAP: any 1 of the major criteria or 3+ minor criteria Major Criteria: -Septic shock + vasopressors -Respiratory failure requiring mechanical ventilation Minor criteria: -Confusion/disorientation -Uremia (BUN ≥20) -RR ≥30 -Hypotension requiring aggressive fluid resuscitation -PaO2/FI02 ratio ≤250 -Multilobar infiltrates -Leukopenia (WBC <4,000) -Thrombocytopenia (Plt <100,000 uL) -Hypothermia (<36°C)	Ceftriaxone 1g IV Q24h **PLUS** Azithromycin 500 mg IV/PO X5 days **OR** doxycycline 100mg IV/PO Q12h (if macrolide intolerance/allergy) Patients with a documented TypeI IgE-mediated penicillin or cephalosporin allergy OR any legitimate cephalosporin allergy OR as PO therapy in patients tolerating PO: Levofloxacin 750 mg[1] IV/PO Q24h	5 days initial duration* 7 days for complicated pneumonia* Complicated pneumonia: structural lung disease, mod/severe COPD, confirmed staphylococcus or pseudomonas, and/or immunosupression[4] *Longer durations of therapy may be indicated, depending upon clinical response 5 days if afebrile with <2 signs of clinical instability on days 3-5 Signs of Clinical Instability: • Arterial O2 sat ≤ 90% • HR ≥ 100 bpm • RR ≥ 24 breaths/min • BP ≤ 90 mmHg • Altered mental status (vs. baseline)	• Anaerobic coverage for aspiration pneumonia is not routinely warranted unless: o Lung abscesses o Empyema • Consider doxycycline as an alternative to azithromycin in patients at high risk for QTc prolongation o QTc prolongation (>500ms) o Hypokalemia o Hypomagnesemia o Significant bradycardia o Uncompensated heart failure o Patients receiving class IA or class III antiarrhythmic drugs • Non-severe CAP**: Do not routinely obtain respiratory OR blood cultures OR *Legionella* urinary antigens • Severe CAP**: Obtain respiratory culture AND blood cultures AND *Legionella* urinary antigens • Patients should be switched from IV to PO when they are hemodynamically stable, improving clinically, and able to tolerate PO medications. • Total duration (IV plus PO step down) described in previous column • Options for PO step down therapy should target isolated pathogen. Options for PO step-down if no sputum cultures drawn or

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SAINT JOSEPH MERCY HEALTH SYSTEM
A Member of Trinity Health

if no pathogen identified on respiratory/blood culture(s):

- Amoxicillin/clavulanate 875mg Q12h[1] PLUS/MINUS azithromycin
- Amoxicillin 1g Q8h[1] PLUS/MINUS azithromycin
- Cefdinir 300mg Q12h[1] PLUS/MINUS azithromycin
- Cefuroxime 500mg Q12h[1] PLUS/MINUS azithromycin
- If TypeI IgE-mediated penicillin or any legitimate cephalosporin allergy: Levofloxacin 750mg Q24h[1]

5 days of therapy for Uncomplicated CAP Patients

Community-Acquired Pneumonia (CAP) WITH recent hospitalization (3 months) AND IV antibiotic exposure while hospitalized AND NO prior respiratory isolation of *Pseudomonas aeruginosa* or MRSA (within 1 year)

Patients with recent hospitalization without IV antibi
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-Confusion/disorientation
-Uremia (BUN ≥20)
-RR ≥30
-Hypotension requiring aggressive fluid resuscitation
-PaO2/FI02 ratio ≤250
-Multilobar infiltrates
-Leukopenia (WBC <4,000)
-Thrombocytopenia (Plt <100,000 uL)
-Hypothermia (<36°C)

HMS-Preferred empiric treatment for CAP includes:
- Ampicillin-Sulbactam PLUS Azithromycin, Clarithromycin, or Doxycycline

- Ceftriaxone or Cefotaxime PLUS Azithromycin, Clarithro-mycin, or Doxycycline

Non-severe CAP:
Ceftriaxone 1g IV Q24h
PLUS
Azithromycin 500 mg IV/PO X5 days **OR** doxycycline 100mg IV/PO Q12h (if macrolide intolerance/allergy)

Severe CAP:**
Cefepime 2 gm Q12h[1]
PLUS
Azithromycin 500 mg IV Q24H **OR** doxycycline 100mg IV/PO Q12h (if macrolide intolerance/allergy)
PLUS
Vancomycin (pharmacy to dose)

5 - 7 days*

Patients with MRSA *Pseudomonas* or other non-fermenting gram negatives identified on culture should receive 7 days initial duration

*Longer durations of therapy may be indicated, depending upon clinical response

Alternative but HMS Non-Preferred treat-ment for patients with cephalosporin allergy, allergy to both macrolides and doxycycline/tetracy-cline, or severe pencillin allergy

- Escalate coverage in non-severe CAP if MRSA or *Pseudomonas* identified on culture
- Consider MRSA nasal swab to r/o MRSA colonization for vancomycin deescalation
- Non-severe CAP**: Do not routinely obtain respiratory OR blood cultures OR *Legionella* urinary antigens
- If severe CAP** obtain sputum AND blood cultures AND *Legionella* and urinary antigens
- Anaerobic coverage for aspiration pneumonia is not routinely warranted unless:
  - Lung abscesses
  - Empyema
- Patients with a documented TypeI IgE-mediated penicillin or cephalosporin allergy OR any legitimate cephalosporin allergy: Non-severe CAP: Levofloxacin IV/PO 750 mg Q24h. Severe CAP: Meropenem 500 mg IV Q6H[1]
- Deescalate MRSA and pseudomonal coverage if no MRSA or *Pseudomonas* identified on culture OR if cultures are unable to be obtained
- Options for PO step down therapy should target isolated pathogen. See previously defined PO options.

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1. Refer to SJMHS antibiotic dosing tables for dose adjustments in renal dysfunction.

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			if no pathogen identified on respiratory/blood culture(s): o Amoxicillin/clavulanate 875mg Q12h[1] PLUS/MINUS azithromycin o Amoxicillin 1g Q8h[1] PLUS/MINUS azithromycin o Cefdinir 300mg Q12h[1] PLUS/MINUS azithromycin o Cefuroxime 500mg Q12h[1] PLUS/MINUS azithromycin o If TypeI IgE-mediated penicillin or any legitimate cephalosporin allergy: Levofloxacin 750mg Q24h[1]
Community-Acquired Pneumonia (CAP) WITH recent hospitalization (3 months) AND IV antibiotic exposure while hospitalized AND NO prior respiratory isolation of *Pseudomonas aeruginosa* or MRSA (within 1 year) Patients with recent hospitalization without IV antibiotic exposure or prior Pseudomonas or MRSA treat as above **Severe CAP: any 1 of the major criteria or 3+ minor criteria Major Criteria: -Septic shock + vasopressors -Respiratory failure requiring mechanical ventilation Minor criteria: -Confusion/disorientation -Uremia (BUN ≥20) -RR ≥30 -Hypotension requiring aggressive fluid resuscitation -PaO2/FI02 ratio ≤250 -Multilobar infiltrates -Leukopenia (WBC <4,000) -Thrombocytopenia (Plt <100,000 uL) -Hypothermia (<36°C)	**Non-severe CAP**: Ceftriaxone 1g IV Q24h **PLUS** Azithromycin 500 mg IV/PO X5 days **OR** doxycycline 100mg IV/PO Q12h (if macrolide intolerance/allergy) **Severe CAP**:** Cefepime 2 gm Q12h[1] **PLUS** Azithromycin 500 mg IV Q24H **OR** doxycycline 100mg IV/PO Q12h (if macrolide intolerance/allergy) **PLUS** Vancomycin (pharmacy to dose)	5 - 7 days* Patients with MRSA *Pseudomonas* or other non-fermenting gram negatives identified on culture should receive 7 days initial duration *Longer durations of therapy may be indicated, depending upon clinical response	• Escalate coverage in non-severe CAP if MRSA or *Pseudomonas* identified on culture • Consider MRSA nasal swab to r/o MRSA colonization for vancomycin deescalation • Non-severe CAP**: Do not routinely obtain respiratory OR blood cultures OR *Legionella* urinary antigens • If severe CAP** obtain sputum AND blood cultures AND *Legionella* and urinary antigens • Anaerobic coverage for aspiration pneumonia is not routinely warranted unless: o Lung abscesses o Empyema • Patients with a documented TypeI IgE-mediated penicillin or cephalosporin allergy OR any legitimate cephalosporin allergy: Non-severe CAP: Levofloxacin IV/PO 750 mg Q24h. Severe CAP: Meropenem 500 mg IV Q6H[1] • Deescalate MRSA and pseudomonal coverage if no MRSA or *Pseudomonas* identified on culture OR if cultures are unable to be obtained • Options for PO step down therapy should target isolated pathogen. See previously defined PO options.

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1. Metlay JP,Waterer GW, et al. IDSA/ATS Clinical Practice Guidelines on the Diagnosis and Treatment of Adults with Community-Acquired Pneumonia. Clin Infect Dis 2019;200 (7):e45-67.
2. Liu C, Bayer A, et al. Clinical Practice Guidelines by the IDSA for the treatment of MRSA Infections in Adults and Children.Clin Infect Dis 2011;52(3):e18-e55.
3. Kalil AC, Metersky ML, Klompas M, et al. Management of Adults with Hospital-acquired and Ventilator-associated Pneumonia: 2016 Clinical Practice Guidelines by the Infectious Diseases Society of America and the American Thoracic Society. Clin Infect Dis. 2016;96(5):e61-e111.
4. Michigan hospital medicine safety consortium

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