



2019 IDSA/ATS Community-Acquired Pneumonia Guideline: more micro, less macrolide, no HCAP.

Caroline Castillo, MD
OHSU ID Division
15th Annual NW Regional Hospital Medicine Conference
September 25, 2020



Disclosure

- No personal financial disclosures
 - Spouse is a speaker for Horizon Therapeutics, PLC
- DHHSU



Overview

- Objectives
- Brief review of 2019 IDSA/ATS Community-Acquired Pneumonia (CAP) Guideline
- Case-based application
- Conclusion



Objectives

- Identify important changes in management of CAP since 2007
- Integrate assessment of clinical severity and risk for multi-drug resistance (MDR) into management of CAP
- Identify indications for obtaining sputum and blood cultures, nasal MRSA PCR, and additional diagnostic studies
- Understand indications for standard empiric regimen, additional coverage, and early deescalation



Globally, lower respiratory infections are the 4th leading cause of years of life lost¹

- Pneumonia is a leading cause of hospitalization among US adults
 - 1.3 million ED visits²
 - 250,000 hospitalizations³
 - 50,000 deaths (15.1 per 100,000)³
- Epidemiology is evolving due to immunization
 - Nearly 70% of adults >65yo have received at least 1 pneumococcal vaccination⁴

¹ GBD 2017 Causes of Death Collaborators. *Lancet*, 2018.

²Source: [National Hospital Ambulatory Medical Care Survey: 2017 Emergency Department Summary Tables, table 12.](#)

³Source: CDC, National Center for Health Statistics, 2017.

⁴Source: [Early release of selected estimates based on data from the 2018 National Health Interview Survey, data table for figure 5.1.](#)

Etiology of CAP

- None identified 55-74%
- Bacterial 15-29%
- Viral 14-27%
- Fungal 1-3%
- Mycobacterial 1-2%



Figure: Breakdown of bacterial organisms identified on sputum culture (inner to outer circle: VAMC, EPIC, CAPITA).

- S. pneumoniae
- S. aureus
- Legionella sp
- Other
- H. influenzae
- P. aeruginosa
- Mycoplasma, Chlamydia

VAMC, Musher DM. J Infect, 2013.

Jain S, CDC EPIC Study Team. N Eng J Med, 2015.

CAPITA, Huijts SM. Clin Microbiol Infect, 2018.

2019 IDSA/ATS CAP Guideline Basics

- GRADE methodology
 - Inclusion: US adults with CAP, radiographic confirmation
 - Exclusion: congenital/acquired immunodeficiency (drug-induced), travel
- 16 most important management decisions (PICO)
 - Recommendation by severity, MDR risk
 - Summary of evidence
 - Rationale
 - Research needed
- Scope: diagnosis through treatment

GRADE Quality of Evidence	Critical Outcome	Non-critical Outcome
High (H)	Strong	Strong
Moderate (M)	Strong	Strong/ Conditional
Low (L)	Strong	Conditional
Very low (VL)	Strong	Conditional

Strong:

Conditional:

“We recommend. . .”

“We suggest. . .”

Summary of Important Changes

- Expansion of indications for sputum, blood culture
 - Deescalating broad-spectrum abx
- HCAP Abandoned
 - Effort to reverse overuse of broad-spectrum abx
- Macrolide monotherapy only when *S. pneumoniae* <25% resistance
- Emphasis on severity of illness, data-driven MDR risk factors versus site of care
- Procalcitonin, corticosteroids, follow-up imaging addressed





IDSA/ATS Criteria for Defining Severe CAP (2007)

Major Criteria (1)

- Septic shock requiring vasopressor
- Respiratory failure requiring mechanical ventilation

Minor Criteria (≥ 3)

- Respiratory rate ≥ 30
- $\text{Pa}_{\text{O}_2} / \text{Fi}_{\text{O}_2}$ ratio ≤ 250
- Multi-lobar infiltrates
- Confusion/disorientation
- Uremia (BUN ≥ 20)
- Leukopenia (WBC < 4)
- Thrombocytopenia (Plts $< 100,000$)
- Hypothermia (T $< 36\text{C}$)
- Hypotension (requiring aggressive fluid resuscitation)

Hospitalized Patient Characteristics	Sputum cx	Blood cx	Nasal MRSA PCR	Urine Ag*	Rapid flu PCR†	Standard Regimen	Additional empiric coverage if MDR risk‡	Duration
Meets severe criteria	Y (VL)	Y (VL)	-	Y (L)	Y (M)	β-lactam + macrolide (M) OR β-lactam + rFQL (L)	Y (M)	Clinical stability min 5 days (M)
Does not meet severe criteria	-	N (VL)	-	N (L)	Y (M)	β-lactam + macrolide (H) OR resp rFQL (H)	No, except hx MDR PNA	Clinical stability min 5 days (M)
Hx of MRSA?	Y (VL)	Y (VL)	Y	-	-	Determined by severity	Vancomycin Linezolid	Clinical stability min 7 days if cx+
Hx of PsA?	Y (VL)	Y (VL)	-	-	-	Determined by severity	Pip-tazo Cefepime/Ceftaz Aztreonam Meropenem/Imi	Clinical stability min 7 days if cx+
Hospitalized + IV abx within 90d?	Y (VL)	Y (VL)	Y	-	-	Determined by severity	Severe – Y (M) Nonsevere – no empiric coverage	Clinical stability min 7 days if cx+
Empiric MDR tx?	Y (VL)	Y (VL)	Y	-	-	Determined by severity	-	Clinical stability min 7 days if cx+

* Both Strep pneumoniae, legionella urine antigen, legionella sputum culture or PCT recommended in patients with severe pneumonia. Legionella Ag recommended for travel, outbreak (L).

† When influenza virus is circulating in the community, molecular test is preferred over rapid Ag (M).

‡ Deescalate to standard regimen within 48h if culture/nasal PCR negative and the patient is improving.



Other important recommendations. . .

Q5 Procalcitonin

We recommend that empiric antibiotic therapy should be initiated in adults. . . regardless of initial serum procalcitonin level. (M)

Q6/7 Clinical prediction rules

In addition to clinical judgement, we recommend use of a validated clinical prediction rule for prognosis, preferentially the Pneumonia Severity Index (PSI) to determine need for hospitalization. (M)

Clinical judgement and use of IDSA/ATS 2007 severity criteria is recommended to determine need for higher level of care. (L)

Q10 Aspiration pneumonia

We suggest not routinely adding anaerobic coverage. . . unless lung abscess or empyema is suspected. (VL)

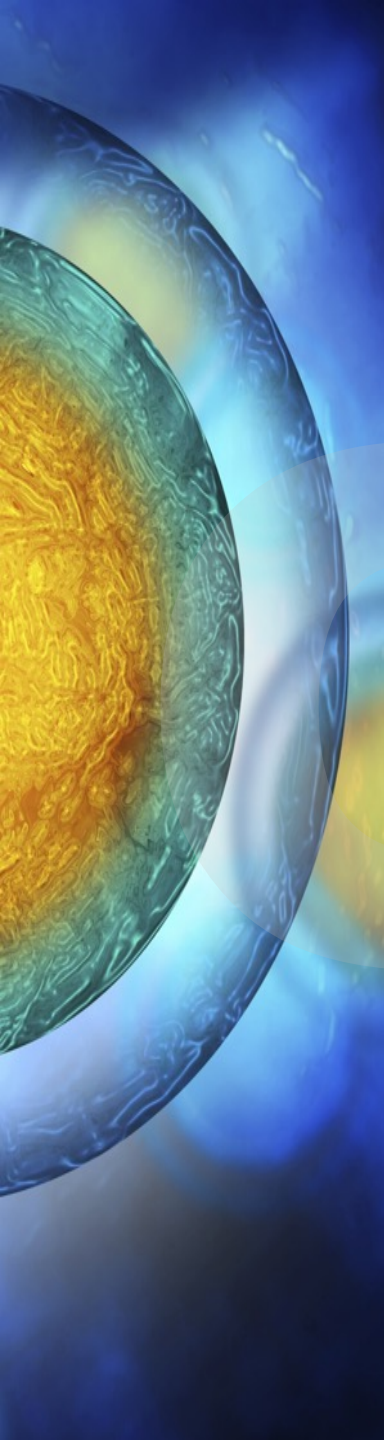
Q12 Corticosteroids

We recommend not routinely using corticosteroids in nonsevere CAP. (H)

We suggest no routine use in severe CAP. (M)

We suggest no routine use in influenza PNA. (L)

We endorse the Surviving Sepsis Campaign recommendations on use in CAP and refractory shock.



Case 1

DHHSU

June 2019

- 53yo man in ED, fever, pleuritic pain, productive cough x3d
- PMH: HTN, HCV cirrhosis, CKD2, CAD, nephrolithiasis
- Hospitalized 2m prior for urosepsis s/p lithotripsy, received IV abx
- Tm 38.6 HR 102 BP 147/83 RR 22 SpO2 94% RA
- WBC 13, Plts 130, Cr 1.3, BUN 25, Na 128, procalcitonin 0.16

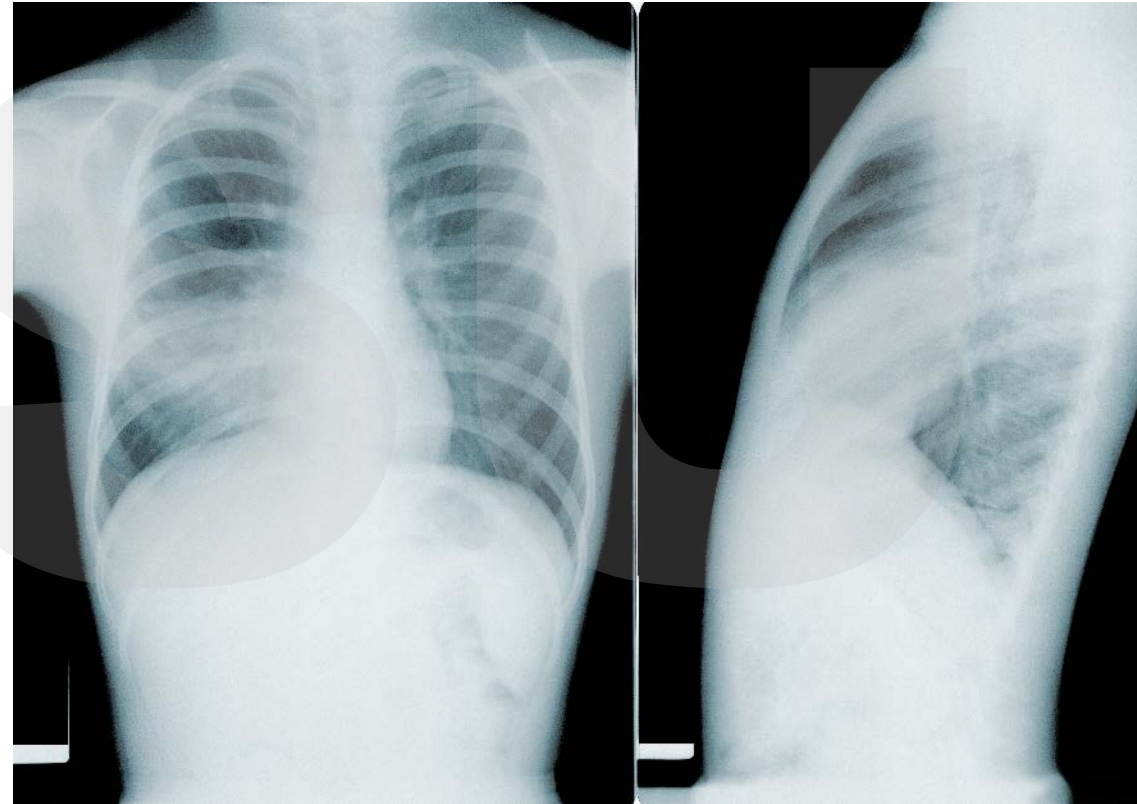


Image source: CDC, PHIL #21525. H. Bruce Dull, M.D., 1966.



You are curbsided while in the ED admitting a patient

- Does this patient meet admission criteria?

DHHSU



You are curbsided while in the ED admitting a patient

- Does this patient meet admission criteria? YES

PSI/PORT score: 103 (RISK class IV 8.2-9.3% mortality) [Q6(M)]

- Does this patient meet criteria for severe CAP?



IDSA/ATS Criteria for Defining Severe CAP (2007)

Major Criteria (1)

- Septic shock requiring vasopressor
- Respiratory failure requiring mechanical ventilation

Minor Criteria (≥ 3)

- Respiratory rate ≥ 30
- $\text{Pa}_{\text{O}_2} / \text{Fi}_{\text{O}_2}$ ratio ≤ 250
- Multi-lobar infiltrates
- Confusion/disorientation
- Uremia (BUN ≥ 20)
- Leukopenia (WBC < 4)
- Thrombocytopenia (Plts $< 100,000$)
- Hypothermia (T $< 36\text{C}$)
- Hypotension (requiring aggressive fluid resuscitation)



You are curbsided while in the ED admitting a patient

- Does this patient meet admission criteria? YES

PSI/PORT score: 103 (RISK class IV 8.2-9.3% mortality) [Q6(M)]

- Does this patient meet criteria for severe CAP? NO
- Does this patient need any additional studies?



You are curbsided while in the ED admitting a patient

- Does this patient meet admission criteria? YES

PSI/PORT score: 103 (RISK class IV 8.2-9.3% mortality) [Q6(M)]

- Does this patient meet criteria for severe CAP? NO
- Does this patient need any additional studies? YES

Sputum gram stain, culture [Q1(VL)]

Blood culture [Q2(VL)]

Nasal MRSA PCR

- The procalcitonin was low, should empiric antibiotics be withheld?



You are curbsided while in the ED admitting a patient

- Does this patient meet admission criteria? YES
PSI/PORT score: 103 (RISK class IV 8.2-9.3% mortality) [Q6(M)]
- Does this patient meet criteria for severe CAP? NO
- Does this patient need any additional studies? YES
Sputum gram stain, culture [Q1(VL)]
Blood culture [Q2(VL)]
Nasal MRSA PCR
- The procalcitonin was low, should empiric antibiotics be withheld? NO
Empiric abx should be initiated in adults with clinically suspected or radiographically confirmed CAP regardless of initial serum procalcitonin. [Q5(M)]
- Which empiric regimen would you recommend?

You are curbsided while in the ED admitting a patient

- Does this patient meet admission criteria? YES
PSI/PORT score: 103 (RISK class IV 8.2-9.3% mortality) [Q6(M)]
- Does this patient meet criteria for severe CAP? NO
- Does this patient need any additional studies? YES
Sputum gram stain, culture [Q1(VL)]
Blood culture [Q2(VL)]
Nasal MRSA PCR
- The procalcitonin was low, should empiric antibiotics be withheld? NO
Empiric abx should be initiated in adults with clinically suspected or radiographically confirmed CAP regardless of initial serum procalcitonin. [Q5(M)]
- Which empiric regimen would you recommend?
 β -lactam + macrolide OR respiratory FQL [Q9.1(H)]
Nonsevere CAP, no hx MDR PNA, no additional coverage



The patient clinically improves. . .

- Labs, vital signs normalized within 48h
- Sputum and blood cultures are NGTD. MRSA PCR (-)
- He meets discharge criteria at day 3
- Please provide discharge plan (regimen, duration, f/u imaging):



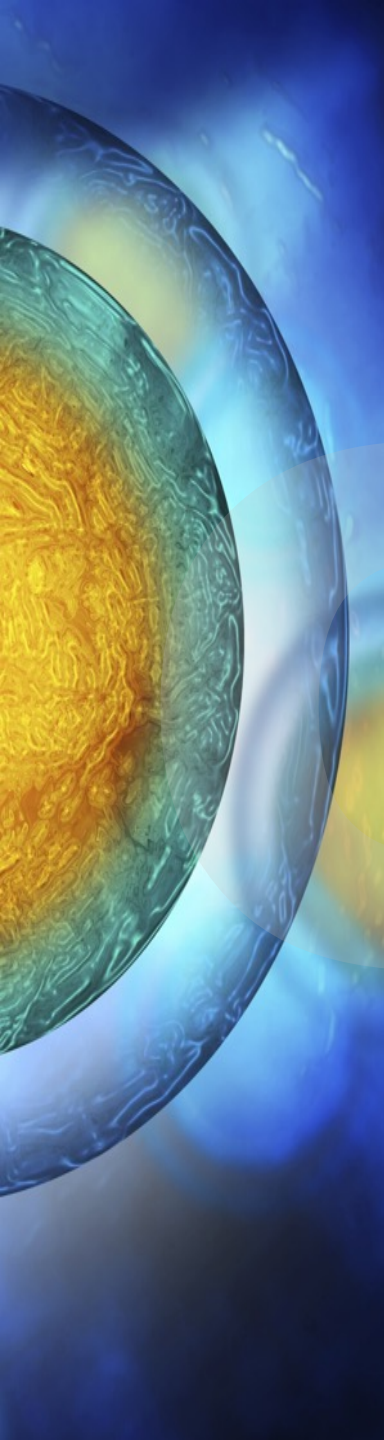
The patient clinically improves. . .

- Labs, vital signs normalized within 48h
- Sputum and blood cultures are NGTD. MRSA PCR (-)
- He meets discharge criteria at day 3
- Please provide discharge plan (regimen, duration, f/u imaging):
 - β -lactam + macrolide OR rFQL [Q8.2(M)]*
 - 5 days, assuming continued improvement [Q15(M)]*
 - No need for f/u imaging if symptoms resolve within 5-7d [Q16(L)]*



Take home points

- PSI score to determine admission criteria
- Empiric treatment should be initiated for clinically suspected, radiographically confirmed CAP regardless of initial serum procalcitonin.
- Determine CAP severity as initial management branch point
- Management of nonsevere CAP in patient with + MDR risk assessment
 - Sputum, blood culture, nasal PCR indicated for MDR risk
 - No indication for influenza PCR (no circulating influenza), urine antigens
 - Empiric regimen: *β-lactam + macrolide OR respiratory FQL*
 - Additional MDR coverage not indicated in nonsevere patient
 - Min 5d duration, clinical stability for non-MDR CAP regardless of severity
- Follow-up imaging not indicated unless symptoms persist beyond 5-7d



Case 2

DHHSU

December 2019

- 73yo woman, resident of LTCF, found unresponsive by caregiver
- PMH: ESRD on HD, DM2, ICM, morbid obesity, MRSA PJI 9m prior
- Tm 39.5, HR 135, BP 74/46, RR 33, SpO2 84% 15L NRB
- WBC 3.2, Plts 600, BUN 84, procal 4, glu 482, lactate 5.9, ABG 7.07/97/54/28
- Resp path panel: influenza A detected
- Emergently intubated





IDSA/ATS Criteria for Defining Severe CAP (2007)

Major Criteria (1)

- Septic shock requiring vasopressor
- Respiratory failure requiring mechanical ventilation

Minor Criteria (≥ 3)

- Respiratory rate ≥ 30
- $\text{Pa}_{\text{O}_2} / \text{Fi}_{\text{O}_2}$ ratio ≤ 250
- Multi-lobar infiltrates
- Confusion/disorientation
- Uremia (BUN ≥ 20)
- Leukopenia (WBC < 4)
- Thrombocytopenia (Plts $< 100,000$)
- Hypothermia (T $< 36\text{C}$)
- Hypotension (requiring aggressive fluid resuscitation)



You are the admitting provider in an open ICU. . .

- Sputum and blood cultures were appropriately obtained for severe CAP, +MDR risk assessment[Q1(VL), Q2(VL)]
- A request for meropenem by ED was not approved by pharmacist based on the 2019 IDSA/ATS CAP guideline
- Which empiric antibiotic regimen is indicated?



You are the admitting provider in an open ICU. . .

- Sputum and blood cultures were appropriately obtained for severe CAP, +MDR risk assessment [Q1(VL), Q2(VL)]
- A request for meropenem by ED was not approved by pharmacist based on the 2019 IDSA/ATS CAP guideline
- Which empiric antibiotic regimen is indicated?

*β -lactam + macrolide [Q11(M)] +
vancomycin or linezolid [Q11(M)] +
oseltamivir [Q13(M)]
No risk factors for PsA identified*



You are the admitting provider in an open ICU. . .

- Sputum and blood cultures were appropriately obtained for severe CAP, +MDR risk assessment [Q1(VL), Q2(VL)]
- A request for meropenem by ED was not approved by pharmacist based on the 2019 IDSA/ATS CAP guideline
- Which empiric antibiotic regimen is indicated?
 - β -lactam + macrolide [Q11(M)] + vancomycin or linezolid [Q11(M)] + oseltamivir [Q13(M)]*
- Are additional studies indicated?



You are the admitting provider in an open ICU. . .

- Sputum and blood cultures were appropriately obtained for severe CAP, +MDR risk assessment [Q1(VL), Q2(VL)]
- A request for meropenem by ED was not approved by pharmacist based on the 2019 IDSA/ATS CAP guideline
- Which empiric antibiotic regimen is indicated?
 - β -lactam + macrolide [Q11(M)] + vancomycin or linezolid [Q11(M)] + oseltamivir [Q13(M)]*
- Are additional studies indicated?
 - Strep pneumoniae, Legionella Urine Ag [Q3(L)]*
 - Nasal MRSA PCR*



The patient is in septic shock refractory to fluid resuscitation and vasopressors. . .

- What other adjunctive therapy should be considered?
- Does the patient need coverage for aspiration pneumonia?



The patient is in septic shock refractory to fluid resuscitation and vasopressors. . .

- What other adjunctive therapy should be considered?
Corticosteroids should be considered, endorsed per surviving sepsis campaign [Q12]
- Does the patient need coverage for aspiration pneumonia? NO
Anaerobic coverage not routinely recommended unless lung abscess or empyema suspected [Q10(VL)]



MRSA pneumonia is confirmed. . .

- Nasal PCR +, sputum culture with 4+ growth of MRSA
- Regimen is narrowed to vancomycin, oseltamivir
- Extubated on day 4 of therapy with normalization of vitals/labs by day 6
- What is the recommended duration of treatment?
- Is follow-up imaging indicated?



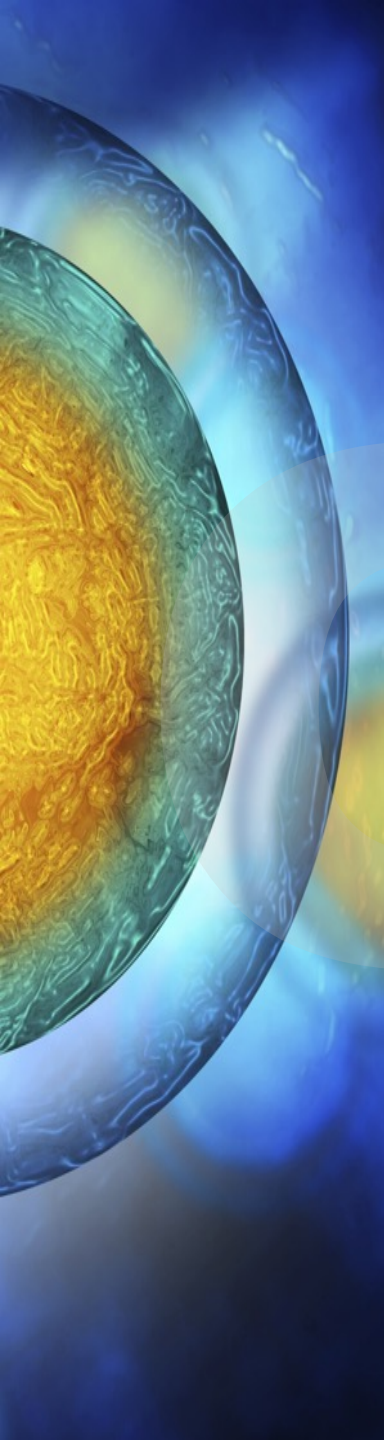
MRSA pneumonia is confirmed. . .

- Nasal PCR +, sputum culture with 4+ growth of MRSA
- Regimen is narrowed to vancomycin, oseltamivir
- Extubated on day 4 of therapy with normalization of vitals/labs by day 6
- What is the recommended duration of treatment?
7 days per IDSA/ATS [Q15]
- Is follow-up imaging indicated?
No imaging indicated if symptoms continue to improve [Q16(L)]



Take home points

- Determine CAP severity as initial management branch point
- Management of severe CAP, + risk assessment for MRSA
 - Sputum, blood culture, urine Ag indicated for severity, nasal PCR indicated for +MRSA risk
 - Influenza PCR indicated during flu season
 - Empiric regimen: *β-lactam + macrolide OR β-lactam + respiratory FQL + vancomycin or linezolid*
 - Min 7d duration for MDR CAP
- Limited indication for corticosteroids in tx of CAP: refractory shock (may be indicated for comorbid conditions)
- Anaerobic coverage for suspected aspiration is not indicated unless lung abscess or empyema suspected
- No indication for follow-up imaging if symptoms resolve in 5-7d



Case 3

DHHSU

October 2019

- 83yo man, resident of a memory care facility, non-verbal
- 4d progressive dyspnea, dry cough, low grade fever
- PMH: AD, CKD3, HTN, HLD, DM2 c/b chronic ulcers
- Tm 37.3, HR 102, BP 104/68, RR 28, SpO2 92% on RA
- WBC 11.3, Cr 1.9 (b/l 1.5), BUN 27, BG 320, AST/ALT ~3xULN, lactate 2.1, procal 0.07, ECG sinus tachycardia, QTc 526 mSec
- CXR: bilateral patchy infiltrates
- Blood cultures were obtained but no sputum was produced. Rapid influenza A/B negative.
- He was started on vancomycin, pip-tazo for 'HCAP' and admitted to your service.

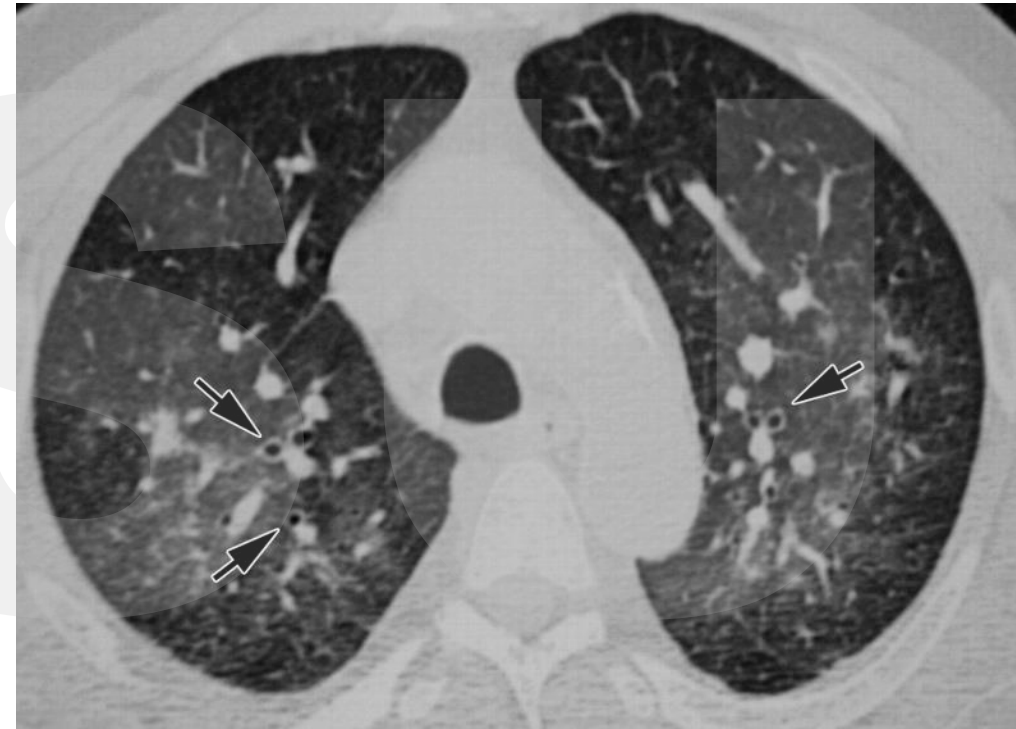


Image Source: Franquet T. Published Online: July 01, 2011
<https://doi.org/10.1148/radiol.11092149>



IDSA/ATS Criteria for Defining Severe CAP (2007)

Major Criteria (1)

- Septic shock requiring vasopressor
- Respiratory failure requiring mechanical ventilation

Minor Criteria (≥ 3)

- Respiratory rate ≥ 30
- $\text{Pa}_{\text{O}_2} / \text{Fi}_{\text{O}_2}$ ratio ≤ 250
- Multi-lobar infiltrates
- Confusion/disorientation
- Uremia (BUN ≥ 20)
- Leukopenia (WBC < 4)
- Thrombocytopenia (Plts $< 100,000$)
- Hypothermia (T $< 36\text{C}$)
- Hypotension (requiring aggressive fluid resuscitation)



You suspect viral pneumonia but cannot assess his mental status and note borderline severe CAP. . .

- What additional studies may help you deescalate the antibiotic regimen?

DHHSU



You suspect viral pneumonia but cannot assess his mental status and note borderline severe CAP. . .

- What additional studies may help you deescalate the antibiotic regimen?

Sputum culture [Q1(VL)]

Nasal MRSA PCR (he is on empiric vancomycin)

Respiratory pathogen panel

- The above studies are negative and he is unable to produce sputum despite multiple attempts at the bedside.
- He is clinically improving. How would you proceed with deescalating the antibiotic regimen?



You suspect viral pneumonia but cannot assess his mental status and note borderline severe CAP. . .

- What additional studies may help you deescalate the antibiotic regimen?

Sputum culture [Q1(VL)]

Nasal MRSA PCR

Respiratory pathogen panel

- The above studies are negative and he is unable to produce sputum despite multiple attempts at the bedside.
- He is clinically improving. How would you proceed with deescalating the antibiotic regimen?

Discontinue vancomycin given negative nasal MRSA PCR

Discontinue pip-tazo, no risk factors for PsA

Start β -lactam + doxycycline [Q9.1(L)]



You suspect viral pneumonia but cannot assess his mental status and note borderline severe CAP. . .

- His abnormal lab parameters improve within 48h with gentle fluid resuscitation and supportive care.
- Risk-benefit analysis favors early discharge to a familiar environment.
- Please provide your recommendations for discharge to his facility (regimen, duration):



You suspect viral pneumonia but cannot assess his mental status and note borderline severe CAP. . .

- His abnormal lab parameters improve within 48h with gentle fluid resuscitation and supportive care.
- Risk-benefit analysis favors early discharge to a familiar environment.
- Please provide your recommendations for discharge to his facility (regimen, duration):

Amox/clav OR cephalosporin AND doxycycline [Q8.2,Table 3(L)]

5 days, assuming continued improvement [Q15(M)]

No need for f/u imaging if symptoms resolve within 5-7d [Q16(L)]



Take home points

- Determine CAP severity as initial management branch point
- Management of nonsevere CAP, on empiric broad-spectrum abx despite negative MDR risk assessment
 - Sputum, blood cultures, nasal PCR indicated to aid in deescalation of empiric MRSA/PsA coverage
 - Influenza PCR indicated during flu season
 - Most appropriate empiric regimen: *β-lactam + doxycycline given prolonged QTc, 5d duration*
 - Vancomycin and pip-tazo were not indicated as empiric regimen due to negative MDR risk assessment
- No indication for follow-up imaging if symptoms resolve in 5-7d



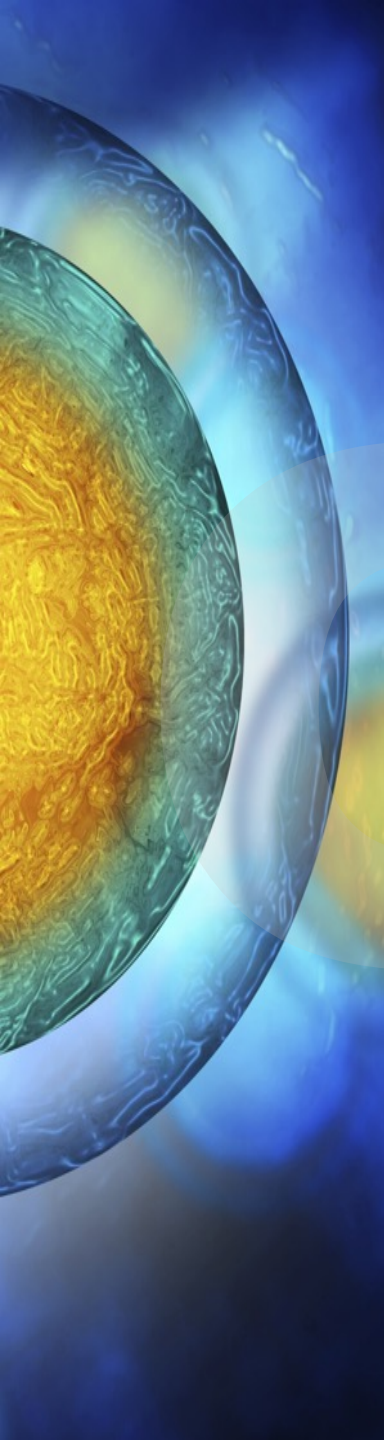
Authors' Conclusions

- Few key clinical questions have been studied adequately to support strong recommendations regarding standard of care.
- Despite concern about MDR PNA, most patients with CAP can be adequately treated with regimens in use for multiple decades.
- Treatment for CAP will remain largely empiric until more rapid, accurate, and affordable diagnostics are available.
- Expanded indications for sputum, blood cultures will support early deescalation and contribute data re: local prevalence, risk factors for MDR CAP.



Full References

- Metlay JP, Waterer GW, Long AC, et al. Diagnosis and Treatment of Adults with Community-acquired Pneumonia. An Official Clinical Practice Guideline of the American Thoracic Society and Infectious Diseases Society of America. *Am J Respir Crit Care Med*. 2019;200(7):e45-e67. doi:10.1164/rccm.201908-1581ST.
- GBD 2017 Causes of Death Collaborators. Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet*. 2018;392(10159):1736-1788. doi:10.1016/S0140-6736(18)32203-7.
- Musher DM, Roig IL, Cazares G, et al. Can an etiologic agent be identified in adults who are hospitalized for community-acquired pneumonia: results of a one-year study. *J Infect* 2013; 67:11-18. doi: 10.1016/j.jinf.2013.03.003.
- Jain S, Self WH, Wunderink RG, et al for the CDC EPIC Study Team. Community-Acquired Pneumonia Requiring Hospitalization Among U.S. Adults. *N Eng J Med* 2015; 373: 415-427. doi: 10.1056/NEJMoa1500245.
- Huijts SM, Coenjaerts FEJ, Bolkenbaas M, et al. The impact of 13-valent pneumococcal conjugate vaccination on virus-associated community-acquired pneumonia in elderly: exploratory analysis of the CAPITA trial. *Clin Microbiol Infect* 2018;24:764-770. doi: 10.1016/j.cmi.2017.10.006.

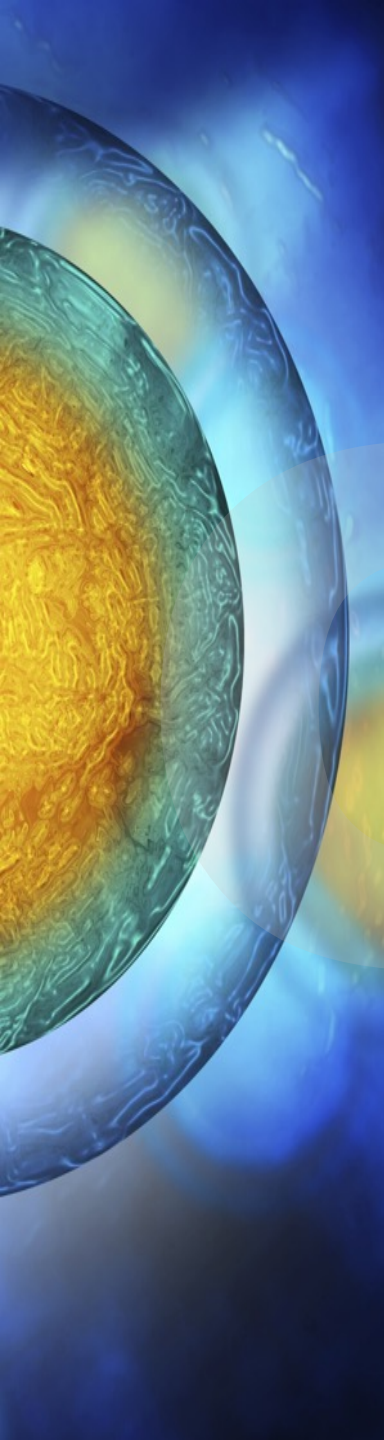


Thank you!

Caroline Castillo, MD

castilca@ohsu.edu

OH
SU



Extra slides

DHHSU

Table 5. Clinical indications for more extensive diagnostic testing.

Indication	Blood culture	Sputum culture	<i>Legionella</i> UAT	Pneumococcal UAT	Other
Intensive care unit admission	X	X	X	X	X ^a
Failure of outpatient antibiotic therapy		X	X	X	
Cavitary infiltrates	X	X			X ^b
Leukopenia	X			X	
Active alcohol abuse	X	X	X	X	
Chronic severe liver disease	X			X	
Severe obstructive/structural lung disease		X			
Asplenia (anatomic or functional)	X			X	
Recent travel (within past 2 weeks)			X		X ^c
Positive <i>Legionella</i> UAT result		X ^d	NA		
Positive pneumococcal UAT result	X	X		NA	
Pleural effusion	X	X	X	X	X ^e

NOTE. NA, not applicable; UAT, urinary antigen test.

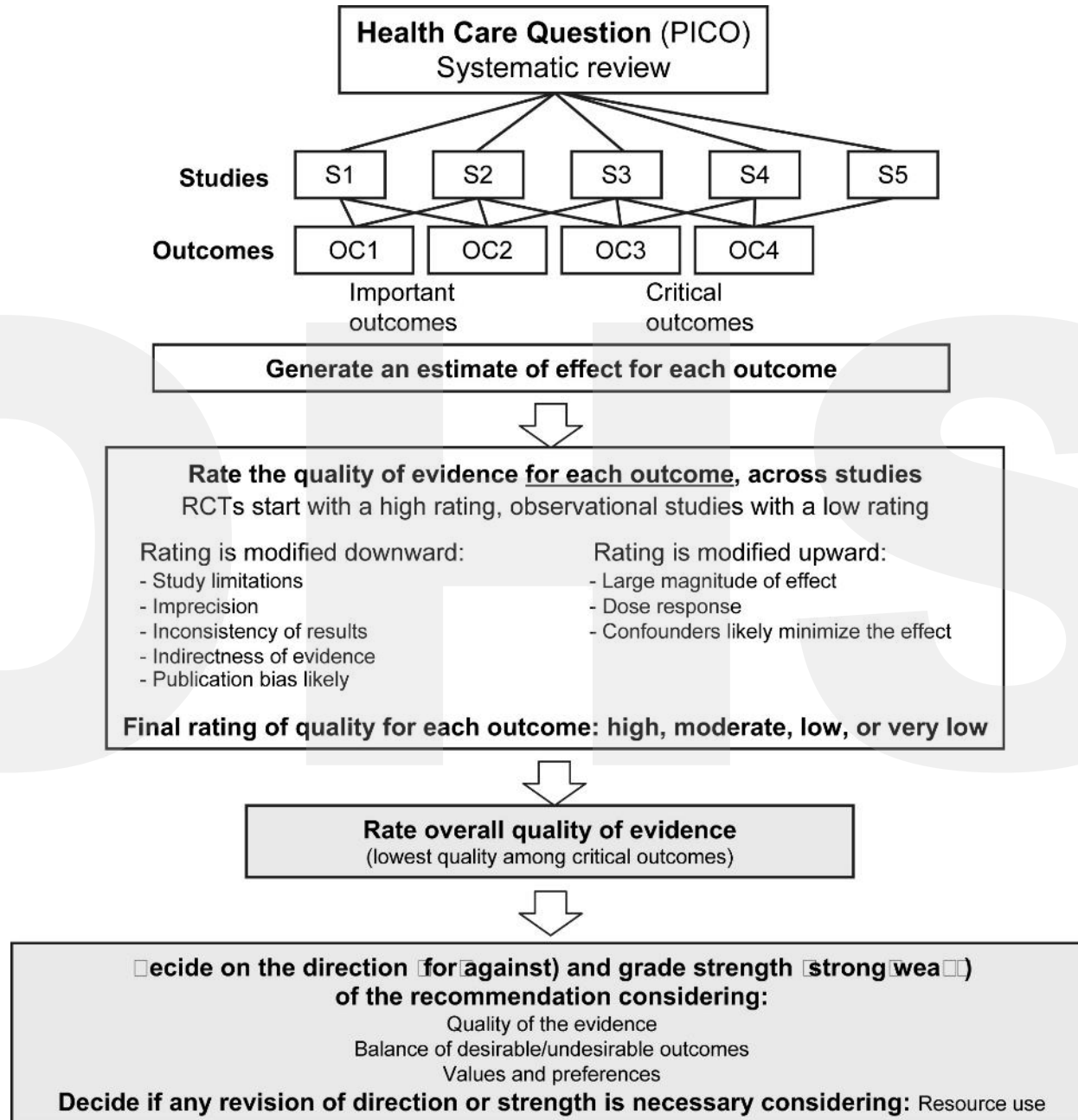
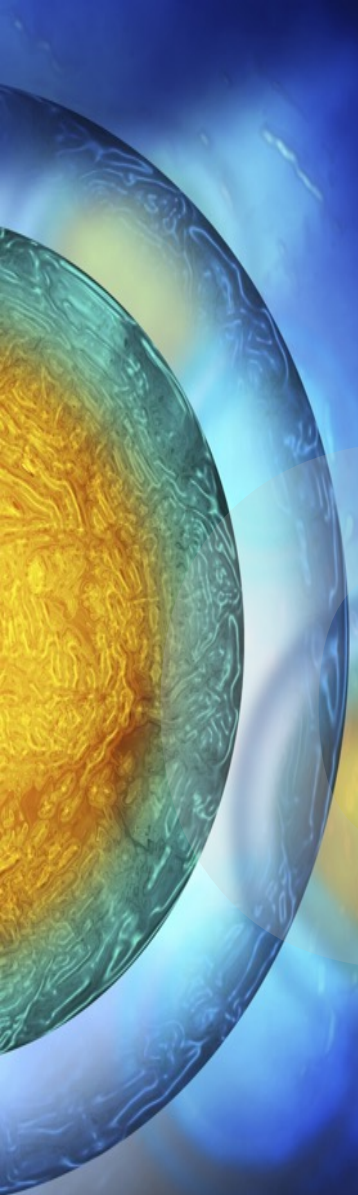
^a Endotracheal aspirate if intubated, possibly bronchoscopy or nonbronchoscopic bronchoalveolar lavage.

^b Fungal and tuberculosis cultures.

^c See table 8 for details.

^d Special media for *Legionella*.

^e Thoracentesis and pleural fluid cultures.



*GRADE guidelines: 1.
Introduction—GRADE evidence
profiles and summary of findings
tables*

*Gordon Guyatt, Andrew D. Oxman, Elie A. Akl, Regina
Kunz, Gunn Vist, Jan Brozek, Susan Norris, Yngve
Falck-Ytter, Paul Glasziou, Hans deBeer, Roman
Jaeschke, David Rind, Joerg Meerpohl, Philipp Dahm,
Holger J. Schünemann*

*Journal of Clinical Epidemiology
Volume 64 Issue 4 Pages 383-394 (April 2011)
DOI: 10.1016/j.jclinepi.2010.04.026*

*Also labeled
“conditional”
or
“discretionary”

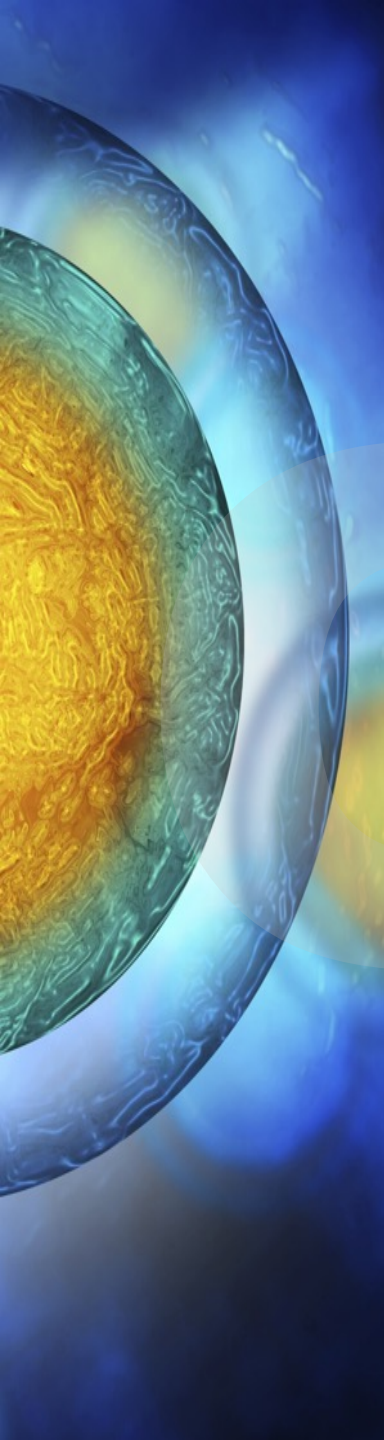


Table 1. 2007 Infectious Diseases Society of America/American Thoracic Society Criteria for Defining Severe Community-acquired Pneumonia

Validated definition includes either one major criterion or three or more minor criteria

Minor criteria

- Respiratory rate ≥ 30 breaths/min
- $Pa_{O_2}/F_{I_{O_2}}$ ratio ≤ 250
- Multilobar infiltrates
- Confusion/disorientation
- Uremia (blood urea nitrogen level ≥ 20 mg/dl)
- Leukopenia* (white blood cell count $< 4,000$ cells/ μ l)
- Thrombocytopenia (platelet count $< 100,000$ / μ l)
- Hypothermia (core temperature $< 36^\circ\text{C}$)
- Hypotension requiring aggressive fluid resuscitation

Major criteria

- Septic shock with need for vasopressors
 - Respiratory failure requiring mechanical ventilation
-

*Due to infection alone (i.e., not chemotherapy induced).

Table 2. Differences between the 2019 and 2007 American Thoracic Society/Infectious Diseases Society of America Community-acquired Pneumonia Guidelines

Recommendation	2007 ATS/IDSA Guideline	2019 ATS/IDSA Guideline
Sputum culture	Primarily recommended in patients with severe disease	Now recommended in patients with severe disease as well as in all inpatients empirically treated for MRSA or <i>Pseudomonas aeruginosa</i>
Blood culture	Primarily recommended in patients with severe disease	Now recommended in patients with severe disease as well as in all inpatients empirically treated for MRSA or <i>P. aeruginosa</i>
Macrolide monotherapy	Strong recommendation for outpatients	Conditional recommendation for outpatients based on resistance levels
Use of procalcitonin	Not covered	Not recommended to determine need for initial antibacterial therapy
Use of corticosteroids	Not covered	Recommended not to use. May be considered in patients with refractory septic shock
Use of healthcare-associated pneumonia category	Accepted as introduced in the 2005 ATS/IDSA hospital-acquired and ventilator-associated pneumonia guidelines	Recommend abandoning this categorization. Emphasis on local epidemiology and validated risk factors to determine need for MRSA or <i>P. aeruginosa</i> coverage. Increased emphasis on deescalation of treatment if cultures are negative
Standard empiric therapy for severe CAP	β -Lactam/macrolide and β -lactam/fluoroquinolone combinations given equal weighting	Both accepted but stronger evidence in favor of β -lactam/macrolide combination
Routine use of follow-up chest imaging	Not addressed	Recommended not to obtain. Patients may be eligible for lung cancer screening, which should be performed as clinically indicated

Definition of abbreviations: ATS = American Thoracic Society; CAP = community-acquired pneumonia; IDSA = Infectious Diseases Society of America; MRSA = methicillin-resistant *Staphylococcus aureus*.

Table 3. Initial Treatment Strategies for Outpatients with Community-acquired Pneumonia

Standard Regimen	
No comorbidities or risk factors for MRSA or <i>Pseudomonas aeruginosa</i> *	Amoxicillin or doxycycline or macrolide (if local pneumococcal resistance is <25%) [†]
With comorbidities [‡]	Combination therapy with amoxicillin/clavulanate or cephalosporin AND macrolide or doxycycline [§] OR monotherapy with respiratory fluoroquinolone

Definition of abbreviations: ER = extended release; MRSA = methicillin-resistant *Staphylococcus aureus*.

*Risk factors include prior respiratory isolation of MRSA or *P. aeruginosa* or recent hospitalization AND receipt of parenteral antibiotics (in the last 90 d).

[†]Amoxicillin 1 g three times daily, doxycycline 100 mg twice daily, azithromycin 500 mg on first day then 250 mg daily, clarithromycin 500 mg twice daily, or clarithromycin ER 1,000 mg daily.

[‡]Comorbidities include chronic heart, lung, liver, or renal disease; diabetes mellitus; alcoholism; malignancy; or asplenia.

[§]Amoxicillin/clavulanate 500 mg/125 mg three times daily, amoxicillin/clavulanate 875 mg/125 mg twice daily, 2,000 mg/125 mg twice daily, cefpodoxime 200 mg twice daily, or cefuroxime 500 mg twice daily; AND azithromycin 500 mg on first day then 250 mg daily, clarithromycin 500 mg twice daily, clarithromycin ER 1,000 mg daily, or doxycycline 100 mg twice daily.

^{||}Levofloxacin 750 mg daily, moxifloxacin 400 mg daily, or gemifloxacin 320 mg daily.

Table 4. Initial Treatment Strategies for Inpatients with Community-acquired Pneumonia by Level of Severity and Risk for Drug Resistance

	Standard Regimen	Prior Respiratory Isolation of MRSA	Prior Respiratory Isolation of <i>Pseudomonas aeruginosa</i>	Recent Hospitalization and Parenteral Antibiotics and Locally Validated Risk Factors for MRSA	Recent Hospitalization and Parenteral Antibiotics and Locally Validated Risk Factors for <i>P. aeruginosa</i>
Nonsevere inpatient pneumonia*	β-Lactam + macrolide [†] or respiratory fluoroquinolone [‡]	Add MRSA coverage [§] and obtain cultures/nasal PCR to allow deescalation or confirmation of need for continued therapy	Add coverage for <i>P. aeruginosa</i> and obtain cultures to allow deescalation or confirmation of need for continued therapy	Obtain cultures but withhold MRSA coverage unless culture results are positive. If rapid nasal PCR is available, withhold additional empiric therapy against MRSA if rapid testing is negative or add coverage if PCR is positive and obtain cultures	Obtain cultures but initiate coverage for <i>P. aeruginosa</i> only if culture results are positive
Severe inpatient pneumonia*	β-Lactam + macrolide [†] or β-lactam + fluoroquinolone [‡]	Add MRSA coverage [§] and obtain cultures/nasal PCR to allow deescalation or confirmation of need for continued therapy	Add coverage for <i>P. aeruginosa</i> and obtain cultures to allow deescalation or confirmation of need for continued therapy	Add MRSA coverage [§] and obtain nasal PCR and cultures to allow deescalation or confirmation of need for continued therapy	Add coverage for <i>P. aeruginosa</i> and obtain cultures to allow deescalation or confirmation of need for continued therapy

Definition of abbreviations: ATS = American Thoracic Society; CAP = community-acquired pneumonia; HAP = hospital-acquired pneumonia; IDSA = Infectious Diseases Society of America; MRSA = methicillin-resistant *Staphylococcus aureus*; VAP = ventilator-associated pneumonia.

*As defined by 2007 ATS/IDSA CAP severity criteria guidelines (see Table 1).

[†]Ampicillin + sulbactam 1.5–3 g every 6 hours, cefotaxime 1–2 g every 8 hours, ceftriaxone 1–2 g daily, or ceftaroline 600 mg every 12 hours AND azithromycin 500 mg daily or clarithromycin 500 mg twice daily.

[‡]Levofloxacin 750 mg daily or moxifloxacin 400 mg daily.

[§]Per the 2016 ATS/IDSA HAP/VAP guidelines: vancomycin (15 mg/kg every 12 h, adjust based on levels) or linezolid (600 mg every 12 h).

^{||}Per the 2016 ATS/IDSA HAP/VAP guidelines: piperacillin-tazobactam (4.5 g every 6 h), cefepime (2 g every 8 h), ceftazidime (2 g every 8 h), imipenem (500 mg every 6 h), meropenem (1 g every 8 h), or aztreonam (2 g every 8 h). Does not include coverage for extended-spectrum β-lactamase-producing Enterobacteriaceae, which should be considered only on the basis of patient or local microbiological data.