

# Infectious Diseases Guideline Updates- Community Acquired Pneumonia and Asymptomatic Bacteriuria

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## Objectives for Pharmacists

- Compare differences between the 2007 and 2019 ATS/IDSA CAP guidelines
- Identify guideline-recommended empiric therapies for the outpatient treatment of CAP
- Discuss updates to the IDSA Asymptomatic Bacteriuria Guidelines
- Identify patients for whom screening and treatment of asymptomatic bacteriuria is recommended

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## Objectives for Technicians

- Discuss updates to the ATS/IDSA CAP guidelines
- List guideline-recommended empiric therapies for the outpatient treatment of CAP
- Discuss updates to the IDSA Asymptomatic Bacteriuria Guidelines
- List indications for screening and treatment of asymptomatic bacteriuria

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## 2019 ATS/IDSA CAP Guidelines

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## Patient Case

JD is a 67-year-old male who presents to urgent care with clinical and radiographic evidence of CAP. He has no significant PMH and does not meet criteria for hospital admission. Of the following regimens, which would NOT be appropriate for empiric treatment of his CAP?

- Amoxicillin PO 1 gram TID
- Doxycycline PO 100 mg BID
- Azithromycin PO 500 mg x 1 day, then 250 mg for 4 days

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## CAP Controversies



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### Pathogenic Cause of Pneumonia

Historically	Now
<ul style="list-style-type: none"> <li>• <i>Streptococcus pneumoniae</i></li> <li>• <i>Haemophilus influenzae</i></li> <li>• <i>Mycoplasma pneumoniae</i></li> <li>• <i>Staphylococcus aureus</i></li> <li>• <i>Legionella species</i></li> <li>• <i>Chlamydia pneumoniae</i></li> <li>• <i>Moraxella catarrhalis</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Streptococcus pneumoniae</i></li> <li>• Respiratory viruses</li> <li>• Unknown causes</li> </ul>

Metlay et al. Am J Respir Crit Care Med. 2019;200(7):e45-67.

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### 2007 ATS/IDSA Criteria for Severe CAP

One major criterion OR three or more minor criteria

**Minor Criteria:**

- Respiratory rate  $\geq 30$  breaths per min
- PaO<sub>2</sub>/FIO<sub>2</sub> ratio  $\leq 250$
- Multilobar infiltrates
- Confusion and/or disorientation
- Uremia (blood urea nitrogen level  $\geq 20$  mg/dL)
- Leukopenia (WBC count  $< 4000$  cells/ $\mu$ l) due to infection alone
- Thrombocytopenia (platelet count  $< 100,000$  platelets/ $\mu$ 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

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### HCAP Has Been Abandoned

Accepted in 2007 ATS/IDSA guidelines

HCAP was defined for those patients who had any one of several potential risk factors for antibiotic-resistant pathogens:

- Residence in a nursing home and other long-term care facilities
- Hospitalization for  $> 2$  days in the last 90 days
- Receipt of home infusion therapy
- Chronic dialysis
- Home wound care
- Family member with a known antibiotic-resistant pathogen

These factors do not predict high prevalence of antibiotic-resistant pathogens in most setting

Recommend abandoning this categorization



Metlay et al. Am J Respir Crit Care Med. 2019;200(7):e45-67.

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### New Risk Factors for Resistant Pathogens

Add empiric coverage of Methicillin-resistant *Staphylococcus aureus* (MRSA) or *Pseudomonas aeruginosa* in adults with CAP if locally validated risk factors for either pathogen are present

Individual risk factors

- Previously infected with MRSA or *P. aeruginosa*, especially those with prior respiratory tract infection
- Hospitalized and received parenteral antibiotics, whether during the hospitalization event or not, in the last 90 days

Metlay et al. Am J Respir Crit Care Med. 2019;200(7):e45-67.

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### Diagnostics

Recommendation	2007 ATS/IDSA Guideline	2019 ATS/IDSA Guideline
Sputum culture	Primarily recommended in patients with severe disease	Now recommended in inpatients who: <ul style="list-style-type: none"> <li>• Are classified as severe disease</li> <li>• Are empirically treated for MRSA or <i>P. aeruginosa</i></li> <li>• Have risk factors for MRSA or <i>P. aeruginosa</i></li> </ul>
Blood culture		

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CAP with MDR risk factors

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## Diagnostics

Do NOT routinely test urine for pneumococcal antigen in adults with CAP, except in adults with severe CAP

Do NOT routinely test urine for *Legionella* antigen in adults with CAP except:

- In cases where indicated by epidemiological factors, such as association with a *Legionella* outbreak or recent travel
- In adults with severe CAP

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## Procalcitonin

Recommendation	2007 ATS/IDSA Guideline	2019 ATS/IDSA Guideline
Procalcitonin	Not covered	Empiric antibiotic therapy should be initiated in adults with clinically suspected and radiographically confirmed CAP regardless of initial serum procalcitonin  Use of procalcitonin to de-escalate antibiotics NOT addressed

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## Empiric Outpatient Treatment

Healthy adults without comorbidities	Adults with comorbidities such as chronic heart, lung, liver, or renal disease; diabetes mellitus; alcoholism; malignancy; or asplenia
<ul style="list-style-type: none"> <li>Amoxicillin 1 g three times daily</li> <li>Doxycycline 100 mg twice daily</li> <li>Macrolide only in areas with pneumococcal resistance to macrolides &lt;25%</li> </ul>	<ul style="list-style-type: none"> <li>Amoxicillin/clavulanate OR a cephalosporin (cefepodoxime 200 mg twice daily or cefuroxime 500 mg twice daily)</li> <li><b>AND</b></li> <li>Macrolide or doxycycline</li> <li><b>OR</b></li> <li>Respiratory fluoroquinolone</li> </ul>

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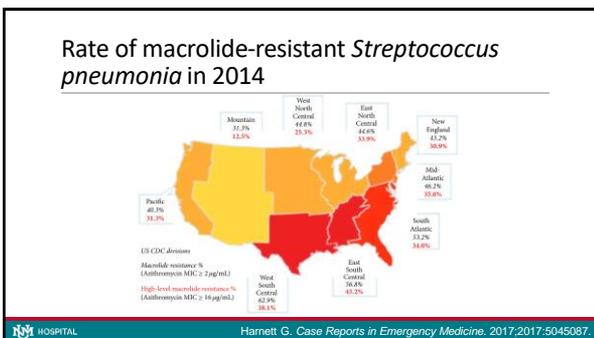
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## Empiric Inpatient Treatment

Inpatients (non-severe) without risk factors for MRSA or <i>P. aeruginosa</i>	Inpatients (severe) without risk factors for MRSA or <i>P. aeruginosa</i>
<ul style="list-style-type: none"> <li>β-lactam (ampicillin/sulbactam, cefotaxime, ceftriaxone or ceftriaxone)</li> <li><b>PLUS</b></li> <li>Macrolide</li> <li><b>OR</b></li> <li>Respiratory fluoroquinolone</li> </ul> <p>Contraindications to both macrolides and fluoroquinolones:</p> <ul style="list-style-type: none"> <li>Combination therapy with a β-lactam and doxycycline 100 mg twice daily</li> </ul>	<ul style="list-style-type: none"> <li>β-lactam + macrolide*</li> <li><b>OR</b></li> <li>β-lactam + respiratory fluoroquinolone</li> </ul> <p>* Stronger evidence for β-Lactam + macrolide</p>

Metlay et al. Am J Respir Crit Care Med. 2019;200(7):e45-67.

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## Atypical Coverage Still Recommended

### Garin et al. 2014

- Randomized control trial in 590 patients with CAP
- Could not rule out the possibility that  $\beta$ -lactam monotherapy was inferior to  $\beta$ -lactam/macrolide therapy for inpatients with CAP

### Nie et al. 2014

- Systematic review and meta-analysis
- $\beta$ -lactam/macrolide therapy reduced mortality in patients with CAP compared with patients treated with  $\beta$ -lactam monotherapy

### Horita et al. 2016

- Systematic review and meta-analysis
- $\beta$ -lactam/macrolide combinations may decrease all-cause death, but mainly for patients with severe CAP

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Garin N, et al. *JAMA Intern Med*. 2014;174(10):1043-1051.  
Nie W, Li B, Xu Q. *J Antimicrob Chemother*. 2014;69:1441-1448.  
Horita T, et al. *Respiratory Care*. 2016;61:1434-1440.

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## Empiric Inpatient Treatment- MRSA

	Prior Respiratory Isolation of MRSA	Recent Hospitalization and Parenteral Antibiotics and Locally Validated Risk Factors for MRSA
<b>Nonsevere pneumonia</b>	Add MRSA coverage (vancomycin or linezolid) and obtain cultures/nasal PCR to allow de-escalation 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
<b>Severe pneumonia</b>	Same as above	Add MRSA coverage and obtain nasal PCR and cultures to allow de-escalation or confirmation of need for continued therapy

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## Empiric Inpatient Treatment- *P. aeruginosa*

	Prior Respiratory Isolation of <i>P. aeruginosa</i>	Recent Hospitalization and Parenteral Antibiotics and Locally Validated Risk Factors for <i>P. aeruginosa</i>
<b>Nonsevere pneumonia</b>	Add coverage for <i>P. aeruginosa</i> (piperacillin-tazobactam, ceftepime, ceftazidime, aztreonam, meropenem, or imipenem) and obtain cultures to allow de-escalation or confirmation of need for continued therapy	Obtain cultures but initiate coverage for <i>P. aeruginosa</i> only if culture results are positive
<b>Severe pneumonia</b>	Same as above	Add coverage for <i>P. aeruginosa</i> and obtain cultures to allow de-escalation or confirmation of need for continued therapy

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## De-escalation

### In patients empirically treated for MRSA or *P. aeruginosa*:

- Deescalate to standard CAP therapy if cultures do not reveal a drug-resistant pathogen and the patient is clinically improving at 48 hours

### Switching from parenteral to oral antibiotics

- No specific time frame given
- Either the same agent or the same drug class should be used

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## Imaging

In adults with CAP whose symptoms have resolved within 5 to 7 days, do NOT routinely obtain follow-up chest imaging

- Positive yield from repeat imaging ranges from 0.2% to 5.0%



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<https://emedicine.medscape.com/article/360090-overview>  
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## Duration

Antibiotic therapy should be continued until the patient achieves stability and for no less than a total of 5 days

- Resolution of vital sign abnormalities [heart rate, respiratory rate, blood pressure, oxygen saturation, and temperature], ability to eat, and normal mentation

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## Aspiration Pneumonia

Do NOT routinely add anaerobic coverage for suspected aspiration pneumonia unless lung abscess or empyema is suspected

- Recent studies have shown that anaerobes are uncommon in patients hospitalized with suspected aspiration
- Patients who aspirate gastric contents are considered to have aspiration pneumonitis. Many of these patients have resolution of symptoms within 24 to 48 hours and require only supportive treatment, without antibiotics

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## Corticosteroids

Do NOT routinely use corticosteroids in adults with nonsevere CAP, severe CAP, or influenza pneumonia

- There are no data suggesting benefit of corticosteroids in patients with nonsevere CAP with respect to mortality or organ failure and only limited data in patients with severe CAP
- Recommendations do not apply to clinically appropriate use of steroids for comorbid diseases

Endorse Surviving Sepsis Campaign recommendations on the use of corticosteroids in patients with CAP and refractory septic shock

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## Influenza

Test for influenza when influenza viruses are circulating in the community

Anti-influenza treatment in adults with CAP who test positive for influenza in the inpatient OR outpatient setting, independent of duration of illness before diagnosis

Standard antibacterial treatment for adults with clinical and radiographic evidence of CAP who test positive for influenza in the inpatient and outpatient settings

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## Patient Case

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- C) Azithromycin PO 500 mg x 1 day, then 250 mg for 4 days

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## Summary of Differences between the 2019 and 2007 ATS/IDSA CAP Guidelines

- 1) Obtain sputum and blood cultures for severe CAP and for patients with risk factors or in those receiving empiric treatment for MRSA or *P. aeruginosa*
- 2) Macrolide monotherapy is now a conditional recommendation for outpatients based on resistance levels
- 3) Abandon HCAP as an indication for broad spectrum antibiotics
- 4) Stronger evidence for  $\beta$ -lactam/macrolide combination in severe CAP
- 5) Procalcitonin not recommended to determine need for initial antimicrobial therapy
- 6) Recommend against corticosteroid use, although it may be considered in patients with refractory septic shock
- 7) Recommend against routine follow-up chest imaging

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# 2019 IDSA Asymptomatic Bacteriuria Guidelines

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## Patient Case

MC is a 72-year-old female who presents to the emergency room from a skilled nursing facility with altered mental status. She has been more lethargic over the past several days and "not her usual self" according to the skilled nursing facility staff. She does not meet SIRS criteria on admission. The team requests a urinalysis with the following results:

Bacteria	Leukocyte esterase	WBC	Nitrite	Epithelial cells
Many	Trace	7	Positive	3

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## Patient Case

MC is too altered to report if she is having any urinary symptoms. The team orders antibiotics for empiric treatment of a UTI. How do you proceed?

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## Asymptomatic Bacteriuria

- Asymptomatic bacteriuria (ASB) is the presence of 1 or more species of bacteria growing in the urine at  $\geq 10^5$  colony-forming units (CFU)/mL, irrespective of the presence of pyuria, in the absence of signs or symptoms attributable to urinary tract infection (UTI)
- Common finding in some healthy female populations and in many women or men with abnormalities of the genitourinary tract that impair voiding
- Classic symptoms of UTI include focal genitourinary symptoms such as urinary frequency, urgency, dysuria, and costovertebral angle tenderness

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## Prevalence of ASB for Different Populations

Population	Prevalence (%)	Population	Prevalence (%)
<b>Healthy Women</b>		<b>Persons with kidney transplants</b>	
Premenopausal	1.0 – 5.0	1st month post-transplant	23 – 24
Pregnant	1.9 – 9.5	1 mo. – 1 yr. post-transplant	10 – 17
Post-menopausal (50-70 yrs)	2.8 – 8.6	> 1 yr. post-transplant	2 – 9
<b>Persons with Diabetes</b>		<b>Persons with spinal cord injuries</b>	
Women	10.8 – 16	Intermittent catheter use	23 – 69
Men	0.7 – 11	Sphincterectomy/condom cath	57
<b>Elderly persons from community</b>		<b>Persons with indwelling catheter</b>	
Women ( $\geq 70$ yrs)	10.8 – 16	Short term (per catheter)	3-5%/day
Men ( $\geq 70$ yrs)	3.6 – 19	Long term	100
<b>Elderly persons in LTCF</b>		<b>Children</b>	
Women	25 – 50	Boys	< 1
Men	15 – 50	Girls	1 – 2

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## Who Should NOT Be Screened for ABS?

- Infants and children
- Healthy premenopausal, nonpregnant women or healthy postmenopausal women
- Older, community-dwelling persons who are functionally impaired
- Older persons residing in long-term care facilities
- Patients with diabetes
- Renal transplant recipients who have had renal transplant surgery >1 month prior
- Patients with nonrenal solid organ transplant
- Patients with spinal cord injury
- Patients with a short-term indwelling urethral catheter (<30 days) or long-term indwelling catheters
- Patients undergoing elective nonurologic surgery
- In patients planning to undergo surgery for an artificial urine sphincter or penile prosthesis implantation
- Patients living with implanted urologic devices

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## Pregnant Women

### Screen for and treat ASB in pregnant women

- Randomized studies from the 1960s to 1980s uniformly reported that antimicrobial treatment decreased the incidence of pyelonephritis from 20%–35% to 1%–4%
- 2015 prospective study in Netherlands suggested that nontreatment of ASB may be an acceptable option for selected low-risk women
- Antimicrobials probably reduce the risk of pyelonephritis and may reduce the risk of low birth weight
  - May also reduce the risk of preterm labor
- Recommend 4 to 7 days of antimicrobial therapy

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## Older, Functionally or Cognitively Impaired Patients

### Careful observation rather than antimicrobial therapy in patients:

- With delirium (acute mental status change, confusion) and without local genitourinary symptoms or other systemic signs of infection
- Who experience a fall
- Treatment of ASB in patients with delirium has not been shown to have any beneficial impact in clinical outcomes compared to no treatment, including reducing severity or duration of delirium and reducing risk of sepsis, death, or hospitalizations

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## Patients With Neutropenia

### No recommendation for or against screening for or treatment of ASB

- High-risk neutropenia (absolute neutrophil count  $<100$  cells/mm<sup>3</sup>,  $\geq 7$  days' duration following chemotherapy)
- Current management for patients with high-risk neutropenia typically includes prophylactic antimicrobial therapy
- Recent retrospective review of patients admitted to hospital with febrile neutropenia occurring within 4 weeks of chemotherapy reported that only 2.8% had UTI (2.9% of those with ANC  $\leq 100$  cells/mm<sup>3</sup>), and only 1 of 109 patients had bacteremia from a urinary source

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## Patients With Catheters

- Short-term catheter-associated bacteriuria does not appear to increase the risk for sepsis or death

• Tambyah et al. reported that 235 of 1497 (14.9%) evaluable newly catheterized patients developed bacteriuria (defined as  $\geq 10^3$  CFU/mL) at a mean of  $6.4 \pm 6.1$  days.

- Only 15 of the 194 (7.7%) patients with bacteriuria who could be interviewed reported subjective symptoms
- No recommendation for or against screening for and treating ASB at the time of catheter removal



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## Patients Undergoing Endourological Procedures

### Screen for and treat ASB prior to surgery in patients who will undergo endoscopic urologic procedures associated with mucosal trauma

- High risk of sepsis for patients undergoing invasive endourologic procedures in the presence of bacteriuria
- Perioperative antimicrobials probably reduce the risk of sepsis by approximately 6% and of UTIs by approximately 9%
- Obtain urine culture prior to procedure, target antimicrobial therapy, recommend 1 to 2 doses rather than prolonged therapy

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## Patient Case

MC is too altered to report if she is having any urinary symptoms. The team orders antibiotics for empiric treatment of a UTI. How do you proceed?

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## Patient Case

MC is too altered to report if she is having any urinary symptoms. The team orders antibiotics for empiric treatment of a UTI. How do you proceed?

**Have an informed discussion with the team. As patient does not have systemic signs of an infection, recommend careful observation rather than antimicrobial therapy.**

## Summary of 2019 IDSA ASB Guidelines

• Just say **NO** to screening and treating ASB! **Except for:**

- Pregnant women
- Patients Undergoing Endourological Procedures

• No recommendation given for neutropenic patients



## Questions?