

Updates in General Internal Medicine for Specialists

Infectious Disease Cases

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Case 1

- 46 year old smoker presents with 4 days of fevers, chills, and productive cough
- T 101.8 HR 98 BP 100/64 RR 32
- Crackles at the L lung base, otherwise normal exam
- BUN/Cr 32/1.2 LFT's normal
Hct 37 WBC 11K
Plts 208



Which test is most likely to help you make the decision about whether or not to treat with antibiotics?

- a. Sputum gram stain and culture
- b. Pneumococcal urine antigen
- c. Legionella urine antigen
- d. Serum procalcitonin
- e. CBC with differential

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- d. **Serum procalcitonin**
- e. CBC with differential

Procalcitonin

- Rises in response to LPS and IL-1B
- Dose not rise in response to IFN-gamma
- Unaffected by steroid administration
- *Best use* is in outpatients with suspect CAP regarding antibiotic use.
- >0.25 ng/ml patients should be treated with antibiotics. Normal is <0.03 ng/ml
- *Data emerging* about use to guide duration of therapy.

Huang, D.T., et al. Procalcitonin-Guided Use of Antibiotics for Lower Respiratory Tract Infection. *NEJM* 2018; **379**:236-49.

- Prospective, randomized trial of rapid procalcitonin in **1656** patients in 14 ER's for whom the decision about antibiotic use was uncertain.
- All had a diagnosis of “lower respiratory tract infection” by clinician.
- 96% of patients in the procalcitonin group had the result in a median of 77 minutes.
- 47% hospitalized, 59% received antibiotics.
- No difference in antibiotic days between the groups (4.2 vs 4.3 days) and no difference in complications or adverse outcomes.

Should this patient be admitted to the hospital?

- a. Yes
- b. No

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Admit?

CURB-65

- **Confusion** (person, time or place) 1
- **Uremia** (BUN >20 mg/dl) 1
- **Respiratory rate** (>30 breaths/minute) 1
- **Blood Pressure** (<90mm Hg or diast <60) 1
- **Age >65** 1

CURB-65 and Mortality

- 0 or 1 1.5% Outpatient
- 2 9.2% Hospitalize
- 3 or > 22% Hospitalize, consider
ICU (especially 4,5)

Your patient is admitted. You treat him with:

- a. Levofloxacin PO
- b. Azithromycin PO
- c. Ceftriaxone IV
- d. Ceftriaxone and Azithromycin
- e. Vancomycin and Ceftriaxone

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Etiology of Comm-Acq Pneumonia

Mandell, LA, et al. *CID* 2000; **31**:383-421.

Jain, SWH, et al. *NEJM* 2015; **373**:415-427.

Organism	Outpts (439)	Inpts (5379)	Inpts (2320) Jain, et al.	ICU (1023)
<i>S. pneumoniae</i>	5%	17%	5%	21% (8%)
<i>H. influenzae</i>	2%	7%	0.5%	
<i>M. pneumoniae</i>	24%	14%	2% (PCR)	
<i>C. pneumoniae</i>	7%	10%	0.4% (PCR)	
Aerobic GNR's		4%	1%	9% (3%)
<i>S. aureus</i>	0.5%	3%	2%	10% (5%)
<i>L. pneumophila</i>		1%	1%	6%
Influenza A or B			6%	
Rhinovirus			9%	
Total Viral			27%	
Unknown	48%	44%	62%	36%

Empiric Therapy for CAP

Guidelines on the Management of Community-Acquired Pneumonia in Adults.
Infectious Disease Society of America/American Thoracic Society Consensus.
Clin Infect Dis (2007); **44 (Suppl 2)**: S27.

Outpatients with CAP:

Macrolide or Quinolone or Doxycycline
(in Europe Amoxicillin and no quinolones)

Inpatients with CAP (or outpatients with comorbid conditions):

1. Beta-lactam--3rd generation cephalosporin such as ceftriaxone (CTX) or amp-sulbactam or meropenem
plus Macrolide

OR

2. Quinolone
(emphasis is treating DRSP and legionella)

Postma, DF, et al. Antibiotic Treatment Strategies for Community-Acquired Pneumonia in Adults. *NEJM* 2015; **372**: 1312-23.

- 2283 patients with CAP in Netherlands, median age = 70
- All admitted to non-ICU beds
- CURB-65 score 2=estimated 10% mortality
- Randomized to:
 - Beta-lactam-ML
 - Beta-lactam alone
 - Quinolone
- Beta-lactam = Amox, Amox-Clav, 3rd gen Cephalosporin
- Beta-lactam alone non-inferior to other strategies for 90 day mortality. Length of stay also equivalent (6 days)

Your patient is admitted and placed on IV Ceftriaxone and PO Azithromycin.

Fevers decline initially, and then on HD 3 he spikes a fever to 104

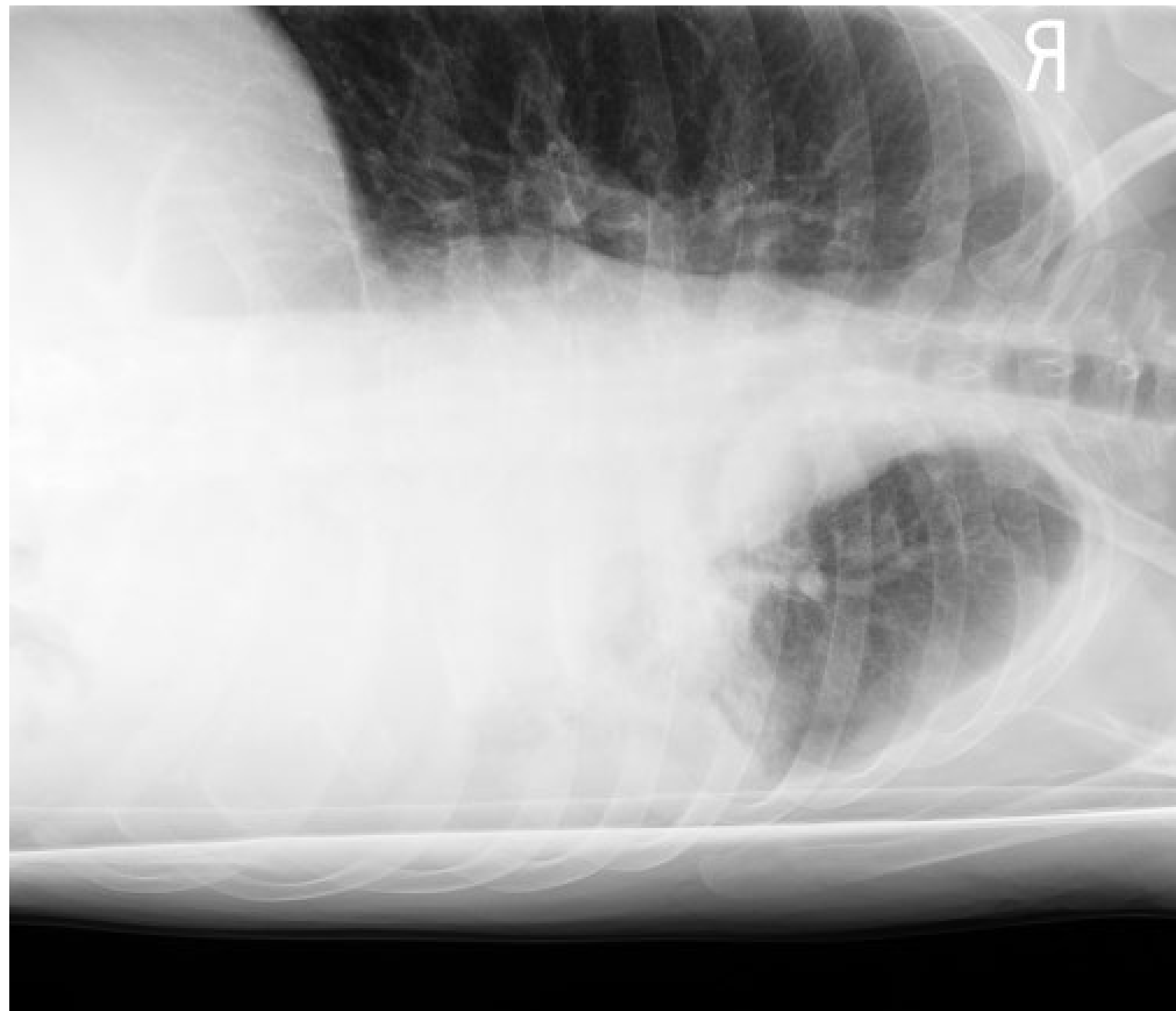
- a. Add Vancomycin IV to his CTX and Azithro
- b. Repeat CXR
- c. Send *C. difficile* assay
- d. Send sputum AFB smear and culture
- e. Prescribe Fluconazole 200 mg PO qd

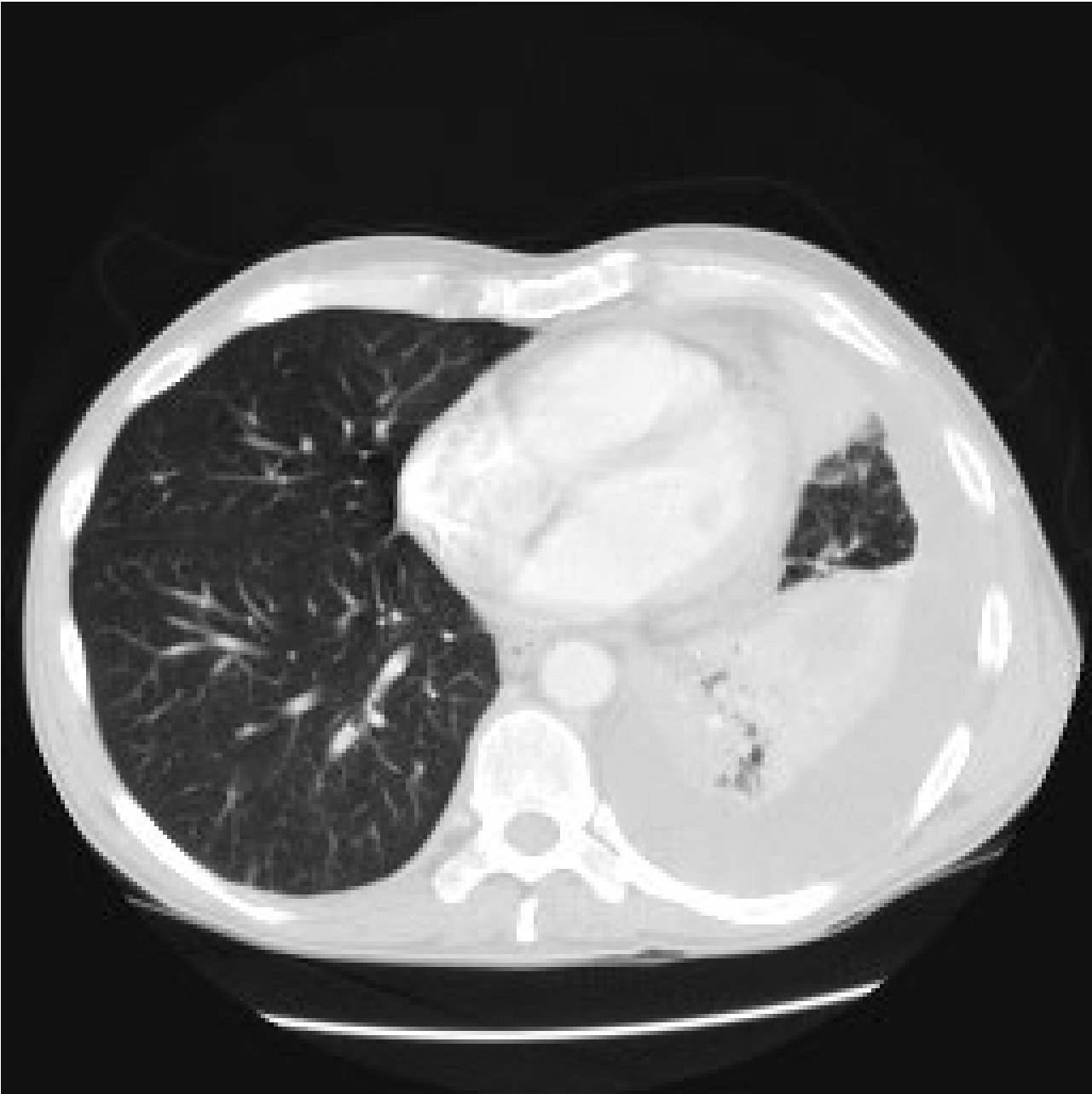
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Case 2

This summer, a 50 year old woman presents to your clinic with 5 days of undifferentiated fevers. She lives in Falmouth, MA. She has no known tick exposures and no recollection of a tick bite or rash. She reports sex with her husband only. There are no children at home or at her work. No ill contacts.

T 101.6 She is fatigued and pale, but there are no other localizing signs of infection on exam. There is no rash and there are no petechiae.

Her labs are notable for:

Hct 29 WBC 3.5 Plts 67, Cr 1.1 ALT 56 AST86 TB 1.1

CXR is normal

What empiric therapy would be reasonable while you await diagnostic testing?

- a. Amoxicillin
- b. Azithromycin
- c. Atovaquone
- d. Doxycycline
- e. b and c
- f. b, c, and d
- g. a, b, c and d

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- e. b and c
- f. **b, c, and d**
- g. a, b, c and d

A tick bite in the summer in New England could transmit:
Lyme, babesia, ehrlichia and anaplasma.

In this case, Lyme is always a possibility, and the absence of rash does not rule this out. The anemia and thrombocytopenia suggest babesia, and the leukopenia suggests ehrlichia/anaplasma.

Doxycycline will cover lyme and ehrlichia/anaplasma. Azithromycin and atovaquone will cover babesia.



Her Lyme antibody returns negative. Her babesia smear and antibody detection are negative. Her ehrlichia and anaplasma PCR are negative.

She is beginning to feel improved on your empiric therapy.

You should:

- a. Continue doxycycline alone for 2-3 weeks
- b. Continue atovaquone and azithromycin for 2-3 weeks
- c. Stop antibiotics
- d. Send serology for *B. miyamotoi*
- e. Send serology for Rocky Mountain Spotted Fever

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- b. Continue atovaquone and azithromycin for 2-3 weeks
- c. Stop antibiotics
- d. **Send serology for *B. miyamotoi***
- e. Send serology for Rocky Mountain Spotted Fever

B. miyamotoi

- Related to tick-borne relapsing fever
- First identified in Japan, now endemic in the NE USA.
- Carried by *Ixodes scapularis* ticks
- Most common symptoms are fever, chills, and headache. Rash is very rare.
- Lyme serology negative
- Diagnosis based on *B. miyamotoi* serology or PCR
- Treatment with doxycycline 2-4 weeks

Case 3

29 year old male presents with pain of his left calf for 4 days.

The month is January. He had to stop using the hamstring machine at his gym because of this pain.

T 102.2 HR 96 BP 106/66 RR 26
No inguinal or popliteal LAD. No lymphangitic streak



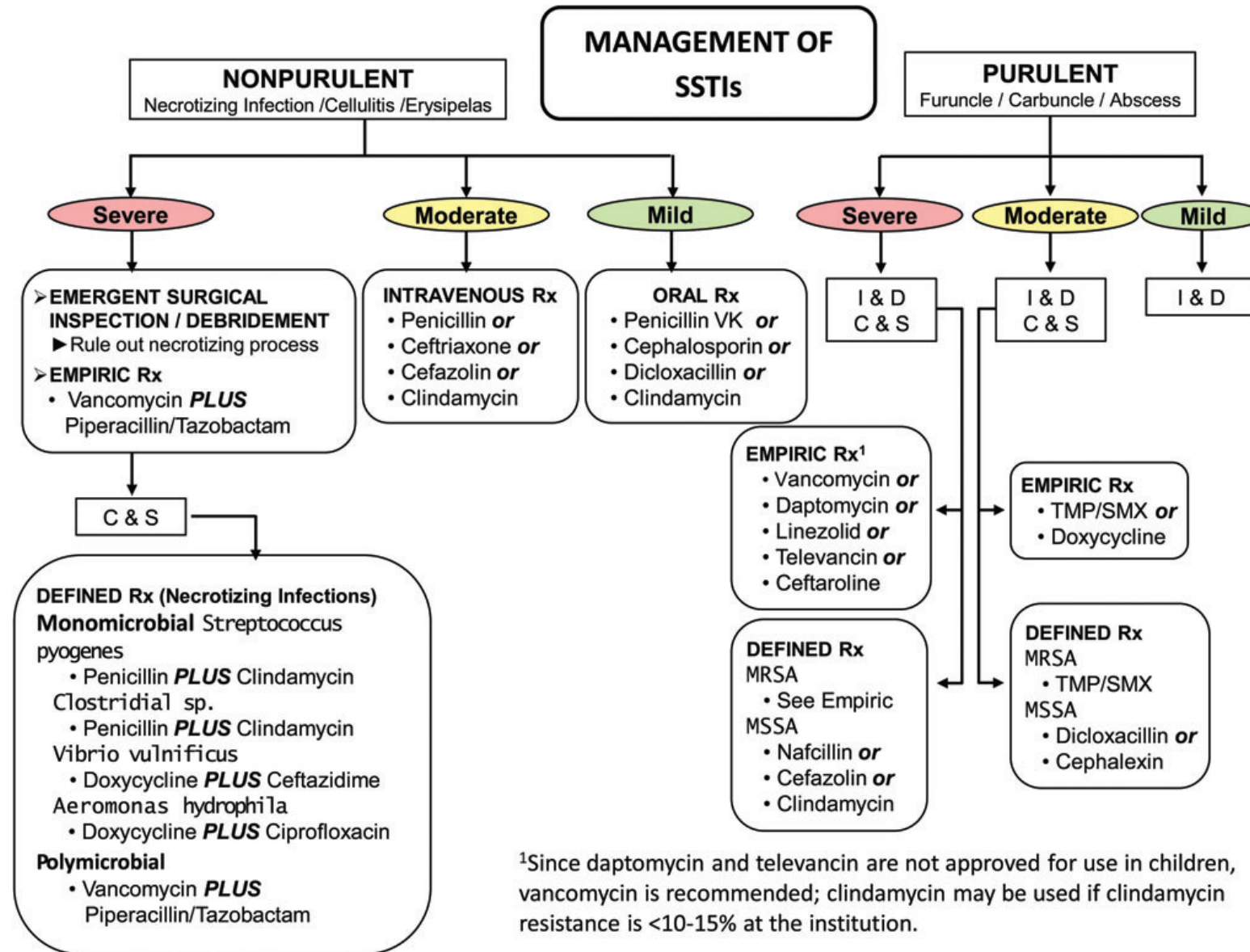
Your management would be:

- a. Incise and drain the abscess with no antibiotics
- b. Incise and drain the abscess and give TMP/SMZ 2 ds PO bid
- c. Incise and drain the abscess and give Dicloxacillin 500 mg PO qid
- d. Admit and administer IV Vancomycin

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Practice Guidelines for the Diagnosis and Management of Skin and Soft Tissue Infections: 2014
Update by the Infectious Disease Society of America.
Clin Infect Dis (2014) **59** (2):e10



TMP/SMZ vs. Placebo for Uncomplicated Skin Abscess

1265 patients

45.3% had culture-proven MRSA

Talan, *et. al. NEJM* (2016); 374:823-32.

	TMP/SMZ	Placebo	Difference
Cure of abscess	80.5 %	73.6 %	6.9% (2.1-11.7%)
Need for subsequent surgical I+D	3%	8%	-5.2% (2.2-8.2%)
New skin infection, different site	3%	10%	-7.2% (4.1-10.4%)
New skin infection in household	3.8%	6.2%	-2.4% (0.4-5.2%)

Risk Factors for MRSA SSTI

- Known MRSA colonization or infection in patient or family
- Overnight stay in health care facility
- Recent flu-like illness
- Contact sports participant
- MSM (men who have sex with men)
- IDU (injection drug use) or dialysis within the past year

The calf lesion resolves with I&D and PO TMP/SMZ. Culture grows MRSA (TMP/SMZ and Doxy-S)

One month later he returns with an abscess of his left gluteus. You:

- a. Retreat with I&D with TMP/SMZ, this time for 14 days, followed by a course of Rifampin.
- b. Obtain U/S of the left gluteus
- c. Retreat with I&D and TMP/SMZ and attempt MRSA eradication with mupirocin and chlorhexidine
- d. Retreat with I&D and TMP/SMZ and attempt MRSA eradication with 3 months Clindamycin 150 mg PO qd

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Prevention Strategies for Patients with Recurrent MRSA SSTI

- Avoid sharing personal hygiene items (razors, brushes, towels)
- Apply 2% mupirocin ointment to anterior nares bid for 10 days
- Apply 4% chlorhexidine gluconate solution to all body parts (exclude face, mucous membranes, open wounds) followed by a thorough rinse for 5 days
- Bathe in dilute bleach solution ($\frac{1}{4}$ cup bleach in $\frac{1}{4}$ tub water) twice weekly for 3 months
- Oral anti-MRSA antibiotic (TMP/SMZ or doxy) for 5-10 days with or without Rifampin *only if infections recur despite the measures above*. Data suggest decrease colonization, but NOT re-infection
- Attempting decolonization of a household may be more effective than decolonizing the index patient alone.

Clinical Practice Guidelines by the Infectious Disease Society of America for the Treatment of Methicillin-Resistant Staphylococcus Aureus Infections in Adults and Children. *Clin Infect Dis* (2011); **52:1**

Case 4

26 year old sexually active woman presents with 3 days of dysuria and frequency, but without fevers or flank pain. You should not:

- a. See her in the office and order a UA and urine culture
- b. Call in ciprofloxacin for 3 days after a phone conversation, without seeing the patient
- c. Treat with TMP/SMZ for 3 days
- d. Treat with Nitrofurantoin for 5 days
- e. Treat with Amoxicillin for 3 days

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- c. Treat with TMP/SMZ for 3 days
- d. Treat with Nitrofurantoin for 5 days
- e. **Treat with Amoxicillin for 3 days**

Her acute cystitis resolves with Nitrofurantoin. A year later she has had 3 more episodes and she asks your advice about preventing recurrence.

You advise:

- a. Post-coital voiding and increased post-coital fluids
- b. Cranberry juice
- c. Acidify urine with Vitamin C
- d. Methanamine hippurate
- e. Continuous TMP/SMZ ss PO qd
- f. Post-coital Nitrofurantoin 50 mg PO qd
- g. Self-treatment with Fosfomycin 3 gm PO once after subsequent symptomatic episodes

Factors associated with recurrent cystitis in young women:

- Sexually activity (particularly with new partner)
- Spermicide and diaphragm use
- 1st UTI before age 15
- Mother with recurrent UTIs
- Vaginal colonization with uropathogen

Factors associated with recurrent cystitis in older women:

- Lack of estrogen
- Institutional setting
- Dementia
- Impaired voiding or neurogenic bladder
- DM
- GU surgery

Case 5

72 year old man with a cystoscopically removed obstructing stone, at home with a foley catheter.

Presents with fever, hematuria, and flank pain, but without change in mental status or hemodynamic instability.

Which of the following would **not** contribute to your decision to treat him for a CA-UTI

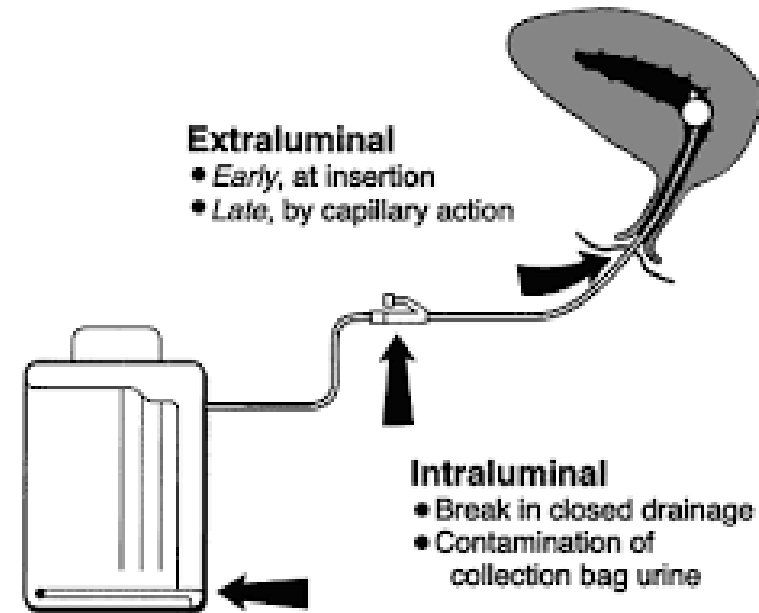
- a. His flank pain
- b. The presence of pyuria on UA
- c. His fever
- d. $>10^3$ uropathogens in urine culture
- e. His hematuria
- f. No other cause for fever was found on exam or by history

Which of the following would **not** contribute to your decision to treat him for a CA-UTI

- a. His flank pain
- b. The presence of pyuria on UA
- c. His fever
- d. $>10^3$ uropathogens in urine culture**
- e. His hematuria
- f. No other cause for fever was found on exam or by history

Catheter-associated bacteruria

- 3-10% of catheterized patients develop significant ($>10^3$) CFU **per day**
- 10-25% of catheterized patients with bacteruria get symptomatic UTI
- <4% of symptomatic CA-UTI result in bacteremia



Catheter-associated UTI, definition

Diagnosis, Prevention, and Treatment of Catheter-associated Urinary Tract Infections in Adults:
2009 International Clinical Practice Guidelines from the Infectious Disease Society of America.

Clin Infect Dis (2010); **50**:625

A patient with intermittent catheterization or urethral or suprapubic indwelling catheter **AND**

- **Symptoms or signs compatible with UTI**

New or worsening fever, rigors, altered MS, flank pain, new hematuria, pelvic pain, or classic lower tract symptoms after catheter removal; unease in patients with spinal cord injury.

- **No other identified source of infection**

- **$>10^3$ CFU/mL in a midstream (if catheter removed within 24 hours) or catheterized urine**

He has $>10^5$ colonies of E. coli on urine culture

Ampicillin-R

Amp-sulbactam-R

Cefazolin-R

Ciprofloxacin-R

Ceftriaxone-R

TMP/SMZ-R

Nitrofurantoin-R

Tetracycline-S

Piperacillin-R

Piperacillin-Tazo-S

Gentamicin-S

Meropenem-S

He has $>10^5$ colonies of *E. coli* on urine culture

- Ampicillin-R
- Amp/sulbactam-R
- Cefazolin-R
- Ciprofloxacin-R
- Ceftriaxone-R
- TMP/SMZ-R
- Nitrofurantoin-R
- Tetracycline-S
- Piperacillin-R
- Pip/tazobactam-S
- Gentamicin-S
- Meropenem-S

Which of the following would **not** be wise?

- a. Admit for PICC line and begin Ertapenem
- b. Ask lab for susceptibilities to Fosfomycin
- c. Begin Tetracycline PO bid
- d. Ask urology to replace (or remove) his Foley catheter
- e. Obtain CT scan of his abdomen and pelvis

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His CT scan showed no obstruction or stone.
His Foley catheter was able to be removed and he could void.
The *E. coli* was susceptible to Fosfomycin.
He was treated successfully with Fosfomycin 3 gm PO every 3 days
for 14 days.

One month later he returns with recurrent fever,
hematuria, malaise, pelvic discomfort, and the same *E.*
coli is grown from his urine.
UA shows no pyuria.

You should:

- Ampicillin-R
 - Amp/sulbactam-R
 - Cefazolin-R
 - Ciprofloxacin-R
 - Ceftriaxone-R
 - TMP/SMZ-R
 - Nitrofurantoin-R
 - Tetracycline-S
 - Piperacillin-R
 - Pip/tazobactam-S
 - Gentamicin-S
 - Meropenem-S
- a. Admit for a PICC line and treat him for 6 weeks with ertapenem
 - b. Reassure him that with no pyuria this is unlikely to be a UTI
 - c. Repeat a course of Fosfomycin 3 gm PO, this time for 6 weeks
 - d. Begin Doxycycline for PO bid for 7-14 days
 - e. Repeat his CT scan

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Urinary Tract Infection in Patients with Spinal Cord Injury or Neurogenic Bladder

- Beware of Atypical Symptoms
 - Fever, autonomic dysfunction, increased spasticity, malaise, nausea, abdominal pain, or any change in urinary habits
- Asymptomatic bacteruria **IS** associated with greater risk of UTI and sepsis
- Meta-analysis of treatment of asymptomatic bacteruria showed:
 - No reduction in UTI (mild or serious)
 - Increased rate of Abx-resistant organisms
- Individual patients **MAY** benefit from chronic antibiotic suppression
- Recurrent UTI and VUR **are** associated with higher rates of renal dysfunction.
- Maximize non-Antibiotic Prevention Strategies:
 - Avoid catheters
 - Unclear that SPTs decrease overall risk of infection c/w indwelling Foley catheter
 - **Consider intermittent straight-catheterization at regular intervals**
- Appropriate catheter management:
 - Anchoring, handwashing, aseptic placement, unobstructed flow, and placement of catheter bag below patient.
 - No routine replacement of urinary catheters
 - Avoid irrigation with antibacterial solutions.

Summary

Key Points

- Understand empiric therapy and management algorithms for:
 - Community Acquired Pneumonia
 - Tick-borne Illnesses
 - Urinary Tract Infection
 - Skin and Soft Tissue Infections

Next Best Steps

- Be able anticipate common and serious consequences of these infections.
- Be able to education patients about prevention of these infections.