

Does My Patient Have a UTI?

September 13, 2023

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Objectives

- Distinguish UTI from asymptomatic bacteriuria
- Know when to treat asymptomatic bacteriuria
- Distinguish UTI from other causes of genitourinary symptoms
- Understand the empiric and definitive treatment options
- Know the treatment duration and workup for gram negative bacteremia
- Know when to consult ID

Question 1

An 89yo woman with a history of dementia, CKD, recurrent UTI, HTN is brought into the ED by her family for fatigue and decreased appetite for the past 2 days. No fevers, chills.

- VS: T 97.8, HR 90, BP 126/82, RR 16, O2 sat 97%.
- Exam: lethargic, denies specific urinary complaints, no focal neurologic deficits, dry mucous membranes, abdomen non-tender, no CVA tenderness.
- Labs: WBC 9, Cr 1.9 (baseline 1.4-1.6)
- UA with 50 WBC/hpf, 2+ leuk esterase, urine culture pending

What is the appropriate next step?

- A. Give IV fluids and monitor
- B. Give IV fluids, await urine culture results prior to treating
- C. Give IV fluids, treat with ceftriaxone 1 gm
- D. Give IV fluids, treat with ertapenem 500mg

Q1. What is the appropriate next step?

A. Give IV fluids and monitor

0%

B. Give IV fluids, await urine culture results prior to treating

0%

C. Give IV fluids, treat with ceftriaxone 1 gm

0%

D. Give IV fluids, treat with ertapenem 500mg

0%

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Diagnosis of UTI

Diagnostic Criteria

- Dysuria, urinary frequency or urgency
- Suprapubic tenderness
- Flank pain, CVA tenderness
- Acute hematuria unrelated to trauma
- In patients with spinal cord injury, increased spasticity, autonomic dysreflexia, sense of unease

Not Helpful

- Pyuria, especially in catheterized patients
- Foul odor
- Cloudy urine
- Acute urinary retention
- Incontinence
- AKI
- Falls in the elderly

Maybe Helpful- only if no alternate etiology found

- Altered mental status
- Fevers, chills
- Sepsis

Prevalence of Asymptomatic Bacteriuria

- Up to ~20% among elderly men and women
- Up to 50% among elderly in LTCF
- Up to ~70% among patients with spinal cord injury
- Up to 100% among patients with long term indwelling urinary catheters

Population	Prevalence, %	Reference
Children		
Boys	<1	[7]
Girls	1–2	[8–10]
Healthy women		
Premenopausal	1.0–5.0	[11]
Pregnant	1.9–9.5	[11]
Postmenopausal (age 50–70 y)	2.8–8.6	[11]
Persons with diabetes		
Women	10.8–16	[12]
Men	0.7–11	[12]
Elderly persons in the community (age ≥70 y)		
Women	10.8–16	[13]
Men	3.6–19	[13]
Elderly persons in a long-term care facility		
Women	25–50	[13]
Men	15–50	[13]
Persons with spinal cord injury		
Intermittent catheter use	23–69	[14]
Sphincterotomy/condom catheter	57	[15]
Persons with kidney transplant		
First month posttransplant	23–24	[16, 17]
1 mo–1 y post-transplant	10–17	[16]
>1 y post-transplant	2–9	[16]
Persons with indwelling catheter use		
Short-term	3%–5%/day catheter	[18]
Long-term	100	[19]

Question 2

A 58yo man with cirrhosis is admitted for hematemesis, undergoes EGD with banding of esophageal varices. On HD #3, the nurse pages you to report a temperature of 38.2, HR 118, BP 102/64, O2 sat 91% on RA, confusion. You are unable to elicit any symptoms. Exam is notable for scleral icterus, tachycardia, decreased breath sounds at bilateral bases, ascites, abdominal rebound tenderness, lower extremity edema. No rash, no CVA tenderness, no foley or central lines. WBC is 18.

What should you order for workup?

- A. BCx x2, UA w/reflex to UCx, CXR, paracentesis
- B. BCx x 2, UA w/reflex to UCx, CXR
- C. BCx x 2, paracentesis, CXR
- D. BCx x 2, CXR
- E. BCx x 2, paracentesis

Q2. What should you order for workup?

A. BCx x 2, UA w/reflex to UCx, CXR, paracentesis

0%

B. BCx x 2, UA w/reflex to UCx, CXR

0%

C. BCx x 2, paracentesis, CXR

0%

D. BCx x 2, CXR

0%

E. BCx x 2, paracentesis

0%

Question 2

A 58yo m
undergoe
#3, the n
118, BP
unable to
icterus, t
bases, as

Don't routinely order the entire "FFWU" if there is a localizing source of infection!

extremity edema. No rash, no CVA tenderness, no foley or central lines. WBC is 18.

E. BCx x 2, paracentesis

Diagnostic Stewardship: Urine Culture Order Set

Urinalysis w/Reflex to Culture ✓ Accept ✗ Cancel

Add-on: No add-on specimen found

Priority: Routine Urgent to Facilitate Discharge

Frequency: Once Tomorrow AM Daily

Starting: Today Tomorrow At:

First Occurrence: **Today 1650**

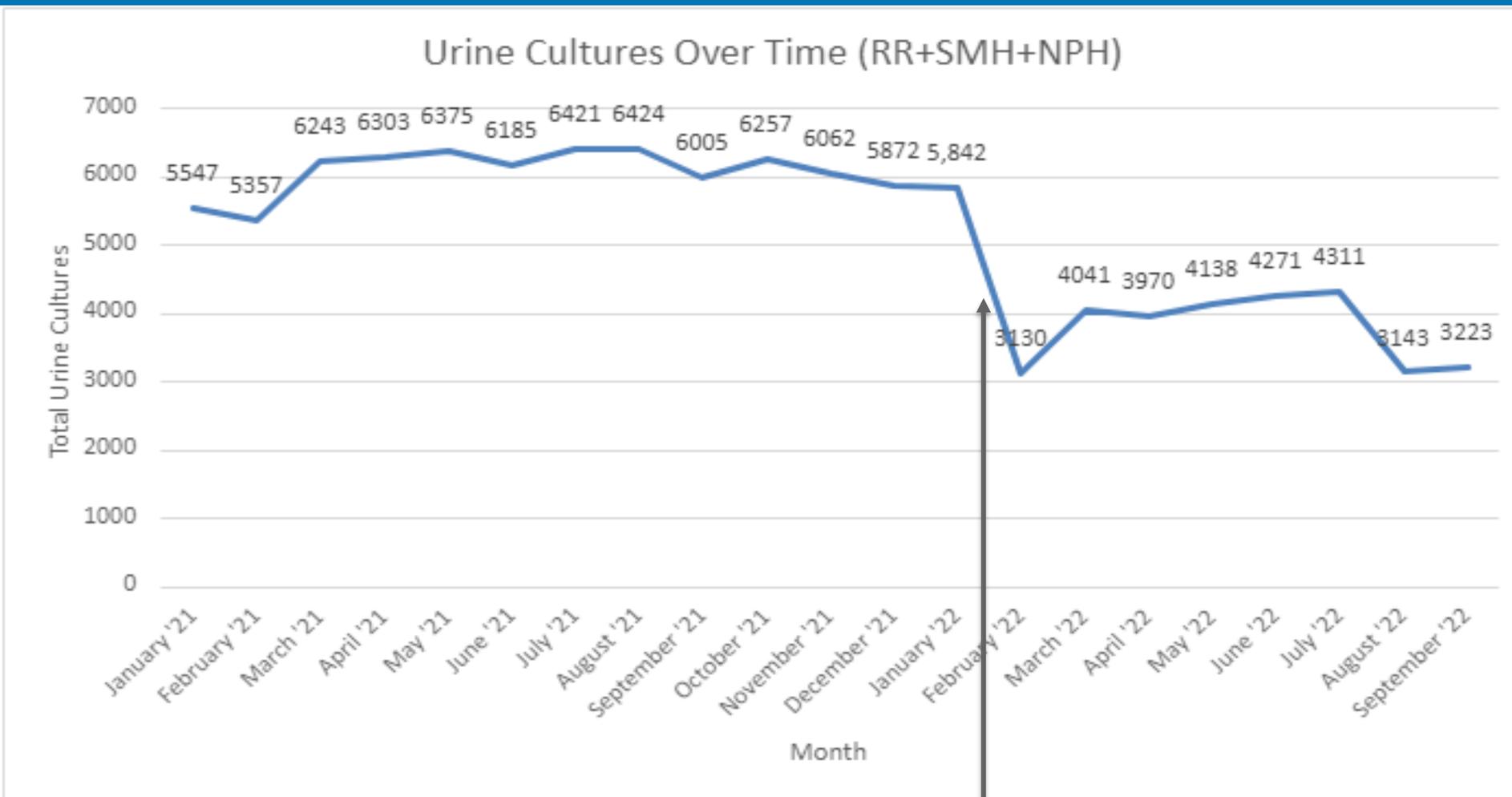
[Show Scheduled Times](#)

02/03/22 1650

Specimen Source: Clean Catch, Midstream Urine, voided Catheterized-Foley

ⓘ Indication: Dysuria, urgency, frequency, suprapubic tenderness Flank pain or CVA tenderness
Acute hematuria unrelated to trauma or foley insertion Fever or sepsis without an alternate source
~~AMS in patients with indwelling catheter or urinary tract abnormality and without an alternate source~~
Spinal cord patients: increased spasticity, autonomic dysreflexia, sense of unease Screening during pregnancy
Screening for urologic procedure with anticipated mucosal trauma Screening within the first 2 months of renal transplant
Other (comment)

Number of Urine Cultures Ordered on Inpatients at UCLA Before & After Implementation of Urine Culture Order Set



Question 3: Which One of These is NOT an Indication to Treat Asymptomatic Bacteriuria?

- A. 69yo man with HTN, HL, COPD undergoing transurethral resection of prostate (TURP) in 1 week
- B. 64yo woman with diabetes undergoing total hip arthroplasty for osteoarthritis in 2 days
- C. 32yo healthy woman in her first trimester of pregnancy
- D. 45yo woman with a h/o recurrent UTI and nephrolithiasis undergoing percutaneous nephrolithotomy (PCNL)

Q3. Which One of These is NOT an Indication to Treat Asymptomatic Bacteriuria?

A. 69yo man with HTN, HL, COPD undergoing transurethral resection of prostate (TURP) in 1 week

0%

B. 64yo woman with diabetes undergoing total hip arthroplasty for osteoarthritis in 2 days

0%

C. 32yo healthy woman in her first trimester of pregnancy

0%

D. 45yo woman with a h/o recurrent UTI and nephrolithiasis undergoing percutaneous nephrolithotomy (PCNL)

0%

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- C. 32yo healthy woman in her first trimester of pregnancy
- D. 45yo woman with a h/o recurrent UTI and nephrolithiasis undergoing percutaneous nephrolithotomy (PCNL)

Indications for Treatment of Asymptomatic Bacteriuria

- Pregnant women early in pregnancy
 - Risk of pyelonephritis
 - Associated with adverse pregnancy outcomes
- Patients undergoing urologic procedure with anticipated mucosal trauma
 - Risk of complicated UTI and bacteremia
- First 1-2 months post-renal transplant- controversial
 - Risk of allograft rejection
- No good data to screen patients undergoing orthopedic or other non-urologic procedures with hardware, non-renal transplant recipients, and neutropenic patients

Question 4

69yo woman with a h/o undifferentiated connective tissue disease on hydroxychloroquine, GERD, HTN, C diff colitis, recurrent vaginitis due to *Candida glabrata*, recent UTI, who presents for persistent dysuria and vaginal burning.

Presented to urgent care 2 weeks ago, urine culture grew *E coli*, treated with nitrofurantoin. Had slight improvement in symptoms. Presents today for follow up. Denies recent sexual activity.

On exam, VSS, no abdominal tenderness, no CVA tenderness. Pelvic exam with vulvar and vaginal atrophy, no plaques, no vaginal or cervical discharge.

Question 4

Urine dipstick is positive for leukocytes.
Prior UCx results below:

12/19/2022 12:31 PM

Specimen Information: Clean Catch, Midstream; Urine

Bacterial Culture Urine

90,000 CFU/mL Escherichia coli !

Susceptibility Setup Date: 12/18/2022

Susceptibility

	Escherichia coli MIC (MCG/ML)	
Ampicillin	>=32	Resistant
Ceftriaxone	1	Susceptible
Ciprofloxacin	<=0.25	Susceptible
Gentamicin	<=1	Susceptible
Nitrofurantoin	<=16	Susceptible
Oral Cephalosporins	R	Resistant
Piperacillin + Tazobactam	8	Susceptible
Tobramycin	<=1	Susceptible
Trimethoprim/Sulfamethoxazole	<=20	Susceptible

What is the next best step?

- A. Hold antibiotics, repeat the UCx
- B. Hold antibiotics, repeat the UCx, send BV screen, genital fungal culture, trichomonas antigen
- C. Prescribe ciprofloxacin, repeat the UCx, send BV screen, genital fungal culture, trichomonas antigen
- D. Prescribe ciprofloxacin, don't repeat the UCx
- E. Prescribe intravaginal estrogen, repeat UCx

What is the next best step?

A. Hold antibiotics, repeat the UCx

0%

B. Hold antibiotics, repeat the UCx, send BV screen, genital fungal culture, trichomonas antigen

0%

C. Prescribe ciprofloxacin, repeat the UCx, send BV screen, genital fungal culture, trichomonas antigen

0%

D. Prescribe ciprofloxacin, don't repeat the UCx

0%

E. Prescribe intravaginal estrogen, repeat UCx

0%

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- D. Prescribe ciprofloxacin, don't repeat the UCx
- E. **Prescribe intravaginal estrogen, repeat UCx**

DDX for Dysuria and Urinary Frequency

	Women	Men
Infectious		
	Vaginitis (candida, Trichomonas, BV)	Prostatitis
	HSV	Epididymitis
	GC/chlamydia urethritis	GC/chlamydia urethritis
Non-infectious		
	Atrophic vaginitis	BPH/obstruction
	Overactive bladder	Overactive bladder
	Interstitial cystitis/bladder pain syndrome	Chronic pelvic pain syndrome

Question 5

A 62yo woman with DM2, HTN, HL, CKD stage IV, presents to your office with a 2 day h/o dysuria and urinary frequency. She denies F/C, flank pain. On exam, VSS, +suprapubic tenderness, no CVA tenderness. Urine dipstick is positive for leukocyte esterase. She has a sulfa allergy.

What is the preferred empiric therapy for this patient?

- A. TMP/SMX
- B. Cephalexin
- C. Nitrofurantoin
- D. Ciprofloxacin

Q5. What is the preferred empiric therapy for this patient?

A. TMP/SMX

0%

B. Cephalexin

0%

C. Nitrofurantoin

0%

D. Ciprofloxacin

0%

Question 5

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What is the preferred empiric therapy for this patient?

- A. TMP/SMX
- B. Cephalexin**
- C. Nitrofurantoin
- D. Ciprofloxacin

UCLA Antibiogram, *E. coli*, outpatient urine

Adults (>21 Years Old) Gram Negative - Urine - Outpatient

% of Isolates Susceptible

 Meropenem 99% →
n = 8371

 Imipenem 99% →
n = 8371

 Ertapenem 99% →
n = 8371

 Nitrofurantoin 98% →
n = 8371

 Gentamicin 92% →
n = 8371

 Ceftriaxone 91% →
n = 8371

See 'General Spectrum of Activity'
section

 Cephalexin 90% →
n = 8371

Oral cephalexin for treatment of
uncomplicated urinary tract infections

 Cefpodoxime 90% →
n = 8371

Oral cefpodoxime for treatment of
uncomplicated urinary tract infections

 Ciprofloxacin 77% →
n = 8371

Ciprofloxacin is associated with
arthropathy and histological changes in
weight bearing joints of juvenile animals
and is not FDA approved for pediatric use

 Trimethoprim-
Sulfamethoxazole 76% →
n = 8371

 Ampicillin 58% →
n = 8371

- Nitrofurantoin > cephalexin >
TMP/SMX > cipro

UCLA Antibiogram, *K. pneumoniae*, outpatient urine

 Meropenem 99% →
n = 1427

 Imipenem 99% →
n = 1427

 Ertapenem 99% →
n = 1427

 Gentamicin 96% →
n = 1427

 Ceftriaxone 93% →
n = 1427

See 'General Spectrum of Activity' section

 Cephalexin 92% →
n = 1427

 Cefpodoxime 92% →
n = 1427

Oral cefpodoxime for treatment of uncomplicated urinary tract infections

 Trimethoprim-Sulfamethoxazole 88% →
n = 1427

 Ciprofloxacin 88% →
n = 1427

Ciprofloxacin is associated with arthropathy and histological changes in weight bearing joints of juvenile animals and is not FDA approved for pediatric use

 Nitrofurantoin 28% →
n = 1427

 Ampicillin R →
n = 1427

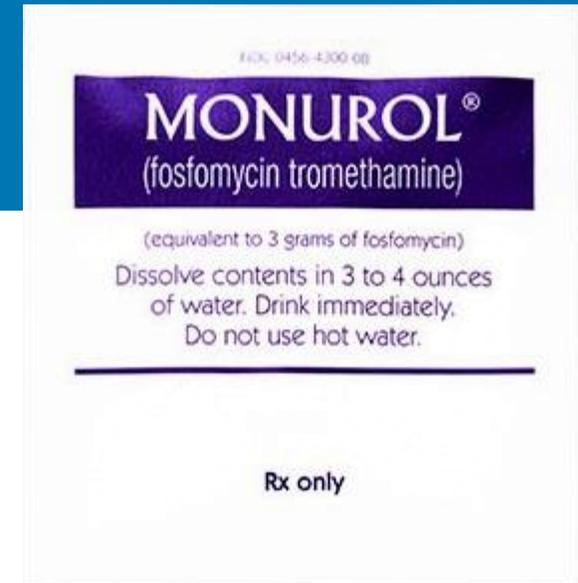
- Cephalexin > TMP/SMX = cipro > nitrofurantoin

Definitive Treatment of Acute Cystitis: The Good & the Bad & the Ugly

	Good	Bad	Ugly (Avoid Use)
TMP/SMX	<ul style="list-style-type: none"> Treats cystitis & pyelonephritis 	<ul style="list-style-type: none"> Hyperkalemia AKI (>0.2-0.3 elevation in creatinine) Rash 	<ul style="list-style-type: none"> Sulfa allergy Elderly, especially if CKD
Nitrofurantoin	<ul style="list-style-type: none"> Well tolerated Narrow spectrum Low risk for C difficile 	<ul style="list-style-type: none"> Pulmonary toxicity 	<ul style="list-style-type: none"> CrCl <30 Pyelonephritis/upper tract disease
Cephalexin	<ul style="list-style-type: none"> Well tolerated 		
Cipro/levofloxacin	<ul style="list-style-type: none"> Treats cystitis, pyelonephritis, prostatitis Treats pseudomonas 	<ul style="list-style-type: none"> C difficile CNS effects (seizures, confusion) Tendonopathy Aortic aneurysm/dissection 	<ul style="list-style-type: none"> QT prolongation Myasthenia gravis Concomitant steroid use (higher risk of tendon rupture) Caution use in elderly
Fosfomycin	<ul style="list-style-type: none"> Treats ESBL Single dose for uncomplicated cystitis 	<ul style="list-style-type: none"> Can be expensive Only reliably effective against E coli and K pna 	<ul style="list-style-type: none"> Pyelonephritis/upper tract disease

Fosfomycin: an old drug with a new purpose

- Phosphonic acid derivative, inhibits bacterial cell wall synthesis by inactivating pyruvyl transferase
- Oral powder
- Indications
 - Uncomplicated cystitis- single 3 gm dose
 - Complicated cystitis- 3 gm every 3 days for total of 3 doses
- Reserve for patients with infection due to ESBL-producing *E. coli* and *K. pna*, or for patients with multiple antibiotic allergies
- **Must request the micro lab to perform susceptibility testing (on *E. coli*, *K. pneumoniae*)**



Question 6

86yo man with dementia, DM, CAD, HTN, HL, BPH s/p TURP, presents from a SNF with fevers, hypotension, somnolence, AKI. He was started on empiric ceftriaxone which was broadened to ertapenem after blood cultures grew GNRs. He rapidly improved and is afebrile with baseline mental status on HD #3. GNRs identified as *Enterobacter cloacae*.

Which of the following is indicated?

- A. Repeat blood cultures to assess for resolution of bacteremia
- B. Renal ultrasound to evaluate for obstruction
- C. 10-14 days of antimicrobial therapy
- D. Narrow antibiotics to ceftriaxone if susceptible

Q6. Which of the following is indicated?

A. Repeat blood cultures to assess for resolution of bacteremia

0%

B. Renal ultrasound to evaluate for obstruction

0%

C. 10-14 days of antimicrobial therapy

0%

D. Narrow antibiotics to ceftriaxone if susceptible

0%

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Uncomplicated Cystitis vs. Complicated UTI

- Uncomplicated: old definition: premenopausal, nonpregnant women with no known urological abnormalities or catheter or comorbidities
 - Now most consider post-menopausal women with well controlled DM and other comorbidities to be uncomplicated
- Complicated
 - Male
 - Urologic abnormality
 - Pregnancy
 - Upper tract disease- pyelonephritis, bacteremia

Treatment Duration for Complicated UTI: Shorter is Better

Shorter Is Better

Diagnosis	Short (d)	Long (d)	Result	#RCT
CAP	3-5	5-14	Equal	14
Atypical CAP	1	3	Equal	1
Possible PNA in ICU	3	14-21	Equal	1*
VAP	8	15	Equal	2
cUTI/Pyelonephritis	5 or 7	10 or 14	Equal	9**
Intra-abd infection	4	10	Equal	2
Complex Appendicitis	1-2	5-6	Equal	2
GNB Bacteremia	7	14	Equal	3 ⁺
Cellulitis/Wound/Abscess	5-6	10	Equal	4 ⁺
Osteomyelitis	42	84	Equal	2
Osteo Removed Implant	28	42	Equal	1
Debrided Diabetic Osteo	10-21	42-90	Equal	2 ^Φ
Septic Arthritis	14	28	Equal	1
Bacterial Meningitis (peds)	5	10	Equal	1
AECB & Sinusitis	≤5	≥7	Equal	>25
Variceal Bleeding	3	7	Equal	1
Neutropenic Fever	AFx72h/3 d	+ANC>500/9 d	Equal	2
Post Op Prophylaxis	0-1	1-5	Equal	55 ^Ψ
Erythema Migrans (Lyme)	7	14	Equal	1
<i>P. vivax</i> Malaria	7	14	Equal	1

Total: 19 Conditions

>125 RCTs

- Most studies include fluoroquinolone treatment of women with pyelonephritis
- 2021 JAMA study of men showed that 7 days of cipro or TMP/SMX was non-inferior to 14 days
- Fluoroquinolones: 5-7 days
- TMP/SMX: 7-10 days
- Beta-lactams: 7-10 days

AmpC-producing Enterobacterales species: From SPICE/SPACE to Heck Yes!

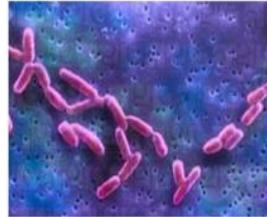
Serratia

Providencia

"**I**ndole-positive" (Proteus, Morganella, Providencia)
species / **A**cinetobacter

Citrobacter

Enterobacter species



Hafnia alvei

Enterobacter cloacae

Citrobacter freundii

Klebsiella aerogenes

Yersinia enterocolitica

<5% AmpC production among Serratia, Morganella,
Providencia species

Repeat Blood Cultures for Gram Negative Bacteremia

Unnecessary in most cases

- Low yield- only 6% in one study
- Do not improve outcomes
- May lead to false positive/contaminants and longer hospital stays

Indications for repeat blood cultures

- Lack of clinical response/persistent fevers >48-72 hours
- Concern for endovascular infection/endocarditis
- Lack of source control
- CLABSI with catheter salvage

Question 7: When Should ID Be Consulted?

- A. Symptoms of UTI not responding to antibiotics
- B. Resistant UTI
- C. Limited antibiotic options due to allergy/intolerance
- D. Need for home IV antibiotics
- E. Recurrent UTI
- F. All of the Above

Q7. When Should ID Be Consulted?

A. Symptoms of UTI not responding to antibiotics

0%

B. Resistant UTI

0%

C. Limited antibiotic options due to allergy/intolerance

0%

D. Need for home IV antibiotics

0%

E. Recurrent UTI

0%

SEE MORE 

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- D. Need for home IV antibiotics
- E. Recurrent UTI
- F. All of the Above**

Contact Information for ASP Pharmacists

Contact	Email/Extension/Pager	Hours
ASP Helpdesk/Consultation	antimicrobialstewardship@mednet.ucla.edu	M-F
RRMC and RNPH ID Pharmacist - Adult Ethan Smith - CC Chat	x71423 p71423	M-F: 0730-1600
RRMC ID Pharmacist - Adult and Pediatric Meganne Kanatani - CC Chat	x78510 p92528	MWF: 0900-1730 Th: 1000-1830
SMH ID Pharmacist - Adult Christine Pham - CC Chat	x77567 p91059	M-F
OPAT ID Pharmacist Lynn Chan - CC Chat	x71328 p93927	M-F

Summary

- Avoid testing for UTI and/or treating bacteriuria for non-specific symptoms such as foul odor, cloudy urine, AMS, falls in the elderly
- Avoid sending the routine “FFWU” with blood cultures, urine cultures and CXR unless the patient has localizing symptoms
- Indications to test and treat asymptomatic bacteriuria include pregnancy, urologic procedure with anticipated mucosal trauma, renal transplant recipient within the first 1-2 months of transplant
- Consider non-infectious causes of urinary symptoms such as overactive bladder, atrophic vaginitis, interstitial cystitis, chronic pelvic pain syndrome

Summary (continued)

- First line antibiotics for uncomplicated cystitis include cephalexin, TMP/SMX, nitrofurantoin. Consider fluoroquinolones if these are not options
- 7-10 days of antibiotics is sufficient for treatment of complicated UTI, pyelonephritis, bacteremia
 - Fluoroquinolones: 5-7 for women, 7 for men. TMP/SMX & beta lactams: 7-10 days
- Surveillance blood cultures for gram negative bacteremia are unnecessary unless there is lack of clinical response, no source control, or concern for endovascular infection

Questions?