



IS IT ASB OR UTI? A CASE-BASED APPROACH

Erica Stohs, MD, MPH & Jessica Zering, PharmD, BCIDP, BCPS, CAPM



Disclosures

Today's speaker (Dr. Erica Stohs) has the following financial relationships to disclose:

- Grant/Research Support from: Merck & Co, Inc & BioMerieux: Industry funded investigator

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- We will not discuss off label use and/or investigational use in this presentation

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This presentation is intended for all nursing home clinicians



Please raise your hand if you would like to speak or type questions and comments into the chat.



Self-mute your line when not speaking.



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This presentation is intended to provide guidance, but does not replace clinical judgement



Reach out to your regulator with regulatory questions.

Reminder

- Make sure to register if you plan to claim ACPE or CME credit
 - We are unable to award these credits to non-registered participants



Learning Objectives

- Apply the definition, diagnosis, and etiologies of a urinary tract infection vs. asymptomatic bacteriuria in the context of a patient case
- Discuss the differences between urinary tract infection and asymptomatic bacteriuria as per Infectious Diseases Society of America guidelines
- List 1st-line therapies and duration of therapies for urinary tract infection as per Infectious Diseases Society of America guidelines
- Discuss the risks associated with unneeded antibiotics in the geriatric population
- Describe stewardship strategies and metrics that can be used to measure successes

Pre-Lecture Questions

1. Mr. J is a 72-year-old man with a history of prostate cancer s/p TURP and requires intermittent catheterization. His family visiting him at his LTCF comments that his most recent urine is cloudy with sediment but no blood. He seems more confused and tired. He denies painful or frequent urination. He is afebrile and other vitals are at his baseline.

What is the most important next step?

- A. Check a urinalysis with reflex to culture
- B. Skip the urinalysis and prescribe ciprofloxacin for a presumed UTI
- C. Check a urine culture AND prescribe sulfamethoxazole-trimethoprim while you await results
- D. Encourage hydration and monitor for additional symptoms

Pre-Lecture Questions

2. Ms. Y is a 67-year-old female who experiences increased urinary frequency for 2 days. The following day, she develops a fever. Using Loeb's criteria, the provider diagnoses her with a UTI.

Which of the following antibiotics is NOT a preferred antibiotic based on national guidelines?

- A. Fosfomycin
- B. Nitrofurantoin
- C. Ciprofloxacin
- D. Sulfamethoxazole-trimethoprim

Pre-Lecture Questions

3. Ms. S is an 80-year-old woman with diabetes mellitus, atrial fibrillation on warfarin for anticoagulation, and stage IV chronic kidney disease. She develops a fever and pelvic pain. She is diagnosed with UTI and requires an antibiotic.

What drug-drug interactions or adverse events should you consider?

- A. Sulfamethoxazole-trimethoprim and hyperkalemia
- B. Sulfamethoxazole-trimethoprim and increased INR
- C. Ciprofloxacin and prolonged QT interval
- D. All of the above



IS IT ASB OR UTI?

Erica Stohs, MD, MPH



WASHINGTON STATE SOCIETY
FOR POST-ACUTE
AND LONG-TERM CARE
MEDICINE

What's in a Urine?

- Asymptomatic Bacteriuria (ASB): presence of bacteria in the urine without the symptoms of an infection.
- ASB: 1 or more species of bacteria growing in a urine at specified quantitative counts ($\geq 10^5$ colony forming units [CFU]/L), irrespective of the presence of pyuria, in the absence of signs or symptoms attributable to urinary tract infection (UTI). -IDSA ASB Guidelines



ASB is Incredibly Common

- Healthy women, especially once post-menopause: 3-9%
- Diabetes: 11-16% women, 1-11% men
- Age >70 years in the community: 11-16% women, 4-19% men
- Age >70 y in a LTCF: 25-50% women, 15-50% men
- Spinal cord injury: 23-69%
- Kidney transplant: 23-24%
- Indwelling catheter use: 3-5% per day / 100% long-term use

[Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019 Update by the Infectious Diseases Society of America](#)

UTI Symptoms



Burning with urination
Frequent urination +/-
incomplete evacuation
Blood in urine
Pain or pressure in
lower abdomen or back
Fever



Cloudy urine
Malodorous urine
Confusion
Falls

Loeb Criteria for UTI

No Indwelling Catheter	Indwelling Catheter (Foley or suprapubic)
Acute dysuria or	<i>At least 1 of the following:</i>
Fever* and at least 1 of the following new or worsening symptoms:	<input type="checkbox"/> Fever*
<input type="checkbox"/> Urgency	<input type="checkbox"/> New CVA tenderness
<input type="checkbox"/> Frequency	<input type="checkbox"/> Rigors
<input type="checkbox"/> Suprapubic pain	<input type="checkbox"/> New onset delirium
<input type="checkbox"/> Gross hematuria	
<input type="checkbox"/> Costovertebral angle (CVA) tenderness	
<input type="checkbox"/> Urinary incontinence	

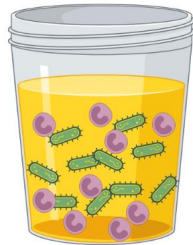
* >37.9° C [100° F] or a 1.5° C [2.4° F] increase above baseline temperature

Loeb M, et al. Infect Control Hosp Epidemiol 2001;22:120-4

Loeb vs McGeer Criteria

Loeb vs McGeer Criteria

- BOTH can be used as antimicrobial stewardship tools in nursing home settings
- Loeb Criteria
 - Clinical decision tool
 - Lab data not yet available
 - Treat the patient, not the case/labs
- McGeer (and NHSN) Criteria
 - Surveillance tools
 - Retrospectively determine if there was a true infection and if antibiotics were appropriate
 - Diagnostic / laboratory information often required



Revisit Case 1

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UTI TREATMENTS AND ANTIBIOTIC HARMS

Jessica Zering, PharmD, BCIDP, BCPS, CAPM



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Statistics

- Antibiotics are one of the most frequently prescribed medications in nursing homes
- Up to 85% of these are inappropriate or not needed
- Nursing home residents are particularly vulnerable to harms from antibiotics
 - Adverse drug reactions are underrecognized & can confound a diagnosis
 - Using antibiotics only when a true infection is suspected can help avoid preventable harms



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Antibiotic Harms

Do antibiotics have side effects?



Any time antibiotics are used, they can cause side effects. However, antibiotics can save lives. When you need antibiotics, the benefits outweigh the risks of side effects. If you don't need antibiotics, you shouldn't take them because they can cause harm.

Common side effects of antibiotics include:



Rash



Dizziness



Nausea



Yeast Infection



Diarrhea

Get immediate medical help if you experience severe diarrhea. It could be a symptom of a **C. difficile infection** (also called **C. diff**), which can lead to severe colon damage and death. People can also have severe and life-threatening allergic reactions.

If you experience side effects, follow up with your healthcare professional.

To learn more about antibiotic prescribing and use, visit www.cdc.gov/antibiotic-use or call 1-800-CDC-INFO.

1 out of 5

medication-related visits to the emergency room are from reactions to antibiotics.



CS320411-A

About 20% of all patients put on an antibiotic will suffer an adverse drug reaction!

[Curran J et al. Clinical Microbiology and Infection. 2022;28\(4\): 479-490](https://doi.org/10.1093/cid/ciab111)

Antibiotic Harms

Estimating Daily Antibiotic Harms

Umbrella Review and Meta-Analysis

Public Health
Ontario

Santé
publique
Ontario

 **35** Systematic Reviews

 **71** Short vs. Long Antibiotic Duration Trials

 **92%** studies evaluated respiratory tract and urinary tract infections

 **23,174** patients evaluated



Adverse Events

N=20,345

4%↑

odds ratio/day



Antibiotic Resistance

N=2,330

3%↑*

odds ratio/day



Super-infections

N=5,776

2%↓*

odds ratio/day

Each Additional Day Can Cause Harm

5 vs 3

Days



9%↑ odds ratio

Of adverse events

7 vs 3

Days



19%↑ odds ratio

Of adverse events

* Non-statistically significant difference

Source: Curran J et al. Estimating daily antibiotic harms: An Umbrella Review with Individual Study Meta-analysis Clin Micro Infect. 2021

Physiologic Changes in Older Adults

- Older adults are more vulnerable to medication harms

Table 1. Common Physiologic Changes with Age That May Change Drug Pharmacokinetics

Organ System	Physiologic Change with Aging	Effect on Pharmacokinetics
GI	<ul style="list-style-type: none"> ↑ Or no change in stomach pH ↓ GI blood flow Slowed gastric emptying Slowed GI transit 	<ul style="list-style-type: none"> • ↓ Absorption of some drugs and nutrients requiring acid environment • Absorption rate may be prolonged
Skin	<ul style="list-style-type: none"> Thinning of dermis Loss of subcutaneous fat 	<ul style="list-style-type: none"> • ↓ Or no change to drug reservoir formation with transdermal formulation
Body composition	<ul style="list-style-type: none"> ↓ Total body water ↓ Lean body mass ↑ Body fat ↓ Or unchanged serum albumin ↑ α_1-Acid glycoprotein 	<ul style="list-style-type: none"> • ↑ Volume of distribution and accumulation of lipid-soluble drugs • ↓ Volume of distribution of water-soluble drugs • ↑ Free fraction of highly protein-bound drugs
Liver	<ul style="list-style-type: none"> ↓ Liver mass ↓ Blood flow to the liver ↓ Or no change in CYP enzymes 	<ul style="list-style-type: none"> • ↓ First-pass extraction and metabolism • ↑ Half-life and • ↓ clearance of drugs with a high first-pass extraction and metabolism • ↓ Or no change in phase I metabolism • No change in phase II drug metabolism
Renal	<ul style="list-style-type: none"> ↓ GFR ↓ Renal blood flow ↓ Tubular secretion ↓ Renal mass 	<ul style="list-style-type: none"> • ↓ Renal elimination of many medications • ↑ Half-life of renally eliminated drugs and metabolites

CYP = cytochrome P450; GFR = glomerular filtration rate; GI = gastrointestinal.

Some UTI Antibiotic Side Effects

Adverse Drug Reactions

- Altered mental status
- Nausea/vomiting
- Effects on mood
- Aortic aneurysm
- Tendon rupture
- Yeast infections
- Blood sugar disturbances in diabetics
- *C. difficile* infections
- Kidney/liver injury
- **And more!**

1. [Food and Drug Administration. 2018](#)
2. [Cipla USA, Inc. Levaquin Medication Guide. 2022](#)
3. [Chou et al. Clin Inf Dis. 2013;57\(7\):971-980](#)
4. [Werner et al. BMC Inf Dis. 2011;11](#)

What If It's UTI?

- If it does not meet criteria for a UTI, antibiotics are not warranted
- If it meets criteria for a UTI, antibiotics are warranted
- Tools to assist with antibiotic selection:
 - [Infectious Diseases Society of America \(IDSA\) - Uncomplicated Cystitis and Pyelonephritis Guideline](#)
 - Facility antibiogram



Preferred Agents for UTI (IDSA Guidelines)

First Line Therapies

- Nitrofurantoin
- Trimethoprim-sulfamethoxazole
- Fosfomycin

Second Line Therapies

- Fluoroquinolones
- Beta-lactams

[Nicolle LE et al. Clinical Infectious Diseases. 2019;68\(10\):e83-e110](#)

The “Why” Behind 1st-line Therapies

- Higher efficacy
- Less resistance
 - *E. coli* resistance to fluoroquinolones exceeds 15% in Washington State
 - Use institution antibiogram - example below
- Fewer adverse drug reactions

	Total # of Isolates	Ampicillin	Ampicillin-Sulbactam	Cefazolin	Cefepime	Ceftriaxone	Ciprofloxacin	Clindamycin	Erythromycin	Gentamicin ²	Levofloxacin	Linezolid	Nitrofurantoin ¹	Oxacillin	Penicillin G	Piperacillin-tazobactam	Tetracycline	Trimethprim-Sulfamethoxazole	Vancomycin
Negative	<i>Enterobacter cloacae</i> ⁴	--	--	--	--	--	--	--	--	96	--	--	--	--	--	92	--	96	--
	<i>Escherichia coli</i> (non-urine)	66	48	71	69	68	81	72	--	--	84	--	--	--	--	93	--	66	--
	<i>Escherichia coli</i> (urine)	478	52	81	83	81	90	79	--	--	92	--	--	93	--	96	--	76	--

Special Situations

- Drug interactions
- Nitrofurantoin use in older adults
- Urinary tract infections in men
- Kidney disease (including dialysis)
- Penicillin allergies (and 1st line therapies cannot be used)



Microsoft Stock Image

Significant UTI Antibiotic Interactions

Fluoroquinolones (FQs)

- Most FQs + antipsychotic drugs
 - Increase in QT interval
- All FQs + warfarin:
 - Increases INR level
- **Ciprofloxacin + tizanidine:**
 - **Increases tizanidine level, potentially leading to toxicity – use alternative antibiotic**

Sulfamethoxazole + Trimethoprim (SMZ/TMP)

- SMZ/TMP + warfarin:
 - Increases INR level
- **SMZ/TMP + ACE inhibitor:**
 - **Causes potentially life-threatening hyperkalemia – use alternative antibiotic**

Significant UTI Antibiotic Interactions

Beta-Lactams (BLs)

- BLs + warfarin:
 - Might affect INR – monitor and adjust warfarin dose as per protocol

Nitrofurantoin

- Nitrofurantoin + magnesium-containing antacid
 - Reduces absorption of nitrofurantoin

Consult your pharmacist for guidance on managing warfarin dosing and drug interactions

Nitrofurantoin in Older Adults

TABLE 2 2023 American Geriatrics Society Beers Criteria® for potentially inappropriate medication use in older adults.

Organ system, therapeutic category, drug(s) ^a	Rationale	Recommendation	Quality of evidence ^b	Strength of recommendation ^b
<i>Anti-infective</i> Nitrofurantoin	Potential for pulmonary toxicity, hepatotoxicity, and peripheral neuropathy, especially with long-term use; safer alternatives available.	Avoid in individuals with CrCl <30 mL/min or for long-term suppression.	Low	Strong

- Current literature shows that this medication remains effective with CrCl > 30 mL/min and causes minimal hepatic/pulmonary side effects when used for short courses
- **Do not use for pyelonephritis**

[Chung, C et al. Senior Care Pharmacist. 2019;34:303 – 307](#)

[American Geriatrics Society Beers Criteria Update Expert Panel. Journal of the American Geriatrics Society. 2023;71\(7\): 2052 - 2081](#)

Urinary Tract Infections in Men

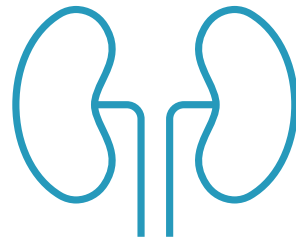
- Men with UTIs will require additional workup to rule out structural complications (i.e. prostatitis)
- Nitrofurantoin may be considered if CrCl > 30 and no evidence of prostatitis or other complicating urological factors
- After work-up, if it is determined that a complex UTI exists, consider antibiotic that disseminates into prostate tissue
 - Sulfamethoxazole–trimethoprim or fluoroquinolone



[Ingalsbe ML et al. Ther Adv Urol. 2015;7\(4\): 186-193](#)
[Cunha BA et al. Eur J Clin Microbiol Infect Dis. 2017;36\(7\):1213-1216](#)
Funnce, L. Are male urinary tract infections always complicated?
[PowerPoint Lecture]. UW-CSiM. 2021

Kidney Disease

- Ensure proper dosing by calculating a creatinine clearance on all residents
 - Check to see if the resident is receiving dialysis or renal replacement therapies
- Nitrofurantoin and sulfamethoxazole-trimethoprim are contraindicated if on dialysis



Beers Criteria 2023

TABLE 6 2023 American Geriatrics Society Beers Criteria[®] for medications that should be avoided or have their dosage reduced with varying levels of kidney function in older adults.

Drug	CrCl (mL/min) at which action is required	Rationale	Recommendation	Quality of evidence	Strength of recommendation
<i>Anti-infective</i>					
Ciprofloxacin	<30	Increased risk of CNS effects (e.g., seizures, confusion) and tendon rupture.	Dosages used to treat common infections typically require reduction when CrCl <30 mL/min.	Moderate	Strong
Nitrofurantoin	<30	Potential for pulmonary toxicity, hepatotoxicity, and peripheral neuropathy, especially with long-term use. (See also Table 2).	Avoid if CrCl <30 mL/min	Low	Strong
Trimethoprim-sulfamethoxazole	<30	Increased risk of worsening of kidney function and hyperkalemia; risk of hyperkalemia especially prominent with concurrent use of an ACE, ARB, or ARNI.	Reduce dosage if CrCl is 15–29 mL/min. Avoid if CrCl <15 mL/min.	Moderate	Strong

Consult pharmacist for renal dosing recommendations prior to prescribing

[American Geriatrics Society Beers Criteria Update Expert Panel. Journal of the American Geriatrics Society. 2023;71\(7\): 2052 - 2081](#)

Penicillin Allergies (& Can't Use 1st Line Therapies)

- Most penicillin allergies are not true allergies
- Determine if a true allergy exists (very short questionnaire tool linked at the end)

Figure 1: Assessment of a Patient Reported Penicillin Allergy



*HSR: Hypersensitivity reaction **See below for inpatient test dose procedure. For outpatient test dose and skin testing, refer to allergy clinic. Cefazolin in Penicillin Allergy - See reference 13 and 14. ** See beta lactam cross-reactivity table

Revisiting Case 2

2. Ms. Y is a 67-year-old female who experiences increased urinary frequency for 2 days. The following day, she develops a fever. Using Loeb's criteria, the provider diagnoses her with a UTI.

Which of the following antibiotics is NOT a preferred antibiotic based on national guidelines?

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3. Ms. S is an 80-year-old woman with diabetes mellitus, atrial fibrillation on warfarin for anticoagulation, and stage IV chronic kidney disease. She develops a fever and pelvic pain. She is diagnosed with UTI and requires an antibiotic.

What drug-drug interactions or adverse events should you consider?

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Resources

Education (Residents and Families)

- [Antibiotics for UTI in Older Adults \(Eng\)](#)
- [Antibiotics for UTI in Older Adults \(Spanish\)](#)
- To implement: Put into resident orientation, hand these to residents and families when an antibiotic isn't a part of the care plan, print these and put them on tables near facility entrance

Penicillin Allergy Questionnaire

- [CDC: Is It Really a Penicillin Allergy?](#)
- To implement: Ask these quick questions and use the algorithm provided earlier in this slidedeck to identify if a resident has a true allergy

Creatinine Clearance Calculator

- [Global RPH Creatinine Clearance Calculator](#)
- To implement: Use prior to prescribing or dispensing

Clinical Guidance

- [Infectious Diseases Society of America \(IDSA\) - Uncomplicated Cystitis and Pyelonephritis Guideline](#)
- [Infectious Disease Society of America \(IDSA\) - Management of Asymptomatic Bacteriuria](#)



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