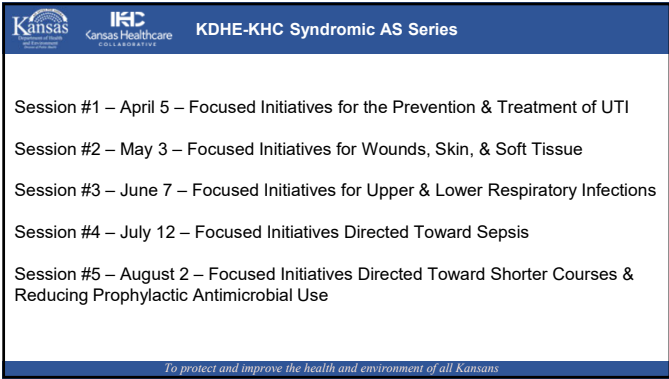
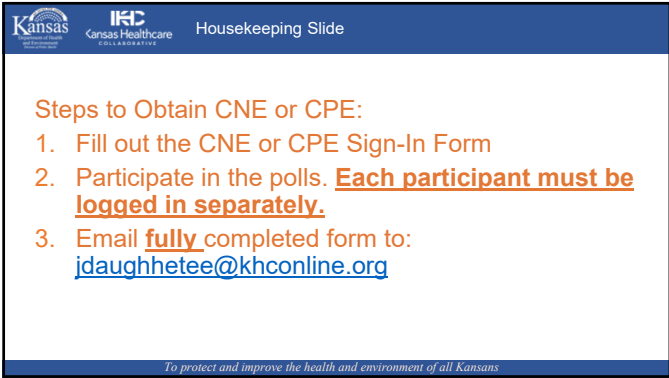


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Presenters

Kellie Wark, MD, MPH
Antimicrobial Stewardship Co-Lead
Kansas Department of Health and
Environment
Asst. Professor of Infectious Disease
The University of Kansas Health Systems
kwark@kumc.edu / kellie.wark@ks.gov




4

[illegible]



Objectives

- Review the epidemiology and pathogenesis of UTIs, CAUTIs, and asymptomatic bacteriuria
- Identify facility treatment guidelines
- Identify evidence based antibiotic stewardship initiatives
- Examine diagnostic stewardship pitfalls



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[illegible]

- Bacteriuria = bacteria in urine
- Asymptomatic bacteriuria = bacteria in urine w/o symptoms
- Urethritis = urethral infection or inflammation
- Acute cystitis = bladder infection **or** inflammation
- UTI = infection
 - Uncomplicated UTI = cystitis or pyelonephritis in pre-menopausal, non-pregnant, otherwise healthy females
 - Complicated UTI = cystitis or pyelonephritis in males, pregnant females, structural or functional GU abnormalities, immunocompromised, elderly
- Acute pyelonephritis = kidney infection

6

[illegible]

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Polling Question

True or False: Asymptomatic bacteriuria is defined as white blood cells in the urine without symptoms of UTI?

A. True

B. False

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Polling Question

True or False: Asymptomatic **bacteriuria** is defined as **white blood cells** in the urine without symptoms of UTI?

A. True

B. False

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Asymptomatic Bacteriuria

Definition

Bacteria in urine

NO symptoms



Who to Screen?

✓ Pregnant ("early visits") (treatment = 4-7 days)

✓ Before urologic interventions (treatment = 1-2 dose)

✗ Neutropenic patients

✗ Kidney transplant patients

✗ Solid organ transplant recipients

✗ Non-urologic surgeries

✗ Indwelling catheters

✗ Elderly with falls



✗ Elderly with confusion (rule out alternative causes first)

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Asymptomatic Bacteriuria

The Myth of Clean Catch & Midstream Samples

- Clean catch:** part labia, clean urethral meatus and surrounding mucosa, then obtain urine sample



- Midstream:** initial stream is discarded, only collect the latter half of the stream (e.g., start then stop)

Similar rates of mixed growth & skin flora contaminants on midstream vs clean-caught samples

Bar C. & Del Portal D. Emerg Med News; 2018 <https://journals.hew.com/em-news/2018/08/18/>
Leshure M. NEJM 1993; 328(4):289
Lifshitz G. Arch Intern Med. 2000;160(16):2537-40.
Frazee R., et al. West J Emerg Med. 2012;13(5):491-5

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Polling Question

Which of the following are risk factors for the development of asymptomatic bacteriuria?

A.Increased age

B.Female gender



C.Diabetes

D.Indwelling urinary catheter

E.All of the above

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Polling Question

Which of the following are risk factors for the development of asymptomatic bacteriuria?

A.Increased age

B.Female gender

C.Diabetes

D.Indwelling urinary catheter

E.All of the above

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Prevalence of asymptomatic bacteriuria in selected populations	
Population	Prevalence (%)
Healthy premenopausal women	1.0 – 5.0
Pregnant women	1.9 - 9.5
Post-menopausal women aged 50-70	2.8 – 16
Diabetic women	9.0 – 27.0
Diabetic men	0.7 – 11.0
Women in LTC	25 – 50
Men in LTC	15 - 40
Patients performing clean intermittent catheterization (CIC)	23 – 89
Patients on HD	28
Patients with indwelling short-term cath	9 – 23
Patients with indwelling long-term cath	100

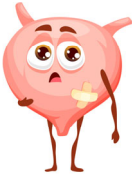
Nicolle et al. CID 2019;68(10):e83-110.

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Describes Syndrome of:

- Dysuria
- Frequency
- Urgency
- Suprapubic tenderness
- Rarely fevers, back/flank pain (think kidney)



Inflammation Caused by:

- Infections (i.e., UTI)
- Urethritis (gonorrhea, chlamydia)
- Interstitial cystitis
- Stones
- Glomerulonephritis
- Instrumentation

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Prevalence of asymptomatic bacteriuria in selected populations		
Dysuria, Urgency, Frequency,	Flank/back pain, Fevers	Smelly Urine
UTI	Pyelonephritis	UTI (if no other symptoms = NOPE)
Urethritis (men > women)	Obstruction (hydronephrosis)	Foods (asparagus, brussel sprouts, fish, onions, garlic, coffee)
Vaginitis (dryness, estrogen)	Renal infarct	Liver disorder (ammonia)
Interstitial cystitis	Stones	Dehydration
Stones		Diabetes
		Yeast infection
Pelvic floor dysfunction		Meds (sulfa, diabetic, rheumatoid meds, azathioprine)
Overactive bladder		Kidney stones
STI		

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[illegible]

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[illegible]

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[illegible]

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Polling Question

What is the first diagnostic step in diagnosing a urinary tract infection?

A. Urine dipstick

B. Urinalysis

C. Urine culture

D. CT abdomen/pelvis

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Polling Question

What is the first diagnostic step in diagnosing a urinary tract infection?

A. Urine dipstick

B. **Urinalysis**

C. Urine culture

D. CT abdomen/pelvis

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Urinary Tract Infection

Antimicrobial
Stewardship &
Healthcare
Epidemiology

Review

Deconstructing the urinalysis: A novel approach to diagnostic and antimicrobial stewardship

Sonali D. Advani MBBS, MPH^{1,2}, Christopher R. Polage MD, MAS³ and Mohamad G. Fakih MD, MPH^{1,3}

Weiner L et al ICHS 2016; 37(11):1288

SHEA

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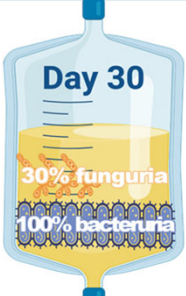
22

[illegible]

23

[illegible]

24



Day 30

30% funguria

100% bacteriuria

Catheter Associated Urinary Tract Infection

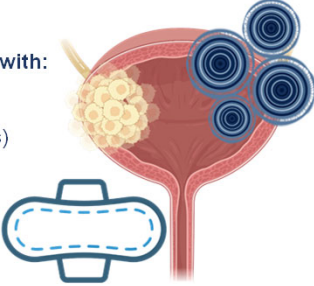
Epidemiology

Daily risk of CA-bacteriuria:
3-10% per day
By day 30=100%
3-32% CA-funguria
75-90% are **asymptomatic**

Warren et al NEJM 1978
Holley et al Am J Med 1981

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Risk Factors

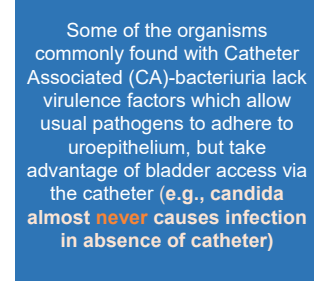
Urinary catheters associated with:

- Increased stone formation
- Urease-producers (i.e., proteus)
- Local GU infections, fistulas
- Bladder cancer
- Incontinence

Warren J., et al. Infect Dis Clin North Amer. 1987;11

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Microbiology

- E.coli (24%)
- Candida spp (24%)
- Enterococcus spp (14%)
- Pseudomonas aeruginosa (10%)
- Klebsiella spp (10%)

Weiner L et al ICHS 2016; 37(11):1288

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Some of the organisms commonly found with Catheter Associated (CA)-bacteriuria lack virulence factors which allow usual pathogens to adhere to uroepithelium, but take advantage of bladder access via the catheter (e.g., **candida** almost **never** causes infection in absence of catheter)

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31[illegible]32[illegible][illegible]

[illegible]



Clinical Decision Support

Outcomes

CAUTI Rates

- **9.9%** (1.82-> 1.64/1000 cath-days)
- **19.1%** (11.5->9.3/10k cath-days)
- **0%** (0.3->0.3/1000 pt-days)

Antibiotic Rx Per Normal UA

- **10.8%** (48.7% -> 43.4% = -5.3%, p<0.001)
- **13.6** (35.9% -> 31% = -4.9%, no p value)
- **80.0%** (45.1% -> 9% = -36.1%, p<0.01)



Antibiotic DOT

- **5.3** (449-> 425 /1000 PD, no p value)
- **15.2** (102.5->86.9/1000 PD, p=0.01)

Hojat L, et al. OFID 2023;10(1): ofac091

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Micro Nudges

Endorsed by IDSA/SHEA and CLSI

- **GOAL:** guide prescribers towards certain antibiotics
- Selective or cascading reporting are most common
- Should be interdisciplinary (developed by lab, stewardship, end-users)
- Can be implemented at different timepoints inpatient care: initial work-up, antibiotic-initiation/selection or end (duration)

3 forms:

1) **Present desirable** options, and **mask undesirable** options



2) Frame recommendations with **comments to guide decisions**

3) **Visually enhance desired** options

Langford B et al. ICHE 2019;40(12):1400-06

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Reporting Nudges



Leverage the laboratory to improve antibiotic use

- **Result** text interpretation
- "multiple organisms present indicating likely contamination"
- "no pyuria, culture not performed"

Morgan D., et al. JAMA 2017; 318(7):607-08

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Reporting Nudges

Candiduria Nudging

"In absence of symptoms, Candida is generally considered normal flora. No therapy indicated unless high risk (pregnant, neonate, or neutropenic) or undergoing urologic procedure. If Foley catheter present, remove or replace when able"

Candida urine cultures

- 1 academic + 4 community hospitals (KC)
- Antibiotic treatment pre- and post templated comment to candida urine culture results

Antibiotic Outcomes

- - 14% antifungals (48%→34% w/in 72h candida-result, p=02)

Clinical Outcomes

- No change in 28-day candidemia

Schwartz et al. ASHE Aug 2022; 2(1): e156.

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[illegible]

Polling Question

True or False: Cascaded reporting is the strategy of reporting susceptibility results in which secondary antibiotics (e.g., broader spectrum or costlier) may be reported **only** if the organism is resistant to the primary/narrower agents



A. True

B. False

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[illegible]

  **Polling Question**

True or False: Cascaded reporting is the strategy of reporting susceptibility results in which secondary antibiotics (e.g., broader spectrum or costlier) may be reported **only** if the organism is resistant to the primary/narrower agents

A. True
B. False

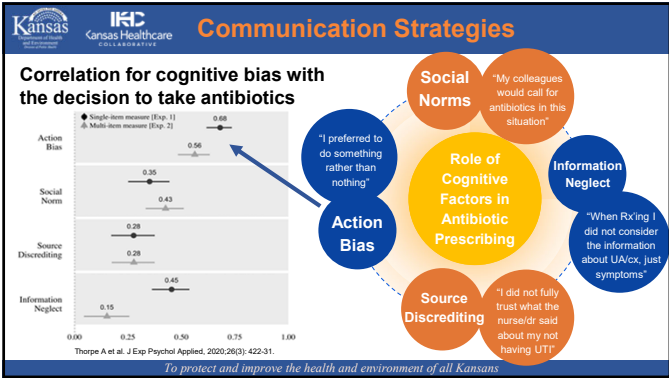
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Communication Strategies

Reframe the Inaction Message - Prescriber

- "Watch and wait"
- "Wait for cultures"
- "Cultures are negative there is nothing more to do"
- "UA had bacteria but given no symptoms, no need for treatment"
- "Start pain relief (e.g. Azo, pyridium, tylenol) and increase hydration"
- "Good news! UA is negative, lets address the factors that might have caused the frequency (caffeine)"
- "UA had bacteria which is common, but given you have no symptoms, let me know if develop symptoms of UTI (pain, urgency, frequency)"

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Communication Strategies

Reframe the Inaction Message - Nurse

- "Likely not UTI, call back if symptoms change"
- "No need for UA given no symptoms"
- "Given symptoms inconsistent with UTI, I'm not calling the Dr"
- "Likely the smelly urine is from foods you ate, stop that food and let us know if develop burning, urgency, pain"
- "Given symptoms inconsistent with UTI, I'm documenting smelly urine with lack of pain, urgency, frequency, fevers and no UA obtained"

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Communication Strategies


Reframe the Inaction Message - Pharmacist

- “7 days is too long, but better safe than sorry”
- “Levofloxacin has an interaction with the patient’s other meds but the ordering provider is aware”
- “7 days is a longer course than our guidelines recommend, and we’ve been having problems with C.diff, do you mind if I change to 3 days?”
- “Levofloxacin interacts with their cardiac meds, an alternative based on our facility guidelines is nitrofurantoin which this E.coli is covered by”

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[illegible]



Communication Strategies

Barriers to assertive communication for UTI culture or antibiotic-ordering in ED + LTC settings:


- Strict hierarchies
- Age-based seniority
- Unfamiliarity with system or provider
- Perception of limited knowledge
- Perception of limited expertise
- Concerns of offending colleague
- Concerns of team disharmony

Omura M, et al. *Nurse Educ Today*. 2016;67:100-07

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[illegible]



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Communication & Support

Rx Name:

DIAGNOSIS
<input type="checkbox"/> Asymptomatic bacteriuria (bacteria in urine without infection)
<input type="checkbox"/> Dyspareunia (painful intercourse without infection)
<input type="checkbox"/> Dyspareunia (painful sex)
<input type="checkbox"/> Interstitial cystitis (bladder wall inflammation)
<input type="checkbox"/> Pelvic floor dysfunction (pelvic muscle pain)
<input type="checkbox"/> Vaginitis (vaginal irritation)

The symptoms used to or urinalysis you presented with today do NOT suggest an infection.

Antibiotics were not started because they are ineffective for dysuria without infection and asymptomatic bacteriuria, may cause side effects, have GI may lead to resistant bacteria leading future antibiotic options.

Please return or call if symptoms do get worse in _____ day(s), develop fevers or chills, lower abdominal or back pain, urinary frequency, or other new or concerning symptoms.

SYMPTOM RELIEF MEDICATIONS


<input type="checkbox"/> Acetaminophen 325-650 mg every 4-6 hours as needed	Pain, burning
<input type="checkbox"/> Phenazopyridine 100-200 mg three times daily as needed	Pain, burning
<input type="checkbox"/> Urinary analgesic (dyspareunia) over-the-counter	
<input type="checkbox"/> Methemoglobinemia 150 mg + sodium calcium 162 mg daily, 2 tablets four times daily as needed	Burning +/- prevent infection
<input type="checkbox"/> Estrogens topically, 2 to 5 times weekly*	Vaginal irritation, healthy vaginal flora

PREVENTIVE MEDICATIONS

<input type="checkbox"/> Methemoglobinemia 100mg twice daily * (side with vitamin C 1000 mg to activate, does 1 take same time as solids, avoid wine meal, avoid)	Prevent bladder bacterial growth
<input type="checkbox"/> Cranberry supplement 1 to 3g or cranberry juice daily	Prevent E.coli bladder wall attach
<input type="checkbox"/> D-mannose 2 gram daily	Prevent bacterial bladder wall attachment
<input type="checkbox"/> Probiotic, lactobacillus at least 10 billion cfu daily	Protect from (damaged) bacterial overgrowth

DUTY URGENCY

<input type="checkbox"/> Avoid caffeine, alcohol, artificial sweeteners, spicy foods <input type="checkbox"/> Consider diet for interstitial Cystitis (cherry oil) <input type="checkbox"/> Avoid constipation and diarrhea <input type="checkbox"/> Empty bladder at regular intervals	<input type="checkbox"/> Urinary catheter (peritoneal, diaphragms, femoral hygiene uppers, powders, douches) <input type="checkbox"/> Urinate after sex, wear cotton undergarments <input type="checkbox"/> Avoid constipation and diarrhea <input type="checkbox"/> Empty bladder at regular intervals
--	--



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Date: _____

Prescriber: _____

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[illegible]

[illegible]

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Polling Question

What is the most autonomous intervention to improve antibiotics for UTIs, however also the least impactful **long-term**?

A. Education



B. Automation (e.g., reflex urinalysis to culture)

C. Standardization of collection practices

D. Incentives and feedback

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Practice Changes

Workflow Algorithms

- Review diagnostic/treatment tools or algorithms to determine if outdated or not evidence based
- Quit the dipsticks
- Obtain & store UA/cx properly
- Delirium/mental status changes checklists/algorithm

Guidelines

- Include **not** treating asymptomatic bacteriuria (and exceptions)

Decision Support

- Results message-framing, nudging
- EMR diagnostic pathways

Communication



- Prompts
- Alternative treatment tools

Education

- Staff + patients
- Peer education
- Providers re: guidelines

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Summary Initiatives

- Clinical Decision Support** – less labor intense way to assist providers in assisting guideline-directed dx/tx, **medium-resource, moderate impact**
- Cascaded reporting** – reduces unnecessary broad-spectrum beta-lactam and fluoroquinolone use, potentially improved downstream clinical outcome improvements; can be applied inpatient + outpatient, standard of care at many institutions, **medium-resource, moderate impact**
- Micro reporting nudges** - nudge prescribers towards certain antibiotics, interdisciplinary (lab + stewardship + end-users), low resource, low-moderate impact, **low-resource, moderate impact**
- Practice change**- examine or create guidelines, workflow algorithms, **low-moderate resource, high impact**
- Communication** - create scripts or prompts, address action bias, **low-resource, moderate impact**
- Education**- short term results, need long-term practice changes, culture/norm changes to sustain, **low-resource, low-moderate impact**

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Next Session Prep • KHC can update this slide (example from previous below)

- Identify a utilization metric that is feasible or currently used in your health system
- Obtain raw data and attempt to calculate your metric
- Come prepared with the challenges and barriers you experienced
- We want the next session to be “hands on”!
- If you have an example you’d like to be used anonymously for next session’s demonstration, please e-mail nwilson5@kumc.edu !

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Housekeeping Slide

Steps to Obtain CNE or CPE:

1. Fill out the CNE or CPE Sign-In Form
2. Participate in the polls. **Each participant must be logged in separately.**
3. Email **fully** completed form to: jdaughhetee@khconline.org

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Questions?

Contact information

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