



**North Carolina
Clinical Antibiotic
Stewardship Partners**

INFECTION MANAGEMENT AND ANTIBIOTIC STEWARDSHIP

Urinary Tract Infections: Appropriate Prevention, Diagnosis, Treatment and Care

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Conflict of interest Disclosures

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- ▶ These slides contain materials from a variety of colleagues including CDC, WHO, AHRQ, etc.



Outline of today's session

1. Define urinary tract infection (UTI)
2. Discuss the prevention of UTIs
3. Review the purpose of Urinalysis (UA) and components of UA
4. Review the McGeer Criteria
5. Discuss treatment for UTIs



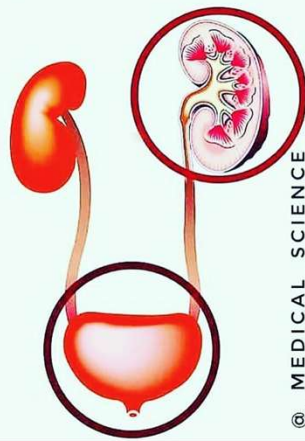
A Common Case

- ▶ 84 yo F living in your facility is “more fatigued” today per her son’s report. Staff note she has eaten less than usual and does seem more fatigued but has no other symptoms of note. Son insists that this is what happens “every time Mom has a uti” and requests that antibiotic treatment be initiated now. How do you respond?

CDC NHSN UTI Definitions

- ▶ Urinary Tract Infection (UTI)/Cystitis
 - ▶ infection of the bladder (lower urinary tract).
- ▶ Pyelonephritis –
 - ▶ infection of the upper urinary tract (ureters / renal collecting system / kidneys).

Symptoms of Urinary Tract Infection (UTI)



Pyelonephritis (Kidney infection)

- Flank pain
- High fever
- Malaise
- WBCs & bacteria in urine
- Urinary symptoms similar to cystitis

Cystitis (Bladder infection)

- Increased urinary frequency
- Urgency
- Dysuria (painful urination)
- Pain above the pubic region
- WBCs & bacteria in urine
- More common in women

@_MEDICAL_SCIENCE

CDC NH UTI Definitions/Points to Clarify



“Mixed flora” is not considered an organism and cannot be reported.



*Yeast **cannot** be reported as an organism for a UTI.*

UTIs: Why do we worry?

Primary cause of bacteremia in LTC residents is due to UTIs!

Incidence of **symptomatic** UTIs in elderly in LTC around 10%

Asymptomatic bacteriuria prevalence:
30% F/ 10% M

Prevention of UTI



Physiologic Risk Factors for UTIs in the Elderly

- ▶ Physiologic changes of the bladder with aging:
 - ▶ Women
 - ▶ Men



Physiologic Risk Factors for UTIs in the Elderly

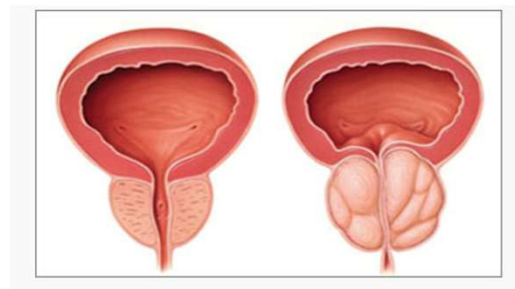
PHYSIOLOGIC CHANGES OF BLADDER WITH AGING:

Women:

- ▶ Elevation of vaginal pH due to estrogen deficiency
- ▶ Results in increased ability of bacteria to adhere to the mucosal cells of the bladder.

Men:

- ▶ Decreased bactericidal activity of prostatic secretions
- ▶ Increased post-void residual volume of urine
 - Cystocele/rectocele
 - Prostate hypertrophy
 - Neurogenic bladder from comorbidity



Environmental Risk Factors for UTI in the Elderly

Environmental Risk Factors

- ▶ Indwelling urinary catheters
- ▶ Congregate living
 - Mechanical/chemical restraints
 - Increased exposure to antibiotics
 - Poor infection control techniques



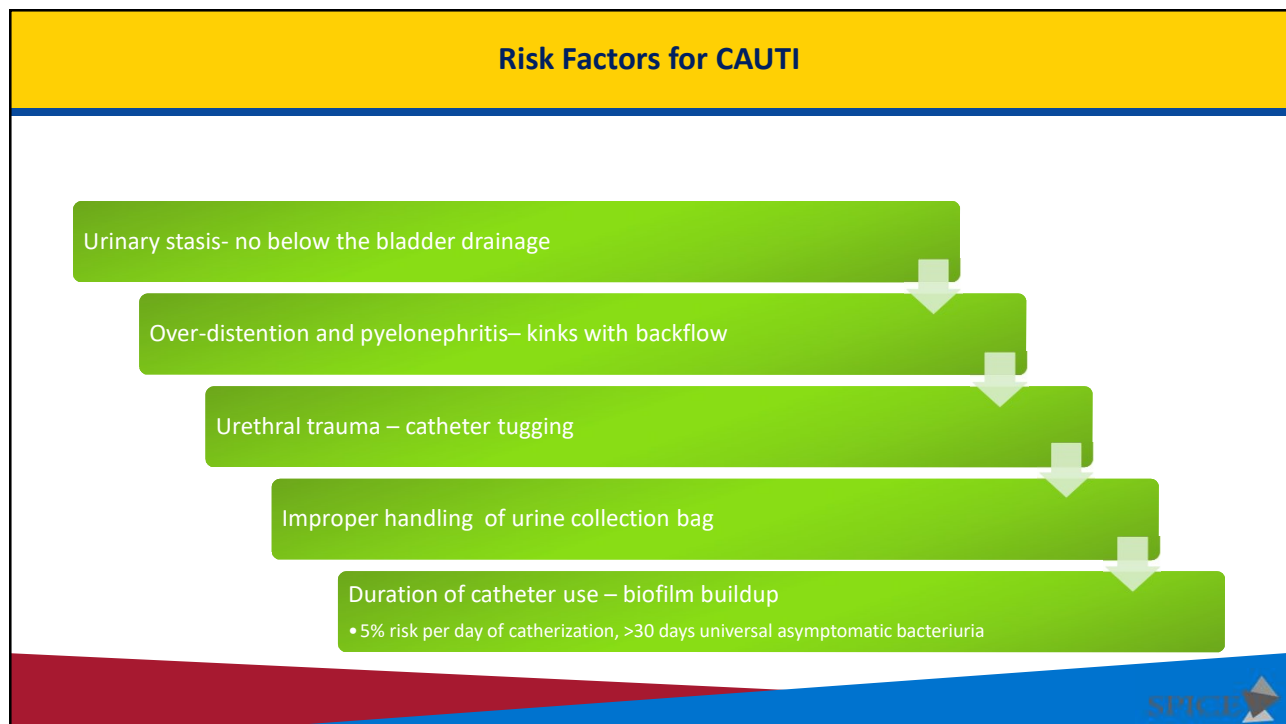
The more impaired or frail the greater the risk of UTI!

Physiologic Risk Factors for UTIs in the Elderly (2)

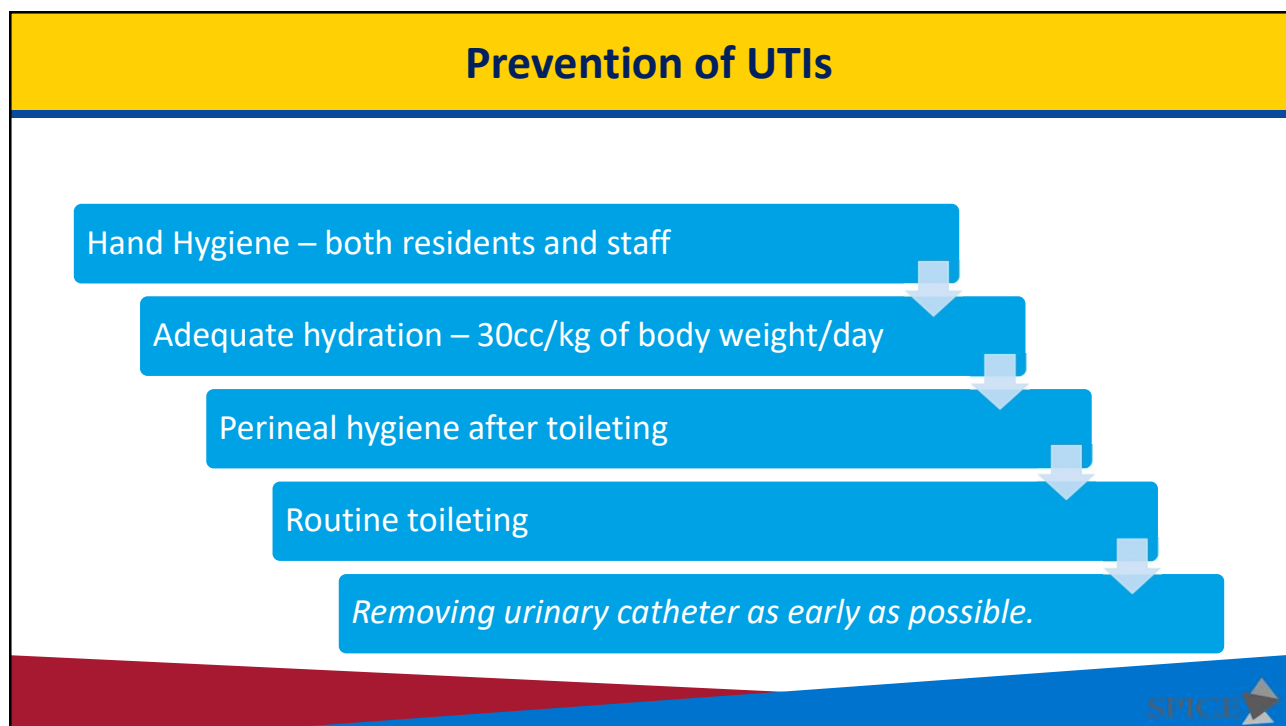
Functional / Cognitive Impairment

- ▶ Decrease self care
- ▶ Decrease cues to void
- ▶ Increased incontinence and perineal soiling
- ▶ Difficulty finding bathroom / suitable location to void





From this information, what are targeted ways to prevent UTI?



WHO NEEDS A UA?



Who Needs a UA?

-  Burning
-  Frequency
-  Irritation
-  Urgency
-  New Blood in the Urine



Dipstick Urinalysis

- ▶ Leukocyte esterase
- ▶ Nitrites
- ▶ Protein
- ▶ Blood



Dipstick Urinalysis

- ▶ Leukocyte esterase positive (pyuria)
- ▶ Nitrites: positive (bacteriuria)
- ▶ Protein: small amount may be present
- ▶ Blood: small amount may be present

Leukocyte positive: 50–75% specific; 80-90% sensitive

Pyuria alone not an indication for treatment.



UA: Hematuria

- ▶ Blood is not common with UTIs in older adults.
- ▶ Frank hematuria should be evaluated promptly!
- ▶ Causes:
 - ▶ Stones
 - ▶ Cancer
 - ▶ Trauma
 - ▶ Infection
 - ▶ Hemorrhage.



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Diagnostic Dilemmas for Older Adults with UTI

Common symptoms

Atypical symptoms

Fever?

Getting the history

Evaluation of Possible UTI

- ▶ Vital signs
- ▶ Fever?
- ▶ History and examination

- ▶ U/A and C&S BEFORE starting antibiotics
- ▶ Clean catch vs I&O catheterization.



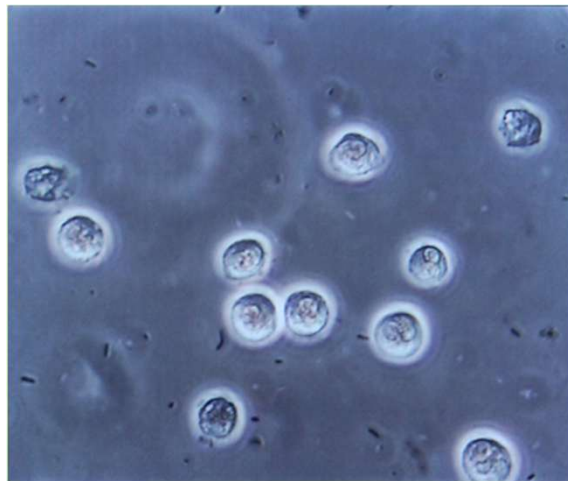
Microbiology of UTI

- ▶ 80% are caused by **gram negative bacilli**

- E.coli, Klebsiella, Enterobacter, Proteus, and Serratia

Few Gram positive bacilli

- Staphylococcus



Urine Culture



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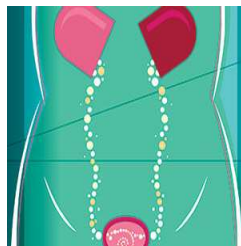
- ▶ **Gold STANDARD** to guide appropriate treatment
- ▶ Results : **>100,000 colonies** of one species
- ▶ Treatment can be delayed until culture results available.
- ▶ Positive culture (bacteriuria) alone **not** a reason to treat.

McGeer Criteria

- ▶ Must fulfill both 1 AND 2
 - ▶ 1. At least 1 of the following signs/symptoms
 - ▶ Acute dysuria or pain, swelling, or tenderness of testes, epididymis, or prostate
 - ▶ Fever or leukocytosis and ≥ 1 of the following:
 - ▶ • Acute costovertebral angle pain or tenderness
 - ▶ • Suprapubic pain
 - ▶ • Gross hematuria
 - ▶ • New or marked increase in incontinence
 - ▶ • New or marked increase in urgency
 - ▶ • New or marked increase in frequency
 - ▶ If no fever or leukocytosis, then ≥ 2 of the following:
 - ▶ • Suprapubic pain • Gross hematuria • New or marked increase in incontinence • New or marked increase in urgency • New or marked increase in frequency
 - ▶ 2. At least 1 of the following microbiological criteria:
 - ▶ $\geq 10^5$ cfu/mL of no more than 2 species of organisms in a voided urine sample
 - ▶ $\geq 10^2$ cfu/mL of any organism(s) in a specimen collected by an in-and-out catheter

Treatment /NO Treatment

- Asymptomatic bacteriuria should **NOT** be treated.
- Routine or post-treatment screening for bacteriuria is not recommended. (Infectious Diseases Society of America)
- ▶ No benefits in decreasing rates of subsequent UTIs
- ▶ Increased risk of resistance and uropathogens



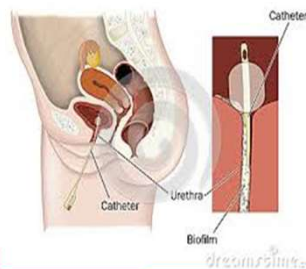
Indwelling Catheter-Associated UTI (CAUTI)

- ▶ Catheter colonization and infection is inevitable and expected!
- ▶ Once bacteria colonizes urine, concentration is 100,000 colonies within 72 hours!!



Mechanisms of Colonization

- ▶ **Colonic and perineal flora primary source**
- ▶ Extra-luminal-- women – shorter urethra
- ▶ Manipulation of the collection system
- ▶ From hands of personnel during insertion
- ▶ Ascending from drainage bag/junction



CMS UTI Antibiotic Treatment

Minimum criteria for initiating antibiotics for UTI

NO indwelling catheter, include:

1. acute dysuria alone or fever ($>37.9^{\circ}\text{C}$ [100°F] or 1.5°C [2.4°F] increase above baseline temperature) and at least one of the following:
 - new or worsening urgency, frequency, suprapubic pain, gross hematuria, costovertebral angle tenderness, or urinary incontinence.

Reference - "Development of Minimum Criteria for the Initiation of Antibiotics in Residents of Long-Term-Care Facilities: Results of a Consensus Conference" - *Infect Control Hosp Epidemiol* 2001;22:120-124.



CMS UTI Antibiotic Treatment

Minimum criteria for initiating antibiotics for UTI

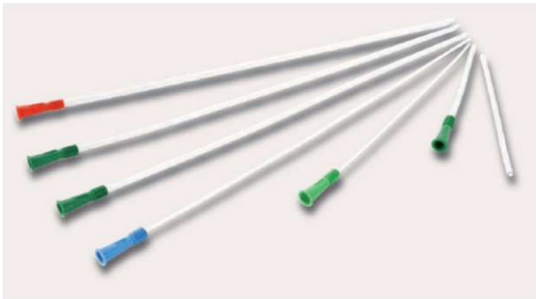
2. **Chronic indwelling catheter** (indwelling Foley catheter or a suprapubic catheter), includes the presence of at least one of the following:

- ▶ fever ($>37.9^{\circ}\text{C}$ [100°F] or 1.5°C [2.4°F] increase above baseline temperature),
- ▶ new costovertebral tenderness, rigors (shaking chills) with or without identified cause, or new onset of delirium.”

▶ Reference - “Development of Minimum Criteria for the Initiation of Antibiotics in Residents of Long-Term–Care Facilities: Results of a Consensus Conference” - *Infect Control Hosp Epidemiol* 2001;22:120-124.



Intermittent Catheterization



- ▶ Intermittent catheterization can often manage overflow incontinence effectively.
 - ▶ New onset incontinence from a transient, hypotonic/atonic bladder (usually seen following indwelling catheterization in the hospital) may benefit from intermittent bladder catheterization until the bladder tone returns (e.g., up to approximately 7 days).
 - ▶ A voiding trial and post void residual can help identify when bladder tone has returned.
- overflow incontinence effectively

USE of Urinary Catheters

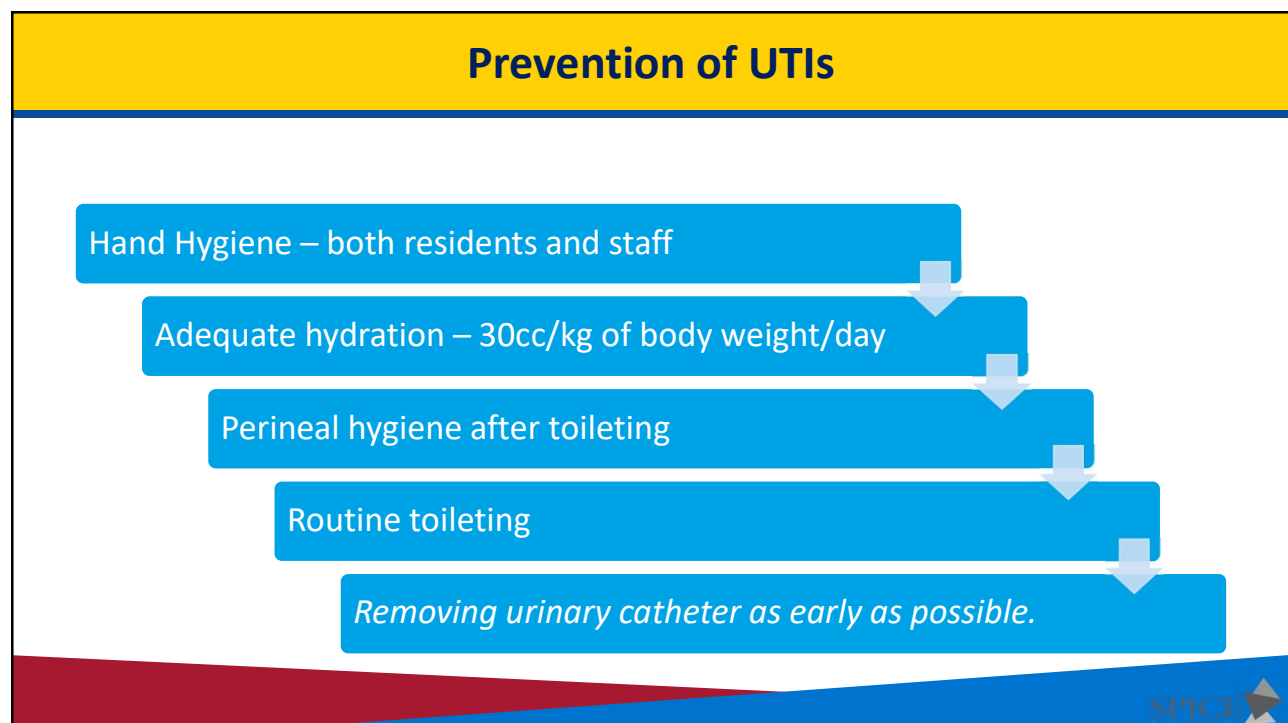
APPROPRIATE

- ▶ Clinical criteria for long/short for indwelling catheter:
 - ▶ Obstruction
 - ▶ Neurogenic bladder
 - ▶ Hematuria (short term)
 - ▶ Wounds stage 3 or >
 - ▶ Aggressive diuresis / monitoring of strict I/O (short term)
 - ▶ Terminally ill for comfort measures

INAPPROPRIATE

- ▶ Used for the convenience of nursing staff.
- ▶ Used in lieu of other bladder management strategies.
- ▶ Used for specimen collection when the resident can voluntarily void

(Indwelling catheters are associated with a 5% risk/day of new UTI)



Prophylaxis For UTI Prevention

- ▶ **Cranberry juice/extract** – Cochrane guidelines from 2022 with some evidence to support use



- ▶ **Oral Estrogens** not shown to be beneficial.
- ▶ Topical, **vaginally applied estrogens** have been shown to be effective – 6 studies applying estrogen by ring, cream, or intravaginal tablet

Antoniou & Somani. Eur Urol Focus. 2022 Nov;8(6):1768-1774

Perrotta et al. Cochrane Database of Systematic Reviews 2008, Issue 2. Art. No.: CD005131

Prophylaxis for UTI prevention

- ▶ Methenamine vs Antibiotics in NH Patients (ALTAR Trial)
- ▶ 102 with daily antibiotics vs 103 with methenamine Hippurate over 12 months
 - ▶ Abx Rx: 0.89 episodes/person/year (95% CI, 0.65-1.12);
Methenamine RX: 1.38 episodes/person/year (95% CI, 1.05-1.72)
 - ▶ Development of resistance among E Coli: 72% of participants in daily antibiotics group vs 56% in the methenamine arm (p = 0.05)
 - ▶ 52% of cultures during “symptomatic UTIs” grew bacteria.

Saul H, et al. C. Methenamine is as effective as antibiotics at preventing urinary tract infections. BMJ. 2023 Jan 17;380:72.

Harding C, et al. Alternative to prophylactic antibiotics for the treatment of recurrent urinary tract infections in women: multicentre, open label, randomised, non-inferiority trial. BMJ 2022;376:e068229.



Prevention of UTI or Overtreatment

- ▶ Risk factor: Colonization
- ▶ Risk factor: Yeast
- ▶ Risk factor: Vaginal atrophy
- ▶ Risk factor: Indwelling Catheter
- ▶ Risk factor: Poor hygiene
- ▶ Prevention: Documentation
- ▶ Prevention: Await cultures
- ▶ Treatment: Vaginal estrogen, Vaseline
- ▶ Prevention: Remove catheter
- ▶ Prevention: Peri care and staff hand hygiene

De-escalation in Urinary Tract Infection

1. Shorter length of therapy
 - Standard of care depends on the antibiotic choice, but is now typically 3 or 5 days.
 - Minimum necessary is best
2. Narrowing of spectrum
 - Utilize the culture results.
 - Consider awaiting treatment until these culture results return to ensure the appropriate antibiotic is being utilized.
3. Is this truly a UTI?

CDC Guidelines on Flushing and irrigation

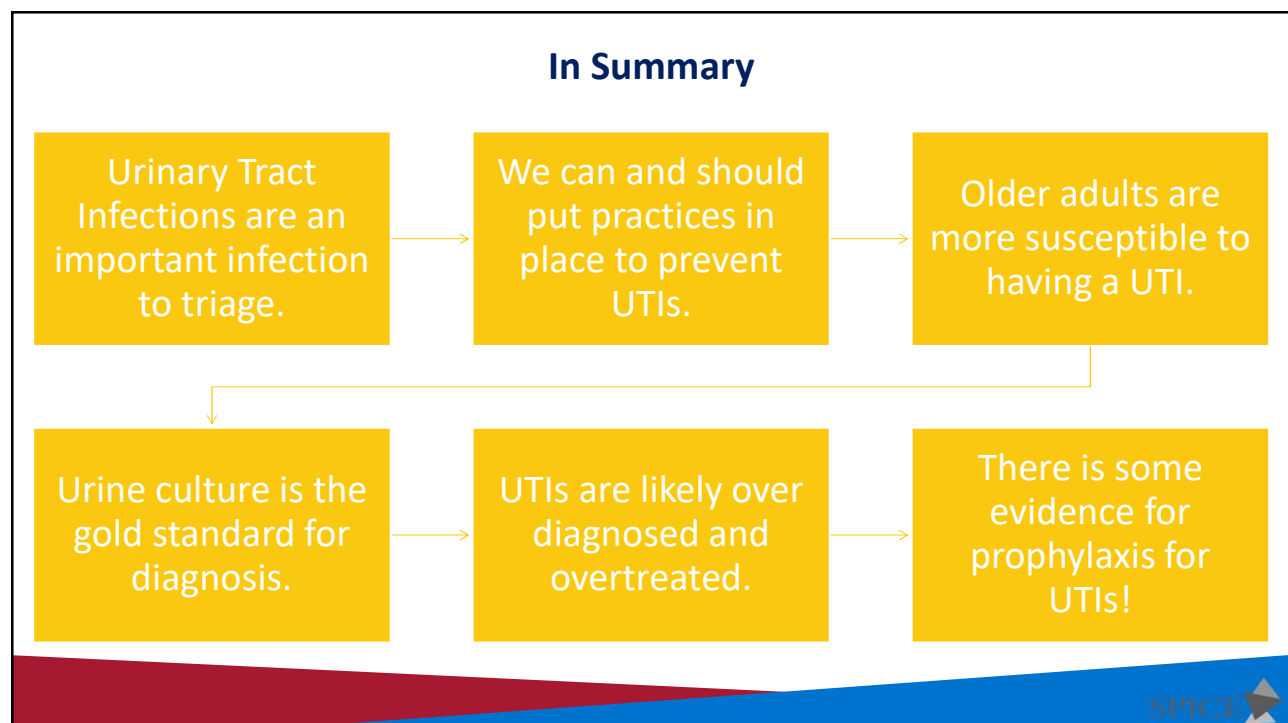
- ▶ If obstruction or infection occurs - change the catheter.

"Unless obstruction is anticipated (e.g., as might occur with bleeding after prostatic or bladder surgery) bladder irrigation is not recommended...If obstruction is anticipated, closed continuous irrigation is suggested to prevent obstruction."

- ▶ "Q2C.3. Bladder irrigation

Low-quality evidence suggested no benefit of bladder irrigation in patients with indwelling or intermittent catheters.

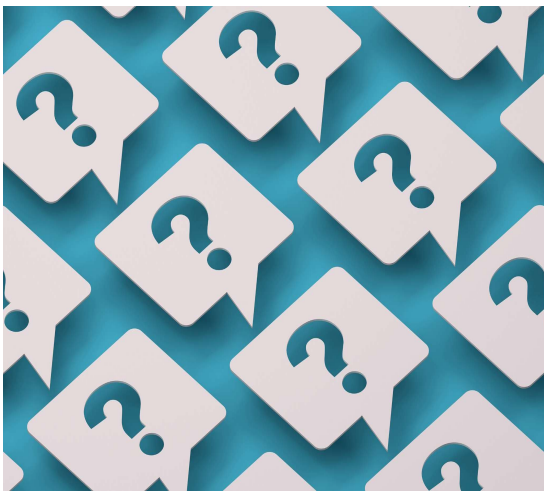
www.cdc.gov/infectioncontrol/pdf/guidelines/...



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Questions and Discussion



► Find more UTI slides at
<https://spice.unc.edu>



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