



**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 UTIs
2. Discuss prevention of UTIs
3. Review purpose of UA and components of UA
4. Review the McGeer Criteria
5. Discuss treatment for UTIs



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A Common Case

- ▶ 84 yo F living in your facility is “more fatigued” today per 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).

- ▶ *“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



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



Risk Factors for CAUTI

Urinary stasis- no below the bladder drainage

Over-distention and pyelonephritis– kinks with backflow

Urethral trauma – catheter tugging

Improper handling of urine collection bag

Duration of catheter use – biofilm buildup

- 5% risk per day of catheterization, >30 days universal asymptomatic bacteriuria

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



Prevention of UTIs

Hand Hygiene – both residents and staff

Adequate hydration – 30cc/kg of body weight/day

Perineal hygiene after toileting






Routine toileting


Removing urinary catheter as early as possible.

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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.



CDC NHSN UTI Definitions

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Diagnostic Dilemmas for Older Adults with UTI

Common symptoms

Atypical symptoms

Fever?

Getting the history

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Evaluation of Possible UTI



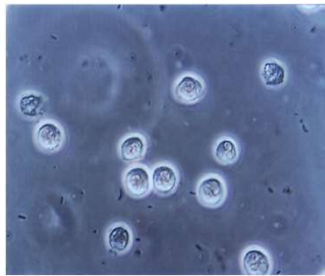
- ▶ Vital signs
- ▶ Fever!?
- ▶ History and examination
- ▶ U/A and C&S BEFORE starting antibiotics

- ▶ Clean catch vs I&O catheterization.

"Pyuria2011" by James Heilman, MD - Own work. Licensed under CC BY-SA 3.0 via Wikimedia Commons - <http://commons.wikimedia.org/wiki/File:Pyuria2011.JPG#mediaviewer/File:Pyuria2011.JPG>

Microbiology of UTI

- ▶ 80% are caused by **gram negative bacilli**
 - E.coli, Klebsiella, Enterobacter, Proteus, and Serratia
 - Gram positive bacilli - Staphylococcus



Urine Culture



This Photo by Unknown Author is licensed under CC BY-NC-ND

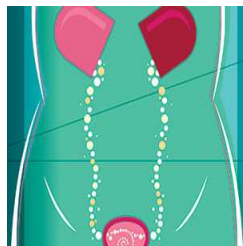
- ▶ Gold STANDARD to guide appropriate treatment
- ▶ Results : **>100,000 colonies** of one species
- ▶ Treatment can be delayed until culture results available.
- ▶ Positive culture (bacteriuria) alone **not** a reason to treat.

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



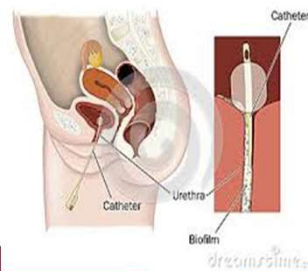
Indwelling Catheter-Associated UTI (CAUTI)

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



Mechanisms of Colonization

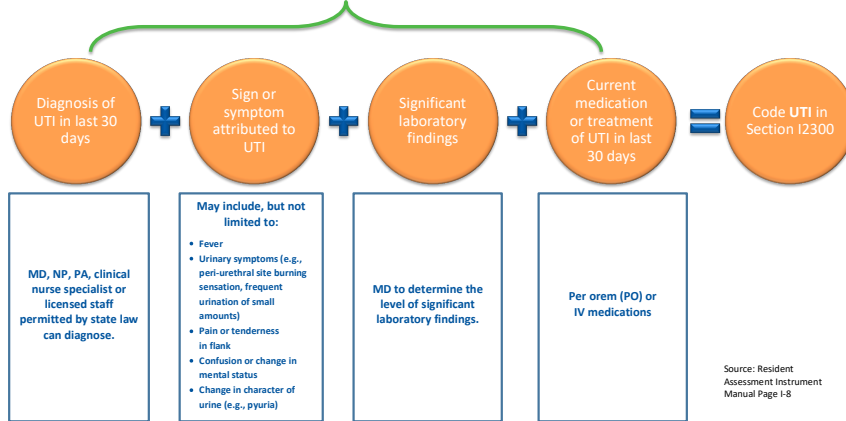
- ▶ **Colonic and perineal flora primary source**
- ▶ Extra-luminal-- women – shorter urethra
- ▶ Manipulation of the collection system
- ▶ From hands of personnel during insertion
- ▶ Ascending from drainage bag/junction





Minimum Data Set (MDS) Coding Guidelines for Urinary Tract Infection (UTI) (Section I2300)

All four must be met before you can code.



This material was prepared by Health Services Advisory Group, the Medicare Quality Improvement Organization for California, under contract with the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services. The contents presented do not necessarily reflect CMS policy. Publication No. CA-1150W-C-2-10022015-10



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.

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)

Prevention of UTIs

Hand Hygiene – both residents and staff

Adequate hydration – 30cc/kg of body weight/day

Perineal hygiene after toileting

Routine toileting

Removing urinary catheter as early as possible.

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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

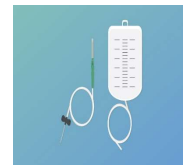
- ▶ Risk factor: Colonization
- ▶ Risk factor: Yeast
- ▶ Risk factor: Vaginal atrophy
- ▶ Risk factor: Indwelling Catheter
- ▶ Risk factor: Poor hygiene
- ▶ Prevention: Documentation
- ▶ Prevention: Await cultures
- ▶ Treatment: Vaginal estrogen, Vaseline
- ▶ Prevention: Remove catheter
- ▶ Prevention: 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?

Prevention Catheter-Associated UTI (1)

- ▶ Catheter used for appropriate indications.
- ▶ Urinary catheter duration of use minimized.
Increase of 5% risk per day!
- ▶ Hand hygiene before and after insertion of catheter and during any manipulation.
- ▶ Only properly trained persons for insertion using aseptic technique.



CDC HICPAC Guidelines for Prevention of Catheter Associated Urinary Tract Infections 2009

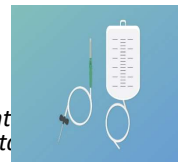
Prevention of Catheter-Associated UTI(2)

CDC HICPAC Guidelines for Prevention of Catheter Associated Urinary Tract Infections 2009

- ▶ Clean technique for intermittent catheterization.
- ▶ Standard Precautions during catheter manipulation.
- ▶ Periurethral cleaning with antiseptics not recommended. Routine hygiene recommended.
- ▶ Routine use of antimicrobial/antiseptic-impregnated catheters not recommended.
- ▶ No routine schedule for catheter replacement (e.g. monthly)
- ▶ Urine samples obtained aseptically.

Note: Before urine samples for culture are obtained from residents in place > 14 days, catheter should be replaced and specimen obtained from the new catheter.

If obstruction or infection occurs - change the catheter.



CDC Guidelines on Flushing and irrigation

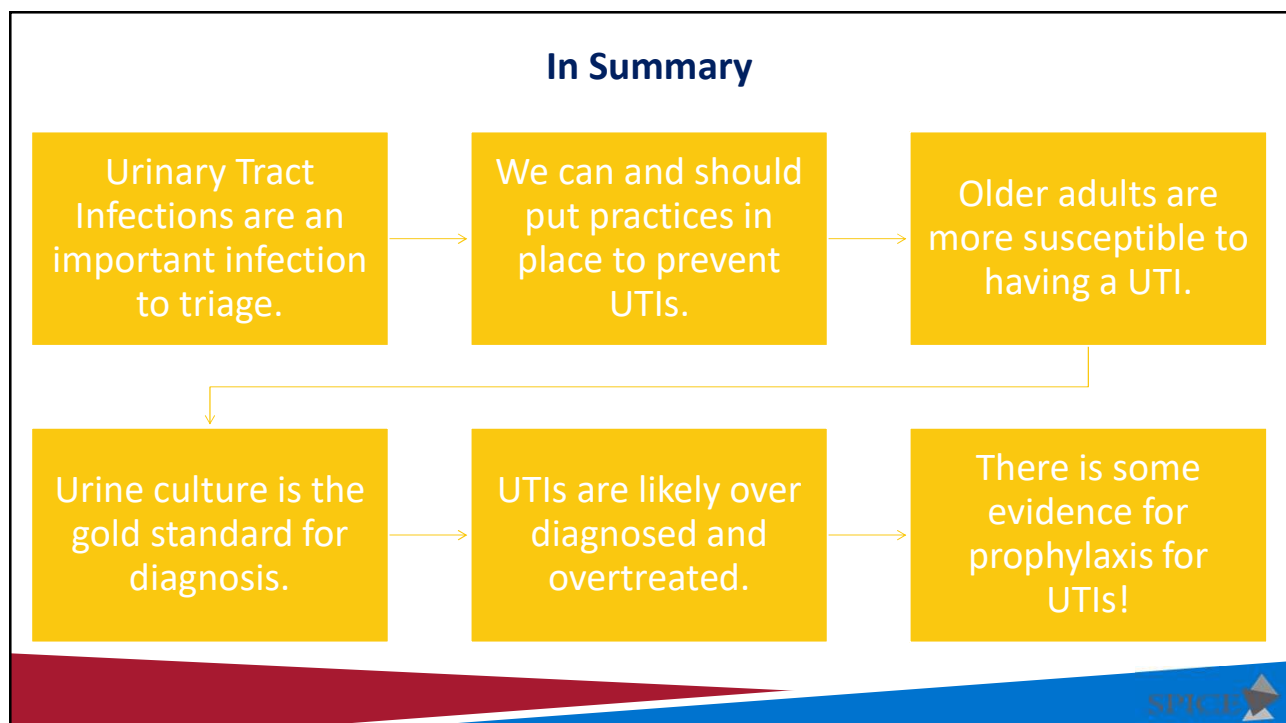
- ▶ If obstruction or infection occurs - change the catheter.

"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.

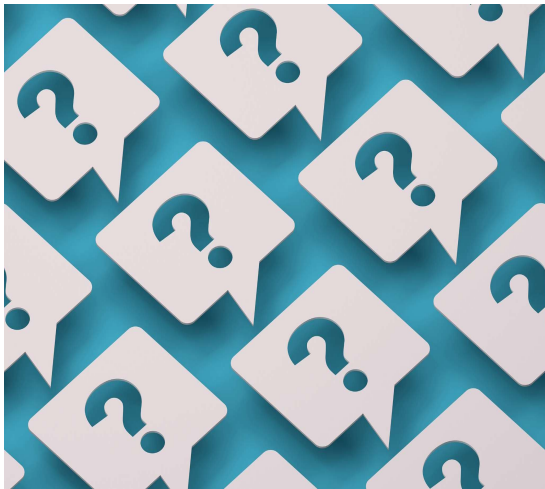
www.cdc.gov/infectioncontrol/pdf/guidelines/...



A Common Case

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Questions and Discussion



► Find session slides at: [SPICE Nursing Home Antibiotic Stewardship Resources](#)