North Carolina SPICE Statewide Program for Infection Control & Epidemiology

North Carolina Clinical Antibiotic Stewardship Partners

INFECTION MANAGEMENT AND antibiotic stewardship

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

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- The views and opinions expressed in this course are my own and do not reflect the official policy or position of any agency of the U.S. or NC government or UNC.
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- These slides contain materials from a variety of colleagues including CDC, WHO, AHRQ, etc.

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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?

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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.*

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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

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Prevention of UTI

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Physiologic Risk Factors for UTIs in the Elderly

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

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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

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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!

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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

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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 catherization, >30 days universal asymptomatic bacteriuria

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

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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?

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Who Needs a UA?

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

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Dipstick Urinalysis

- Leukocyte esterase
- Nitrites
- Protein
- Blood

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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.

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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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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

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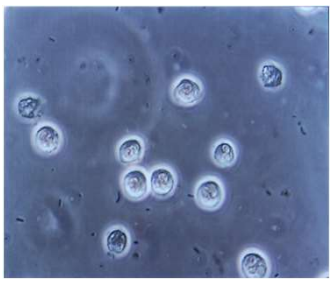
Microbiology of UTI

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



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Urine Culture

- 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.

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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 or 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:
    - ≥105 cfu/mL of no more than 2 species of organisms in a voided urine sample
    - ≥102 cfu/mL of any organism(s) in a specimen collected by an in-and-out catheter

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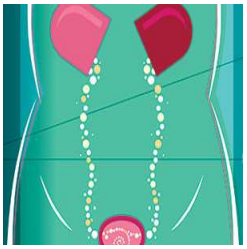
Treatment /NO Treatment

- 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



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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!!

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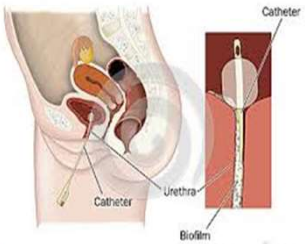
Mechanisms of Colonization

- **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



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Quality Improvement Organizations
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HSAG HEALTH SERVICES ADVISORY GROUP

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

All four must be met before you can code.

Diagnosis of UTI in last 30 days	+ Sign or symptom attributed to UTI	+ Significant laboratory findings	+ Current medication or treatment of UTI in last 30 days	= Code **UTI** in Section I2300
MD, NP, PA, clinical nurse specialist or licensed staff permitted by state law can diagnose.	**May include, but not limited to:** • Fever • Urinary symptoms (e.g., peri-urethral site burning sensation, frequent urination of small amounts) • Pain or tenderness in flank • Confusion or change in mental status • Change in character of urine (e.g., pyuria)	MD to determine the level of significant laboratory findings.	Per orem (PO) or IV medications	

Source: Resident Assessment Instrument Manual Page I-8

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-11SOW-C.2-10022015-10**

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CMS UTI Antibiotic Treatment

Minimum criteria for initiating antibiotics for UTI

NO indwelling catheter, include:

1. acute dysuria alone or fever (>37.9ºC [100ºF] or 1.5ºC [2.4ºF] 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.

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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 (>37.9ºC [100ºF] or 1.5ºC [2.4ºF] 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.*

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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.

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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)

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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

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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.

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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

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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?

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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

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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 resident in place > 14 days, catheter should be replaced and specimen obt catheter.

If obstruction or infection occurs - change the catheter.

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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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In Summary

Urinary Tract Infections are an important infection to triage.

We can and should put practices in place to prevent UTIs.

Older adults are more susceptible to having a UTI.

Urine culture is the gold standard for diagnosis.

UTIs are likely over diagnosed and overtreated.

There is some evidence for prophylaxis 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?

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Questions and Discussion

- Find session slides at https://spice.unc.edu → ncclasp → nursing homes

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