

Module 8: Antimicrobial Stewardship for Urinary Tract Infections



Objectives

By the end of this module, you should be able to:

1. Recognize common and complex UTI symptoms
2. Understand key principles of antimicrobial stewardship (AMS) for UTI
3. Distinguish UTIs from similar conditions
4. Use diagnostic tools for Urinary tract infections
5. Apply local resistance data and guidelines to choose the right antibiotics
6. Optimize antibiotic use in outpatient settings through AMS practices, aiming to prevent resistance



Introduction

- Urinary tract infections (UTIs) are a significant global health concern, with approximately 150 million cases reported annually. Women bear the brunt of this burden, with 50-60% experiencing at least one UTI during their lifetime. Older adults and pregnant women are also at higher risk, while the prevalence in men increases with age, often due to prostate-related issues.
- Urinary tract infections (UTI) are one of the most common indications for antibiotic prescriptions in the outpatient setting.
- Given rising rates of antibiotic resistance among uropathogens, antibiotic stewardship is critically needed to improve outpatient antibiotic use, including in outpatient clinics.



Introduction..

- Outpatient clinics are in general a neglected practice area in antibiotic stewardship programs, yet most antibiotic use is in the outpatient setting.
- Stewardship should focus on the “five Ds” of stewardship for UTI: right diagnosis, right drug, right dose, right duration, and de-escalation.



Classification of Urinary Tract Infections

- Uncomplicated UTIs:
 - Typically occur in healthy individuals with normal urinary tracts.
- Complicated UTIs:
 - Include factors like structural abnormalities, catheter use, or immunosuppression
- Special Populations:
 - Considerations for different age groups, including children and the elderly



Clinical Presentation of UTI-Adults

Lower UTIs (Cystitis):

Common Symptoms:

- Dysuria
- Increased Urinary Frequency and urgency
- Suprapubic Pain
- Hematuria
- Cloudy or Foul-Smelling Urine

Less Common Symptoms:

- Mild Fever

Upper UTIs (Pyelonephritis):

Common Symptoms:

- Flank Pain
- High Fever
- Nausea and Vomiting
- Malaise

Systemic Symptoms

- Fatigue
- Confusion, especially in older adults, UTIs can sometimes present with confusion or delirium



Clinical Presentation of UTI-Children

Infants (0-2 years):

Non-Specific Symptoms:

- Fever
- Irritability
- Poor Feeding
- Vomiting or Diarrhea
- Failure to Thrive

Young Children (2-5 years):

More Specific Symptoms:

- Dysuria
- Increased Urinary Frequency and Urgency
- Abdominal Pain
- Fever

Older Children and Adolescents:

- Symptoms Similar to Adults



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Clinical Presentation - Atypical Presentations

Asymptomatic Bacteriuria:

- **Adults:** Presence of bacteria in the urine without symptoms, common in elderly and pregnant women
- **Children:** May occur without typical symptoms, sometimes detected during routine screening

Special Populations:

- **Elderly Adults:** May present with atypical symptoms such as confusion, sudden incontinence, without classic urinary symptoms
- **Immunocompromised Individuals:** May have less pronounced symptoms or atypical presentations



Clinical Presentation - Atypical Presentations

Complications Associated with UTI Presentations

- **Progression to Pyelonephritis:** Risk factors and signs of progression from lower UTI to upper UTI
- **Sepsis:** Signs of systemic infection, particularly in elderly, infants, or immunocompromised patients
- **Recurrent UTIs:** Recognition of symptoms suggestive of recurrent infections, which may require further evaluation



Right Diagnosis

Diagnostic task	What works	What might work	What does not work
Differentiate UTI from asymptomatic bacteriuria	Careful history to elicit symptoms of UTI	Physical examination	Urinalysis and urine culture (both will be positive in ASB)
Differentiate UTI from sexually transmitted infection	Careful history to elicit symptoms of STI (vaginal discharge); test for STI	Limited pelvic exam (discharge, lesions); rapid UTI diagnostics (in development)	Urinalysis (pyuria likely) and urine culture (contamination likely)
Differentiate UTI from overactive bladder	Careful history; urine culture (if negative)	Urologic evaluation	Urinalysis and urine culture in patients with high prevalence of baseline bacteriuria
Determine etiology of delirium in older adults	Explore nonurinary etiologies of acute mental status change	Observe patient without prescribing antibiotics; encourage oral fluids	Urinalysis and urine culture (both may be positive in nonurinary etiologies)
Differentiate UTI from nonurinary conditions	Careful history, explore nonurinary etiologies	Rapid UTI diagnostics (in development), particularly in younger adults	Urinalysis and urine culture in patients with high prevalence of baseline bacteriuria



Clinical Diagnostics

Risk Factors for UTI

- Female gender (especially in sexually active women)
- History of previous UTIs
- Recent sexual activity
- Use of contraceptives like spermicides or diaphragms
- Postmenopausal status
- Diabetes mellitus
- Presence of a urinary catheter or recent urological procedures

Note:

Complicated UTIs are those occurring in individuals with structural or functional abnormalities of the urinary tract, immunosuppression, or other risk factors such as pregnancy or diabetes. These require a more thorough evaluation and possibly different management strategies.



Clinical diagnostics....

Conditions that can mimic UTI symptoms include:

- **Vaginitis:** Inflammation of the vagina often presents with dysuria and frequency but usually also includes vaginal discharge and irritation.
- **Urethritis:** Inflammation of the urethra, often caused by sexually transmitted infections (STIs), may mimic UTI symptoms.
- **Interstitial cystitis:** A chronic condition that causes bladder pressure and pain, sometimes confused with UTIs due to similar symptoms.
- **Prostatitis:** In men, inflammation of the prostate gland can cause symptoms similar to a UTI, such as dysuria and frequency.



Laboratory Diagnostics

Urinalysis

- Help diagnose and/or monitor several diseases and conditions, such as kidney disorders or urinary tract infections (UTIs)
- A complete urinalysis consists of three distinct testing phases:
 - Visual examination, which evaluates the urine's colour and clarity
 - Chemical examination, which tests chemically for about 9 substances that provide valuable information about health and disease and determines the concentration of the urine
 - Microscopic examination, which identifies and counts the type of cells, casts, crystals, and other components such as bacteria and mucus that can be present in urine



Laboratory Diagnostics...

Culture: Most Common Urinary Pathogens

Gram-negative Organisms

- Enterobacteriales: *E. coli*, *K. pneumoniae*, *Enterobacter*, *Serratia*
- Non-Enterobacteriales: *Pseudomonas aeruginosa*, *Acinetobacter* spp

Gram-positive Cocci

- *Enterococcus* spp.
- *Streptococcus agalactiae* or Group B *Streptococcus* (GBS)
- *Staphylococcus aureus*

Note: Urine specimens should be collected before empiric treatment



Positive Urine Cultures Could be Due To:

- Contamination
- Asymptomatic bacteriuria
- A true infection involving either the lower and/or upper urinary tract

Key to note:

- Clinicians should only send urine cultures when they have significant clinical suspicion of infection to avoid detecting asymptomatic bacteriuria
- Antimicrobials are commonly inappropriately prescribed for asymptomatic bacteriuria, driving the emergence of antimicrobial resistance



Laboratory Diagnostics...

Antimicrobial susceptibility testing (AST)

- Antimicrobial Susceptibility Testing Guidelines such as Clinical Laboratory and Standards Institute (CLSI) has been adopted in selecting Antimicrobials for AST
- Group U ("urine"): Used primary for treating urinary tract infection. NOT routinely reported against pathogens recovered from other sites of infection (e.g. Sulfonamides and nitrofurantoin)



The 5Ds of Stewardship for UTI

The 5 Ds of Stewardship for UTI		Description	Main Challenge	Successful Intervention Strategies
 Diagnosis		Make and document the right diagnosis	Determining which patients have UTI	Clinical decision aids Appropriate collection of cultures Urine procurement by catheterization Reflex urine cultures Computerized decision support systems Selective reporting of urine culture results Text accompanying results to provide interpretation
 Drug		Use the right empiric antibiotic	Rising resistance makes empiric treatment challenging	Local susceptibility reports and stratified antibiograms Selective and cascade reporting of antibiotic susceptibility Provider education Computerized decision support systems Post-prescription review by pharmacists Audit and feedback
 Dose		Use the right dose of antibiotic based on site of infection and renal or hepatic dysfunction	Dosage errors are common	Computerized decision support systems Electronic order sets Audit and feedback
 Duration		Use antibiotics for the recommended duration	Many studies show a "longer is better" mentality	Computerized decision support systems Electronic order sets Audit and feedback
 De-escalation		De-escalate therapy based on susceptibilities and when urine cultures are negative	Labor intensive and occurs too late with UTI to make much impact	Post-prescription review by pharmacists

Right Drug/Dose/Duration (WHO)-Adults

Uncomplicated UTIs:

- **First-Line Treatment**

- **Nitrofurantoin:** 100 mg orally twice daily for 5 days
- **Trimethoprim-sulfamethoxazole (TMP-SMX):** 160/800 mg orally twice daily for 3 days, only if local resistance rates are <20%.
- **Fosfomycin trometamol:** 3 g single oral dose

- **Alternative Treatments**

- **Pivmecillinam:** 400 mg orally twice daily for 5 days
- **Amoxicillin-clavulanate:** 500/125 mg orally twice daily for 5-7 days



Right Drug/Dose/Duration (WHO)-Adults...

Complicated UTIs

- **Initial Empiric Therapy**

- **Ceftriaxone**: 1 g intravenously daily until culture results are available.
- **Fluoroquinolones** (e.g., ciprofloxacin): 500 mg orally twice daily for 7-14 days, depending on severity

- **Definitive Therapy**

- Adjust based on culture and sensitivity results

- **Special Considerations**

- **Pregnancy**: Nitrofurantoin (after the first trimester) or amoxicillin-clavulanate; avoid fluoroquinolones



Right Drug/Dose/Duration (WHO)-Children

Uncomplicated UTIs

- **First-Line Treatment**

- **Amoxicillin-clavulanate**: 20-40 mg/kg/day orally in three divided doses for 7-10 days
- **Cefalexin**: 25-50 mg/kg/day orally in divided doses for 7-10 days

- **Alternative Options**

- **Cotrimoxazole** (TMP-SMX): 8 mg/kg TMP and 40 mg/kg SMX per day in two divided doses for 7-10 days, based on local resistance patterns



Right Drug/Dose/Duration (WHO)-Children..

Complicated UTIs

- **Initial Empiric Therapy**

- **Ceftriaxone:** 50-75 mg/kg intravenously once daily until culture results are available

- **Definitive Therapy**

- Adjust based on culture results and clinical response

- **Duration of Treatment**

- Generally, 7-14 days depending on the severity and response to treatment



De-escalation

Initial Empiric Therapy:

- **Broad-Spectrum Antibiotics:** Often recommended empirically for complicated UTIs or in severely ill patients (e.g., ceftriaxone, fluoroquinolones)

De-escalation Process

- **Culture and Sensitivity Testing:** Essential to guide de-escalation decisions once results are available
- **Switch to Narrow-Spectrum Antibiotics**
 - If a specific pathogen is identified, switch to a narrow-spectrum antibiotic effective against that pathogen



De-escalation..

- **Discontinuation of Therapy**

- If the infection is ruled out based on culture results, discontinue antibiotics to avoid unnecessary treatment

Monitoring and Reassessment

- Regular clinical monitoring and reassessment of therapy, particularly within 48-72 hours of initiating treatment, to determine if de-escalation is appropriate



Case study 1

You are evaluating a 45-year-old woman who presents to your clinic for management of her chronic essential hypertension. She shows you a urine culture report that was performed at another clinical laboratory 3 weeks ago which grew **3 different organisms in large quantities**. She reports that this culture was performed because she complained of **dysuria, urinary urgency and urinary frequency** and that she was told she had a bladder infection. She completed several days of an antibiotic (she cannot recall the name), with resolution of her symptoms. She no longer has dysuria, urinary frequency and she denies fever and abdominal or back pain. Her vital signs are normal and her physical examination is unremarkable. But she asked you if she should submit another sample for urine culture



Case Assessment

- The patient had UTI symptoms (dysuria, urgency, frequency) but has since resolved after antibiotic treatment.
- The urine culture performed three weeks ago showed multiple organisms, suggesting possible contamination rather than a true infection.
- She is currently asymptomatic and her physical examination is normal.
- The patient is questioning the need for a repeat urine culture.



Learning Points from the case

- Since the patient is now asymptomatic, there is no indication for a repeat urine culture. Urine cultures should be reserved for cases with persistent symptoms or complications
- A culture with multiple organisms often suggests contamination, particularly if it was collected improperly or processed late
- Antibiotics should not be prescribed based solely on a positive culture in the absence of symptoms
- Educate the patient on when urine cultures are necessary and reassure her that asymptomatic bacteriuria does not generally require treatment



Key Points

- AMS is vital for UTI management to improve outcomes
- Accurate UTI diagnosis is key for guiding appropriate antibiotic therapy.
- Collect urine specimens before starting broad-spectrum antibiotics
- Prescribe the correct antibiotic, dose, and duration
- Avoid antibiotics for asymptomatic bacteriuria, except in specific cases (e.g., pregnancy).
- Use local resistance data to inform empiric antibiotic therapy.
- Regularly review antibiotic prescribing patterns and adjust as needed.



The End



***You have come to the end of this module. Kindly attempt module
8 quiz before proceeding to module 9***