
RAMA
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FACULTY OF NURSING

Urinary Tract Infection

BY:-
Arpit Kamal
Nursing Tutor
MSN Department
Rama College Of Nursing

Introduction

A urinary tract infection (UTI) is an infection in any part of your urinary system — your kidneys, ureters, bladder and urethra. Most infections involve the lower urinary tract — the bladder and the urethra.

Women are at greater risk of developing a UTI than are men. Among adults aged 20 to 50 years, UTIs are about 50- fold more common in women.

Introduction

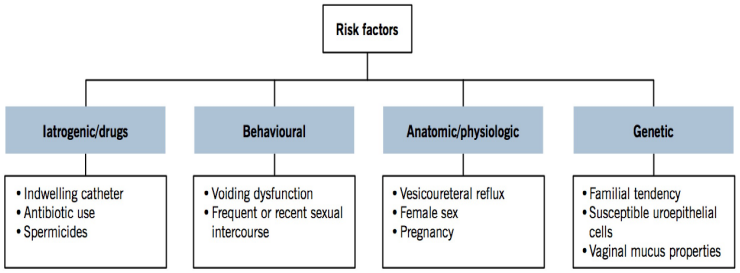
In women in this age group, most UTIs are cystitis or pyelonephritis.

In men of the same age, most UTIs are urethritis or prostatitis.

The incidence of UTI increases in patients > 50 years, but the female: male ratio decreases because of the increasing frequency of prostate enlargement and instrumentation in men.

Risk factors for UTIs

Factors resulting in compromise of normal host defences to bacterial colonization are an important step in the pathogenesis of UTIs.



Indwelling foley catheters provide an ascending route for perineal bacteria to enter the bladder. **Recent antibiotic use** disrupts the normal bacterial flora at the vaginal introitus, allowing uropathogens (e.g. *E. coli*) to colonize. **Spermicides** cause irritation and attachment sites for *E. coli*.

Voiding dysfunction causes increased post-void residual urine volumes, which allows more time for bacterial proliferation. **Frequent or recent sexual intercourse** may introduce bacteria into the urinary tract.

Vesicoureteral reflux causes urinary retention and allows more time for bacterial growth. The retrograde flow also allows bacteria to ascend to the kidneys. **Females** have a short urethra (4 cm vs 25 cm in males). **Pregnancy** results in progesterone-mediated smooth muscle relaxation to the bladder and ureters, and compression of the ureters by the uterus. Both result in urinary retention for increased bacterial growth.

UTI occurrence tends to cluster in **families. Susceptible uroepithelial cells** secrete less IgA, which is the main humoral defence mechanism at the physiologic mucosa. **Properties of vaginal mucus** may allow *E. coli* binding more readily.

Etiology

The bacteria that most often cause cystitis and pyelonephritis are the following:

Enteric, usually gram-negative aerobic bacteria (most often)

Escherichia coli : 75 to 95% of cases.

Klebsiella

Proteus mirabilis

Pseudomonas aeruginosa.

Gram-positive bacteria (less often)

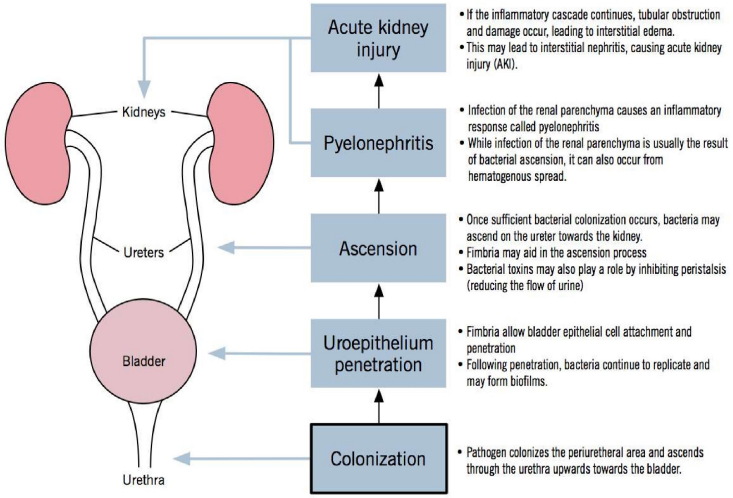
Staphylococcus saprophyticus is isolated in 5 to 10% of bacterial UTIs.

Enterococcus faecalis (group D streptococci)

Streptococcus agalactiae (group B streptococci)

In hospitalized patients, *E. coli* accounts for about 50% of cases. The gram-negative species *Klebsiella*, *Proteus*, *Enterobacter*, *Pseudomonas*, and *Serratia* account for about 40%, and the gram-positive bacterial cocci, *E. faecalis*, *S. saprophyticus*, and *Staphylococcus aureus* account for the remainder.

Pathogenesis of urinary tract infection



Uncomplicated UTI is usually considered to be cystitis or pyelonephritis that occurs in premenopausal adult women with **no structural or functional abnormality of the urinary tract and who are not pregnant and have no significant comorbidity** that could lead to more serious outcomes.

Complicated UTI can involve either sex at any age. A UTI is considered complicated if:

1. the patient is a child, is pregnant,
2. the patient has any of the following:
   - A structural or functional urinary tract abnormality and obstruction of urine flow
   - A comorbidity that increases risk of acquiring infection or resistance to treatment, such as poorly controlled diabetes, chronic kidney disease, or immunocompromise.
   - Recent instrumentation or surgery of the urinary tract

Diagnosis

- Urinary tract infection
- Upper or lower
- Simple or complicated

Urine collection

clean-catch, midstream specimen,

A **specimen obtained by catheterization**

If a sexually transmitted disease (STD) is suspected, a urethral swab for STD testing is obtained prior to voiding.

Dipstick tests:

tested rapidly **Urine testing:**

Nitrate positive: is highly specific for UTI, but the test is not very sensitive.

The leukocyte esterase test is very specific for the presence of > 10 WBCs/μL and is fairly sensitive.

Microscopic examination:

Pyuria : Most truly infected patients have > 10 WBCs/μL.

The presence of bacteria in the absence of pyuria:due to contamination during sampling. Microscopic hematuria occurs in up to 50% of patients, but gross hematuria is uncommon. WBC casts: pyelonephritis, glomerulonephritis, and noninfective tubulointerstitial nephritis.

Pyuria in the absence of bacteriuria and of UTI is possible, for example, if patients have nephrolithiasis, a uroepithelial tumor, appendicitis, or inflammatory bowel disease or if the sample is contaminated by vaginal WBCs.

Cultures are recommended in complicated UTI or an indication for treatment of bacteriuria. Common examples include the following:

- Pregnant women
- Postmenopausal women
- Men
- Prepubertal children
- Patients with urinary tract abnormalities or recent instrumentation
- Patients with immunosuppression or significant comorbidities
- Patients whose symptoms suggest pyelonephritis or sepsis
- Patients with recurrent UTIs (≥ 3/yr)

Urinary tract imaging choices include ultrasonography, CT, and IVU. Occasionally, voiding cystourethrography, retrograde urethrography, or cystoscopy is warranted.

Children with UTI often require imaging.

Most adults do not require assessment for structural abnormalities unless the following occur:

The patient has ≥ 2 episodes of

pyelonephritis. Infections are

complicated.

Nephrolithiasis is suspected.

There is painless gross hematuria or new renal

insufficiency. Fever persists for ≥ 72 h.

Differential Diagnosis

Acute urethral syndrome: which occurs in women, is a syndrome involving dysuria, frequency, and pyuria (dysuria-pyuria syndrome), which thus resembles cystitis. However, in acute urethral syndrome (unlike in cystitis), routine urine cultures are either negative

Urethritis: is a possible cause because causative organisms include *Chlamydia trachomatis* and *Ureaplasma urealyticum*, which are not detected on routine urine culture.

Noninfectious causes:

anatomic abnormalities (eg, urethral stenosis),

physiologic abnormalities (eg, pelvic floor muscle dysfunction),

hormonal imbalances (eg, atrophic

urethritis), localized trauma,

GI system symptoms, and inflammation.

Management

Urethritis

Sexually active patients with symptoms are usually treated presumptively for STDs pending test results. A typical regimen is ceftriaxone 250 mg IM plus either azithromycin 1 g po once or doxycycline 100 mg po bid for 7 days.

Cystitis

First-line treatment of uncomplicated cystitis is nitrofurantoin 100 mg po bid for
3 days (it is contraindicated if creatinine clearance is < 60 mL/min),

trimethoprim/sulfamethoxazole (TMP/SMX) 160/800 mg po bid for 3 days,

Management

Acute pyelonephritis

Antibiotics are required. Outpatient treatment with oral antibiotics is possible if all of the following criteria are satisfied:

Patients are expected to

be adherent Patients are

immunocompetent

Patients have no nausea or vomiting or evidence of volume depletion or septicemia

Patients have no factors suggesting complicated UTI

Ciprofloxacin 500 mg po bid for 7 days

A 2nd option is usually trimethoprim/sulfamethoxazole (TMP/SMX) 160/800 mg po bid for 14 days.

Alternative management

cranberry concentrates : for adult Increase fluid intake

Ural : urine
alkiniser

Antibiotic treatment of LUTI

Do not treat non-pregnant women (of any age) with asymptomatic bacteriuria with an antibiotic.

Treat non-pregnant women of any age with symptoms or signs of acute LUTI with a three day course of trimethoprim or nitrofurantoin.

Particular care should be taken when prescribing nitrofurantoin in the elderly, who may be at increased risk of toxicity.

Take urine for culture to guide change of antibiotic for patients who do not respond to trimethoprim or nitrofurantoin.

Men

Urinary tract infections in men are generally viewed as complicated because they result from an anatomic or functional anomaly or instrumentation of the genitourinary tract.

Conditions like prostatitis, chlamydial infection and epididymitis should be considered in the differential diagnosis of men with acute dysuria or frequency and appropriate diagnostic tests should be considered.

In all men with symptoms of UTI a urine sample should be taken for culture.

Antibiotic treatment

Due to their ability to penetrate prostatic fluid, quinolones (ciprofloxacillin) rather than nitrofurantoin or cephalosporins are indicated.

Treat bacterial UTI empirically with a quinolone in men with symptoms suggestive of

prostatitis. four week course is appropriate for men with symptoms suggestive of

prostatitis.

Refer men for urological investigation if they have symptoms of upper urinary tract infection, fail to
respond to appropriate antibiotics or have recurrent UTI.

Patients On Catheter

Do not rely on classical clinical symptoms or signs for predicting the likelihood of symptomatic UTI in catheterised patients.

Signs and symptoms compatible with catheter-associated UTI include:

- new onset or worsening of fever, rigors
- altered mental status, malaise, or lethargy
- flank pain or costovertebral angle tenderness
- acute haematuria

Patients On Catheter

Do not use dipstick testing to diagnose UTI in patients with catheters.

Antibiotic treatment

Do not treat catheterised patients with asymptomatic bacteriuria with an antibiotic.

Do not routinely prescribe antibiotic prophylaxis to prevent symptomatic UTI in patients with catheters.

Prevention

Drink plenty of liquids, especially water. Drink cranberry juice. Wipe from front to back. Empty your bladder soon after intercourse. Avoid potentially irritating feminine products. Change your birth control method.

Prevention

In women who experience ≥ 3 UTIs/yr, behavioral measures are recommended, If these techniques are unsuccessful, antibiotic prophylaxis should be considered. Common options are continuous and postcoital prophylaxis.

Continuous prophylaxis commonly begins with a 6 mo trial. If UTI recurs after 6 mo of prophylactic therapy, prophylaxis may be reinstituted for 2 or 3 yr.

TMP/SMX 40/200 mg po once/day or 3 times/wk,

nitrofurantoin 50 or 100 mg po once/day, cephalexin 125 to 250 mg po once/day,

Prevention

- **Postcoital prophylaxis** in women may be more effective if UTIs are temporally related to sexual intercourse. Usually, a single dose of one of the drugs used for continuous prophylaxis is effective.
- In **postmenopausal women,** antibiotic prophylaxis is similar to that described previously. Additionally, topical estrogen therapy markedly reduces the incidence of recurrent UTI in women with atrophic vaginitis or atrophic urethritis.

THANK YOU