

# PHC

432 Team

27

Approach to a patient with UTI



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# Objectives

1. Types of UTI (Cystitis, Pyelonephritis)
2. Causes
3. Common organisms
4. How patient presents
5. VesicoUreteral Reflux in children
6. Asymptomatic Pyuria in pregnancy
7. Diagnosis
8. When to start fullinvestigations
9. When to refer to specialist
10. Management
11. Prophylaxis
12. Education



## Definition:

1. A urinary tract infection (is an infection in any part of your urinary system, most infections involve the bladder and the urethra.
2. Urinary tract infections (UTIs) include:
  - a. **Cystitis:** Infection of the bladder (Lower UTI).
  - b. **Pyelonephritis:** infection of the kidney (Upper UTI).
  - c. **Urethritis:** infection of the urethra.

## Classification

<b>Symptoms</b>	Symptomatic	Asymptomatic
<b>Recurrence</b>	Sporadic ( 1 UTI/ 6m)	Recurrent (> 1 UTI/ 6m)
<b>Complicating factors</b>	Uncomplicated	Complicated

1. Uncomplicated UTI: Infection in a structurally and neurologically normal urinary tract.
2. **Complicated UTI: Infection in a urinary tract with functional or structural abnormalities.**

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### #Acute cystitis:

Refers to infection of the bladder (lower urinary tract); it can occur alone or in conjunction with pyelonephritis (infection of the kidney – the upper urinary tract).

1. It is less common in men; this is due to longer urethral length and antibacterial substances in prostatic fluid.
2. However, it may indicate underlying diseases such as prostatitis or malignancy in the prostate or the bladder.
3. **Women tend to get them more often because their urethra is shorter and closer to the anus** than in men.

## **#Acute pyelonephritis:**

Is a potentially organ- and/or life-threatening infection that often leads to renal scarring.

1. Bacteria usually reach the kidney by ascending from the lower urinary tract.
2. Bacteria may also reach the kidney via the bloodstream.
3. Timely diagnosis and management of acute pyelonephritis has a significant impact on patient outcomes.

A complicated urinary tract infection, whether localized to the lower or upper tract, is associated with an underlying condition that increases the risk of failing therapy, including the following:

- a. Diabetes
- b. Pregnancy
- c. Symptoms for seven or more days before seeking care
- d. Hospital acquired infection
- e. Renal failure
- f. Urinary tract obstruction
- g. Recent urinary tract instrumentation
- h. Functional or anatomic abnormality of the urinary tract
- i. History of urinary tract infection in childhood
- j. Renal transplantation
- k. Immunosuppression
- l. Infection with an uropathogen with broad-spectrum antimicrobial resistance is also considered complicated.

## **Causes:**

1. Urinary tract infections typically occur when bacteria enter the urinary tract through the urethra and begin to multiply in the bladder.
2. Although the urinary system is designed to keep out such microscopic invaders, these defenses sometimes fail.
3. When that happens, bacteria may take hold and grow into a full-blown infection in the urinary tract.

## Risk factors

### In men:

1. Obstruction from any cause is a major risk factor for the development of UTI, such as catheterization.
2. In males older than 50 years, prostatic hypertrophy with partial obstruction is the main contributor to the increase in UTI.
3. Homosexual behavior with anal intercourse
4. Intercourse with a female infected or colonized with a uropathogen
5. Lack of circumcision
6. Human immunodeficiency virus (HIV) infection
7. Prostatitis, epididymitis, orchitis

### In women:

1. Most episodes of cystitis and pyelonephritis are generally considered to be uncomplicated in otherwise healthy non-pregnant adult women.
2. Short urethra
3. Sexually active women
4. Postmenopausal
5. Spermicide use

## Common Organisms:

Gram -ve	Gram +ve
E.Coli ( <b>Most Common</b> )90%	Enterococci
Proteus mirabilis	Group B streptococci
Klebsiella spp	Staphylococcus aureus

## Clinical feature

A UTI can present with a range of symptoms, or may be totally asymptomatic and diagnosed only on routine dip testing.

### 1. Bladder (cystitis)

- a. c. Supra pubic pain
- b. Fever is unusual
- c. Dysuria
- d. Frequency and urgency
- e. Hematuria
- f. Sensation of incomplete voiding

### 2. Kidneys (pyelonephritis)

- a. Upper back and side (flank) pain
- b. High fever
- c. Shaking and chills
- d. Nausea and vomiting
- e. Fatigue and night sweating
- f. Hematuria

## Diagnosis of Urinary Tract Infection:

1. In straightforward cases, a diagnosis may be made and treatment given based on symptoms alone without further laboratory confirmation.
2. In complicated or questionable cases, it may be useful to confirm the diagnosis via midstream urine (MSU) sample. A midstream urine sample can be used for urinalysis (dipstick, microscopic) and urine culture.

## Investigations

1. **Dipstick Urinalysis:** Leukocyte esterase, Nitrates\*, protein, and blood are the important features in evaluating for UTI.  
\*Nitrates in the urine are converted to nitrites in the presence of **Gram-negative** bacteria such as E.coli and Klebsiella
2. **Microscopy Urinalysis**
  - a. Look for the presence of red blood cells, white blood cells, or bacteria.
  - b. When coupled with classic symptoms, a finding of **2-5 WBCs or  $\geq$  15 bacteria per hpf** in a centrifuged urine sediment is consistent with UTI. The presence of many epithelial cells usually indicates a contaminated specimen.

### **3. Urine culture**

- a. Urine culture is important **when diagnosis is not clear or UTI is recurrent.**
- b. The presence of more than one organism may indicate a contaminated urine specimen and collection and testing should be repeated.
- c. The presence of **≥ 105 CFU/mL** of bacteria is the traditional diagnostic indicator for UTI. However, in the presence of dysuria and other symptoms for UTI, **102 CFU/mL** confirms the diagnosis.

### **When to start full investigations like U/S, CT scan, IVP?**

1. Imaging and urologic intervention should be considered in the following patients:

- a. Patients with a history of kidney stones.
- b. Patients with diabetes.
- c. Patients with polycystic kidneys are prone to abscess formation.
- d. Patients with tuberculosis have persistently not responded to treatment.
- e. Patients have a history of renal tract disease or anomaly.
- f. Patients have hematuria.
- g. Patients are women with more than three confirmed infections in the preceding year (two confirmed infections in the case of men) with no known contributing comorbidity

2. Imaging in the emergency department is typically not necessary unless concomitant obstructive uropathy is suspected, as this is an emergent condition that requires prompt intervention.

3. Modalities for this include ultrasonography, intravenous pyelography (IVP), contrasted computed tomography (CT) scanning, or helical CT scanning of the urinary system (currently preferred by most experts)

## **When to refer to specialist?**

**Urgent** referral is indicated with suspected cancer.

### **1. Referral for assessment should be considered for men who have:**

- a. Symptoms of upper urinary tract infection (pyelonephritis).
- b. Failure to respond to appropriate antibiotic therapy.
- c. Frequent episodes of urinary tract infection (UTI) - this is stated as two or more episodes in a 3-month period.
- d. Features of urinary obstruction (e.g. in older men, enlarged prostate).
- e. History of pyelonephritis, calculi, or previous genitourinary tract surgery.
- f. Any age with painless macroscopic hematuria:
- g. Recurrent or persistent UTI associated with hematuria, in a male aged 40 years or older.
- h. Unexplained microscopic hematuria, in a male aged 50 years or older.
- i. With an abdominal mass identified clinically or on imaging that is thought to arise from the urinary tract.

### **2. Specialist referral is recommended for investigation of women with:**

- a. Risk factors for complicated UTI.
- b. Surgical correction of a cause of UTI.
- c. When the diagnosis of recurrent uncomplicated UTI is uncertain.



## Management:

### 1. Cystitis in women:

- **Uncomplicated:**

1<sup>st</sup> is Trimethoprim-sulfamethoxazole then Nitrofurantoin.

If they were not available or resistant, use fluoroquinolone (ciprofloxacin). Duration: **3- 5 days**

- **Complicated:**

Orally fluoroquinolone (ciprofloxacin). Duration: **5- 14 days**

If the patient not tolerate orally or resistant organism start Parenteral therapy with levofloxacin (500 mg) or ceftriaxone once daily until the patient improve then transition to oral antibiotic therapy.

### 2. Cystitis in men:

- **Uncomplicated:**

1) 1st is Trimethoprim-sulfamethoxazole

2) If it was not available or resistant use fluoroquinolone (ciprofloxacin).

3) Duration: **7 - 14 days**

- **Complicated:**

1) Orally fluoroquinolone (ciprofloxacin).

2) Duration: **5- 14 day**

3) If the patient not tolerate orally or resistant organism start Parenteral therapy with levofloxacin (500 mg) or ceftriaxone (1 g) once daily until the patient improve then transition to oral antibiotic therapy.

\*To alleviate burning pain during urination use phenazopyridine.

\* Fluoroquinolone-associated tendinitis most commonly involves the Achilles tendon.

### 3. Pyelonephritis in both men and women:

#### a. Mild to moderate (uncomplicated):

Treat as Outpatient with: fluoroquinolone (ciprofloxacin) for 7 days.

#### b. Sever or with risk factor (complicated):

treat as Inpatient with: Intravenous therapy such a long acting parenteral as (ceftriaxone 1g) until patient improve then transition to oral antibiotic therapy.

### 4. Prophylaxis of UTI:

#### a. The patient considered for prophylaxis if:

- 1) Infected  $\geq 2$  infections in 6 months.
- 2) Infected  $\geq 3$  infections in one year.

#### b. Antimicrobial prophylaxis:

Continues prophylaxis	vs.	Postcoital prophylaxis
Continuous prophylaxis decreases recurrences by up to 95 %.		More efficient and acceptable prevention than continuous
1. Trimethoprim 2. sulfamethoxazole		In women with UTIs temporally related to sexual intercourse and pregnant. Single postcoital dose of 1. cephalexin (250 mg) 2. nitrofurantoin (50 mg)

### Education:

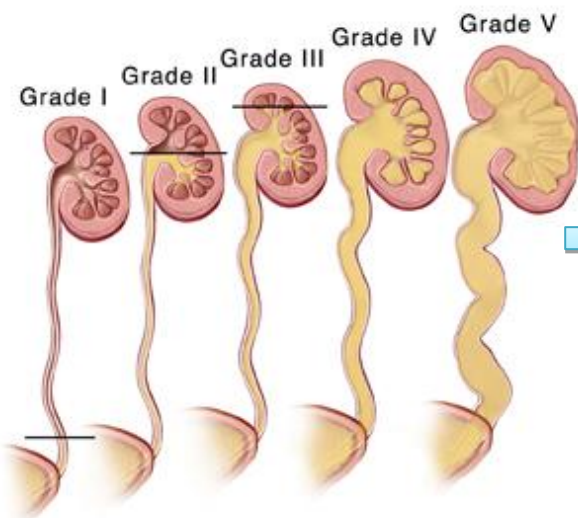
- a. Drink plenty of water (six to eight glasses) every day.
- b. Do not resist the urgent urination; Bacteria can grow when urine stays in the bladder too long.
- c. Women should wipe from front to back to prevent bacteria from entering the vagina or urethra.
- d. Cleanse the genital area before and after sexual intercourse.
- e. Urinate shortly after sex. This can flush away bacteria that might have entered the urethra during sex.
- f. Avoid using feminine hygiene sprays and scented douches, which may irritate the urethra. **Change your birth control method.** Diaphragms, or spermicide-treated condoms, can all contribute to bacterial growth.

## **#Vesicoureteral Reflux in children:**

A condition in which urine flows from the bladder, back towards or into the upper urinary tract.

- The refluxing urine increases the pressure within the kidneys and may contain bacteria that can lead to infection. Long term increased pressure and repeated infections can lead to kidney dysplasia.
- The majority of children with the condition will not require any treatment and will grow out of the condition in childhood; however a small number will require surgery to correct the condition.
- Vesicoureteral reflux in itself does not produce any symptoms. These occur when infection of the urinary tract is present.

**The study to rule out reflux is MCUG and it is also used for grading:**



**Graded 1 – 5, with 1 being the mildest and 5 being the most severe:**

**Grade I:** confined to ureter, contrast is in the distal part of the ureter

**Grade II:** contrast reaches the kidney but there is no dilation

**Grade III:** Mild dilation of the renal pelvis and ureter without loss of calyces

**Grade IV:** moderate dilation but there is loss of calyces

**Grade V:** severe dilation and tortuous dilated ureter”

## **Management:**

- **Prophylactic low dose ABX**
- **Indications for Surgical correction :**
  - Poor compliance with medical regimen
  - breakthrough infection despite antibiotic prophylaxis
  - Progressive renal scarring
  - Severe reflux (Grade IV or V) **FIRST** manage the new-borns medically until they are old enough for surgery.

## #Asymptomatic Bacteriuria in Pregnant Women:

- More than 80% of cases the infecting organism E.coli
- ABU in pregnancy is significant because 20-30% of untreated cases progress to acute pyelonephritis.

### **Management:**

- Treatment of ABU in pregnancy consists of **oral antibiotics for 14 days**. One of the following agents may be used:
  - Ampicillin & cephalosporins** are **generally safe and effective during any phase of pregnancy**
  - \*Sulfamethoxazole contraindicated in pregnancy.**
- Treatment of ABU in pregnancy reduces the frequency of acute pyelonephritis to 2-3%.

## Summary

1. Urinary tract infections (UTIs) include:
  - a. **Cystitis**: Infection of the bladder (Lower UTI).
  - b. **Pyelonephritis**: infection of the kidney (Upper UTI).
  - c. **Urethritis**: infection of the urethra.
2. UTI occur more commonly in women than men, with half of women having at least one infection at some point in their lives. (**because their urethra is shorter and closer to the anus**)
3. **Complicated UTI**: Infection in a urinary tract with functional or structural abnormalities
4. Most common organism causing UTIs **E.Coli (90%)**.
5. Management of Cystitis :

	Men	Women
Course	7 – 14 days	3-5 days
Antibiotics	- Trimethoprim-sulfamethoxazole - fluoroquinolones	- Trimethoprim-sulfamethoxazole - Nitrofurantoin - B-lactams( Augmentin)

## Questions

### 1) What is the most common organism causing UTI?

- a. proteus mirabilis
- b. E.coli
- c. Klbsiella pneumoniae
- d. Pseudomonas aeruginosa

### 2) What factor predispose to the development of UTI:

- a. b,c&d
- b. Kidney stones
- c. Foley catheter
- d. Female gender

### 3) How to differentiate between cystitis and pyelonephritis in urinalysis?

- a. Nitrite
- b. WBC Casts
- c. RBC
- d. WBC

### 4) Which of the following drugs is safe during pregnancy ?

- a. Fluoroquinolone
- b. cephalosporins
- c. Sulfamethoxazole

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#### **Answers:**

- 1st Questions: B
- 2nd Questions:A
- 3rd Questions: B
- 4th Questions: B