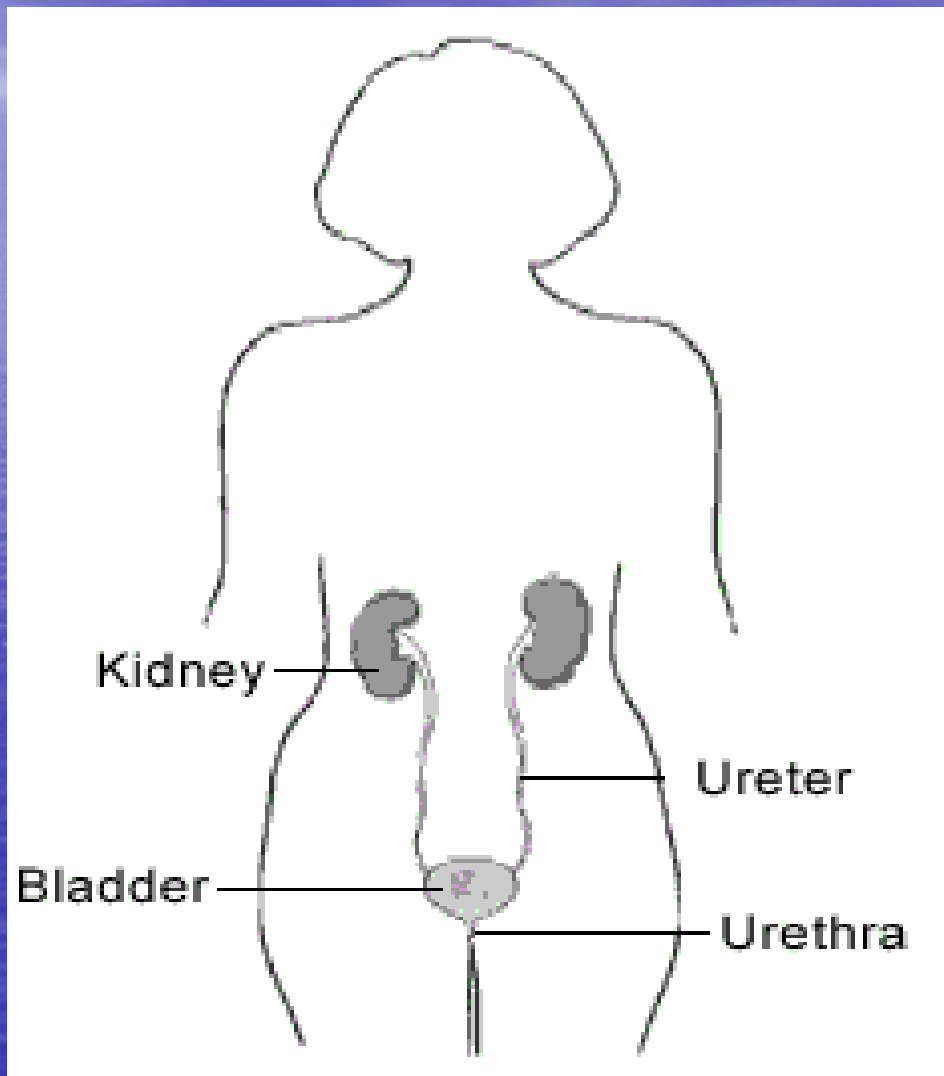


Urinary Tract Infection

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Anatomy



UTI, source of infection

- Ascending route
 - 95% of all cases
- Descending route
 - Only 5%

UTI, different types

- Urethritis
- Cystitis
- Prostatitis
- pyelonephritis

UTI, classification

- Complicated Vs uncomplicated
- Uncomplicated
 - Not associated with structural or neurological abnormalities.
 - Males unlikely to fit in this classification.

Complicated UTI

- Lesion in UTI
- Stone
- Indwelling catheter
- Prostatic hypertrophy
- Obstruction
- Neurological deficit

Male Vs Female UTI

- UTIs in women vastly outnumber those in men due to:
 - Length of urethra
 - Distance of the urogenital meatus from anus
 - Drier environment surrounding the meatus.
 - Prostatic secretion

UTI, presentation

- Asymptomatic bacteriurea.
- Lower UTI
 - Dysuria
 - Frequency of urination
 - Urgency of urination
 - Suprapubic tenderness.
- Upper UTI
 - Fever
 - Flank pain and tenderness

Epidemiology

- Most common type of nosocomial infections.
- 20% of all females will have UTI
- 7 millions new cases of lower UTI annually in US.
- Accounts for 1 million hospitalization annually in US

UTI pathogens

Pathogen	Uncomplicated	Complicated
<i>Escherichia coli</i>	70-95%	40-55%
<i>Klebsiella spp</i>	2-6%	10-17%
<i>Enterobacter spp</i>	0-2%	5-10%
<i>Proteus mirabilis</i>	2-4%	5-10%
<i>Pseudomonas aeruginosa</i>	0-1%	2-10%
<i>Staphylococcus saprophyticus</i>	5-20%	

Predisposing factors

- Extreme age
- Female gender
- Pregnancy
- Instrumentation
- UTI obstruction
- Neurological dysfunction
- Renal disease
- Previous antimicrobial use

Predisposing factors, continue

- Sexually active women
- IUD
- AIDS
- SCD
- Various reports shows no relation with:
 - Oral contraceptives
 - Not voiding before intercourse
 - Non-cotton underwear
 - Use of condoms

UTI, presentation (Diagnosis)

- Lower UTI
 - Dysuria
 - Frequency of urination
 - Urgency of urination
 - Suprapubic tenderness.
- Upper UTI
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Laboratory diagnosis, urine analysis

- Pyuria
 - Present in all UTI types
- Hematuria
 - Present only in cystitis and pyelonephritis.
- Nitrates
- Leukocyte esterase

Urine culture

- Definite marker for UTI
- Cut off point used to be 10^5 CFU/ml; and now as little as 10^2 CFU/ml is accepted.
- Urine collection techniques
 - Mid stream clean-catch urine sample.
 - In-and-out catheterization specimen.
- Transportation and/or storage

Interpretation of C/S

- AB discs available in the plate designed to be comparable with achieved blood concentration.
- Urine concentration might be 20-100 times its level in the blood.
- C/S should be done before AB initiation as urine will be sterile within 1-2 days.

Imaging techniques

- Ultrasound
 - Very limited value
- CAT scan
 - Can visualize the infection condition.
 - Only kept for limited cases.

UTI Management, concepts

- No standard protocol
- Should be customized based on:
 - Local data about the bacterial causes of UTI
 - Local antibiotic resistance pattern
 - Available antibiotics and associated cost
 - Patient specific variables

Ideal AB for UTI

- Coverage
- Concentration in urine
- Duration of therapy
- Frequency of administration
- Low SE profile
- Lower resistance
- Cost (direct vs. indirect)

Asymptomatic Bacteriuria

- Directly related to age

Age	Prevalence
Young women	1-2%
>60	6-10%
>65	15-20%

Asymptomatic Bacteriuria, continue

- Generally does not require treatment except:
 - Pregnant women
 - Neutropenic patients
 - Patients with abnormal renal function
 - Renal transplant recipient in early stages
 - Men and women undergoing urological procedures.

Duration of therapy

- Single dose
- 3 day course
- 7 days course
- 10 days course
- 14 days course

Single dose therapy

- TMP-SMX (2 or 3 double strength tablets)
- Amoxicillin-clavulnate 500 mg
- Amoxicillin 3 gm
- Ampicillin 3.5 gm
- Ciprofloxacin 500 mg
- Norfloxacin 400 mg

Single dose therapy, continue

- Applicable to uncomplicated cases.
- Exclude patients with:
 - Past history of complicated UTI
 - History of AB resistance
 - History of relapse in single dose
 - Males

Single dose therapy, advantages

- Improve compliance
- Cost savings
- Proven efficacy in defined population
- Minimal side effects
- Potential decrease in the incidence of bacterial resistance

Single dose therapy, disadvantages

- Sample sizes are relatively small
- Differences in effectiveness and SE are \pm clinically significant
- Recurrence rate or relapse?!
- If infection reoccur, the severity might be more?!

3 Day course therapy

- Many studies clearly shows the equal efficacy of 3 days therapy compared to 7 days in uncomplicated UTI cases; adverse effects might be even lower.
- Trials made on:
 - Quinolones
 - TMP-SMX
 - Beta lactams

Extended release Ciprofloxacin

- 500 mg for uncomplicated UTI
- 1000 mg for complicated UTI
- C_{\max} is 160% the normal dose
- Is at least as effective as normal dose
- Becoming the gold standard therapy in certain geographical area in USA

7 days therapy

- Used to be the minimum for uncomplicated cases.
- Still used for:
 - Recurrent cases
 - Associated with other risk factors
 - Pregnancy

10-14 days therapy

- Kept for complicated cases
- Usually associated with higher risk for morbidity and mortality.

TMP-SMX

- Used to be the gold standard in USA
- Good coverage for causative pathogens except *P. aeruginosa* and *Enterococcus*.
- Inexpensive.
- Could be used for short term.
- ? Resistance pattern recently emerged.
- Precaution might include G6PD, impaired hepatic or renal function and patients taking thiazide diuretics. Not to be used in pregnancy.

TMP-SMX, patient education

- Take this drug with full glass of water.
- Take it in empty stomach.
- Unless directed otherwise, take extra fluids daily.
- Take the drug at regular interval and continue the duration as prescribed.
- If you miss a dose, take ASAP.
- Keep at least 5-6 hrs interval between the doses.

Penicillins, and cephalosporins

- Used to be the golden therapy.
- Safety profile is high.
- Short duration of therapy.
- ? Resistance cases
- Safe in pregnancy

Flouoroquinolones

- Becoming the gold standard in certain part.
- Activity against *P. aeuroginosa*.
- Lower resistance in USA.
- Short term therapy.
- Not to be used in pregnancy.

Ciprofloxacin, patient education

- This drug may be taken with food to minimize stomach upset.
- Avoid antacid during treatment; calcium, iron, or zinc supplements reduce the absorption.
- Avoid excessive exposure to sunlight during treatment.

Continue

- Report any tendon pain or inflammation occurring during therapy.
- Take the drug at regular intervals; if you miss a dose, take it ASAP. If its about time for next dose, take that dose only. Leave at least 6-8 hours between doses.

UTI in pregnancy

- Even asymptomatic bacteruria have to be treated.
- Studies shows that UTI can cause prematurity as well as fetal morbidity and mortality.
- Culture is needed.
- 3 days duration is the minimum
- Recurrent UTI infection in 33% of the cases.

Phenazopyridine

- Urinary tract analgesic
- Used for managing dysuria
- ? When combined with AB
- Limited use for 2 consecutive days
- Discoloration of the urine
- Not to be used in G6PD due to increase chance of haemolysis



THANKS