

URINARY TRACT INFECTIONS

3rd Y Med Students

Prof. Dr. Asem Shehabi
Faculty of Medicine, University of
Jordan

Urinary Tract Infections-1

- Normal urine is sterile in urinary bladder.. It contains fluids, salts, and waste products, but should be free of any microorganism.
- First portion of urine might be contaminated with few resident microorganisms during its passages through urethra .. More in women than Men.
- Urinary tract infection (**UTI**) occurs often when bacteria from the intestinal tract, contaminate the opening urethra and begin to ascend & multiply causing inflammation of any part of urinary tract System.
- **UTI** is defined as a significant **bacteriuria** associated with presence of signs & symptoms or **asymptomatic**

Urinary Tract Infections-2

- **Dysuria** painful urination including burning, frequent urination, fever, abdominal pain..Due to presence of **Pus cells & Bacteria** in urine, Urinary Stones, Sexually Transmitted infection.
- **Sterial Pyuria:** Presence of pus cells in urine.
- **Cystitis:** Inflammation of the lower urinary tract urethra and Bladder mucosa.. mostly by bacteria. This infection is not invasive.. It is Frequently associated with voiding frequent small volume urine, can be **mild/severe** associated with high fever, burning, abdominal pain, cloudy or bloody urine. Rarely can be associated with **septicemia**.. Young children & Immunosuppressed patients.
- **Hemorrhagic cystitis** is characterized by presence large numbers of visible RBCs in the urine.

Urinary Tract Infections-3

- **Pyelonephritis**: Infection usually results from ascending of the bacteria to the Ureter & Kidney from the urinary bladder caused by a bacterium..rarely Candida/ virus.. High fever.. may result in blood sepsis & kidney failure.
- It can also arise by hematogenous spread (sepsis, pneumonia). In contrast to cystitis.. Pyelonephritis is an invasive disease.. With severe consequences.
- **Blood Sepsis** may complicate UTI.. Common in children & women, following surgery, compromised patients.. Infection of upper part of UT

Urinary Tract Infections-4

- **UTIs** caused by aerobic bacteria spp. of fecal origin.. 90% of **acute community UTIs** .. Developed in patients with normal anatomic structure and function caused by certain strains of *E. coli*
- Coagulase-negative & positive ve *Staphylococcus* caused about 10 %.. other G-ve Klebsilla-Enterobacter group, Proteus or G+ve Enterococci fecalis & others (5-10%).
- **Hospitalized patients** acquired often UT infection with multidrug resistance G-ve bacteria due to presence **MDR bacteria** in their intestine & Hospital environment & following using **Foleys chatter**.. Nosocomail infection 5-15% .
- Common: *P. aeruginosa*, *Proteus spp.*, *Kelbsiella-Enterobacter group* *Enterococcus* spp.

Urinary Tract Infections-5

- **UTI's**.. rank second to respiratory infections in general incidence. The majority of cases seen in outpatients clinics among **Females** (F/M ratio 30:1).
- 90% of all married women have at least one episode of a UTI at some time during their productive years.
- **Pregnancy** & women sexual activity increase UTIs 10 times..Up to 20 % of young women with acute cystitis develop **Recurrent UTI's**.
- Males develop increasing UTIs after ≥ 50 s. mostly due to **prostate gland hypertrophy**..underlying diseases, catheterization, diabetes mellitus, Immunosuppressed patients
- In children congenital urinary tract abnormalities.
- **kidney stones** can injury urethra or form a blockage & causing UTI.

Lab Diagnosis-1

■ Routine Microscopic Analysis:

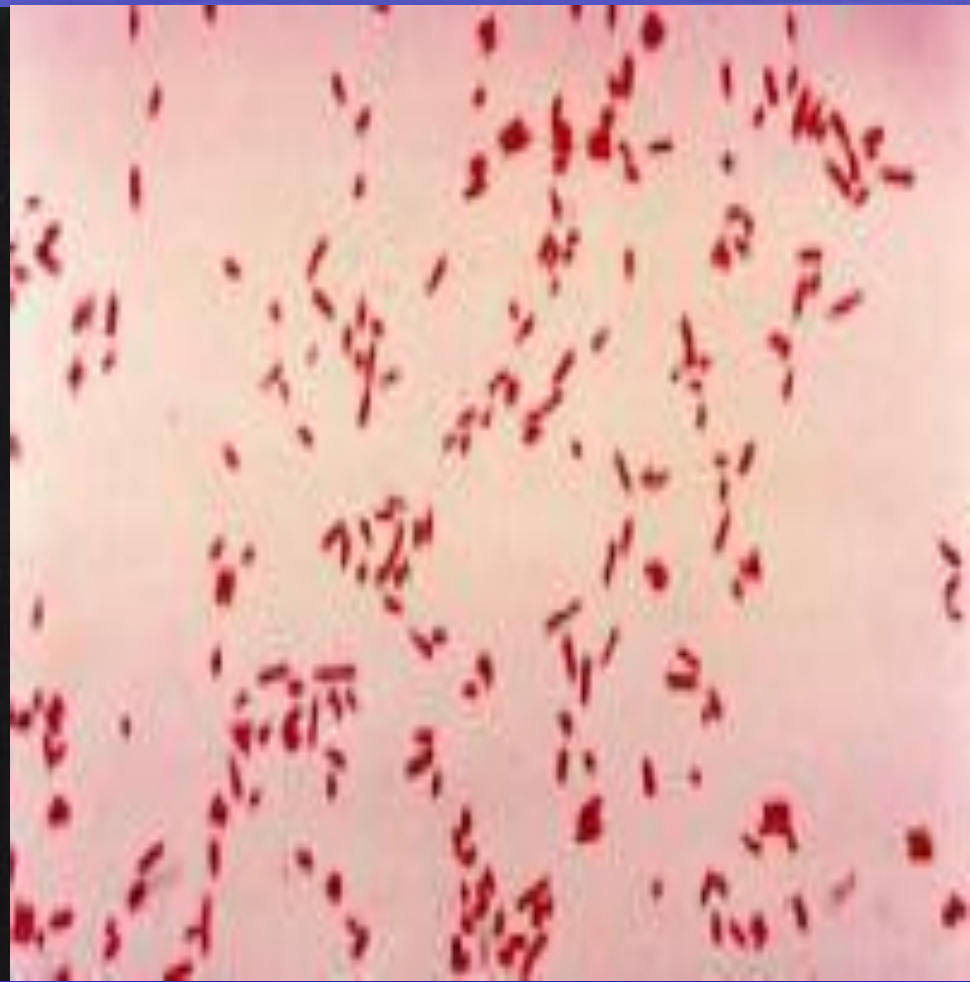
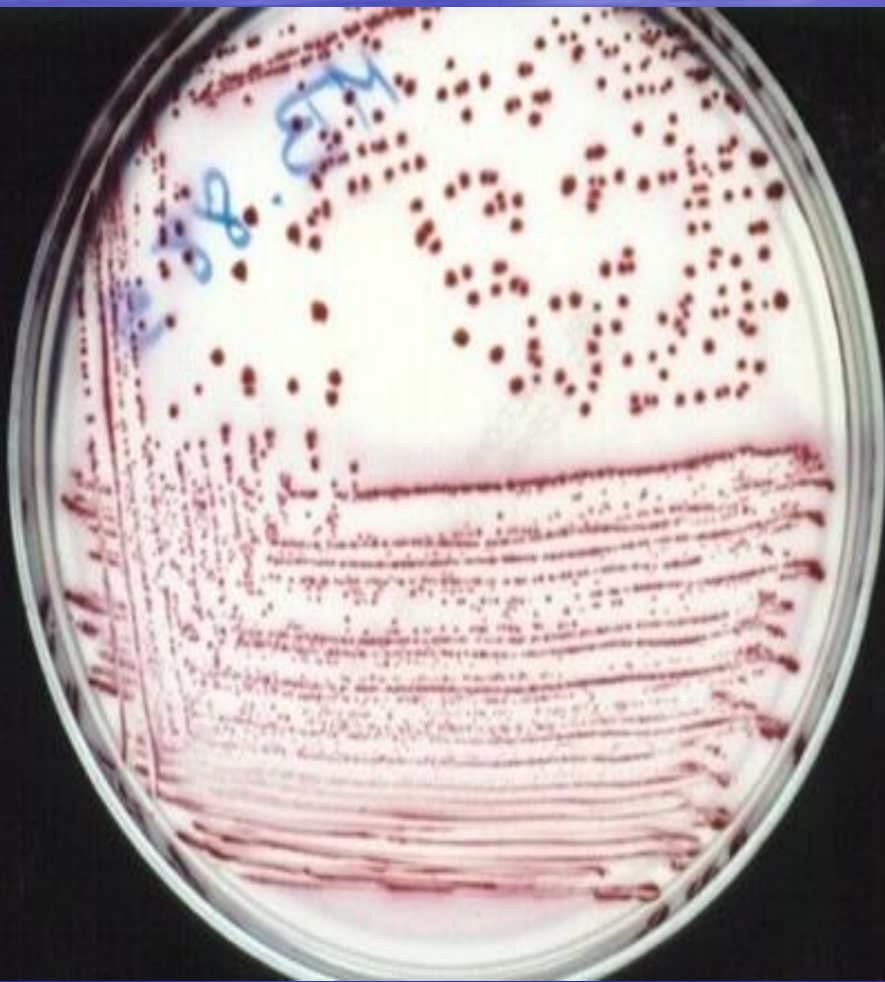
- Clean-catch **Midstream Urine** should be collected.. Early morning & examined within one hour of collection or refrigerated up to $\leq 24\text{h}$.
- **Symptomatic UTI**.. Acute Infection/ Significant Bacteriuria: 100,000 colony-forming units (10^5CFU/ml) & Numerous WBCs ($\geq 10 \text{ WBSs /HPF}$)
- **Hematuria**: Few RBCs in urine of women is not significant.. But in men is Significant .. should be investigated for other diseases.
- Presence of few Bacteria /Yeast cells.. 10-50000 Cells/ml is part urethral normal flora..**Not significant.**
- **Other important factors**: Color, Protein, Sugar, pH (5.5 to 6.5), Casts, Specific gravity etc.

Lab Diagnosis-2

- Asymptomatic /Chronic Infection: 10.000-100,000 CFU/ ml of midstream urine..Few pus cells.. 99% Pure Growth of one facultative anaerobic bacteria species .
- Presence 20.000 CFU/ ml or less with absence WBCs.. Mostly not significant.
- Mixed Bacterial Cultures are mostly contamination except in case obstruction in UT/malignancy
- Suprapubic Urine .. Any pure bacterial count in Infants & Young children is significant
- Fresh urine samples should be cultured on Blood & MacConkey agar for recovery of both Gram+ve and Gram-ve & Yeast,35-37C Incubation ..24-48 Hrs.

E. coli – Lactose Fermenter

Gram-stain & Culture on MacConkey agar



Antimicrobial Treatment -1

- **UTI** clinical manifestations , previous history of infection, antibiotic susceptibility should guide the initial step Antimicrobial Therapy.
- **Community acquired infection /Outpatients**
 - A febrile patients experiencing first time uncomplicated symptomatic.. **Acute cystitis** is usually treated empirically for three days..
 - **First line:** Augmentin, Nitrofurantoin, Cotrimoxazole , Nalidix acid.
 - **Second line:** Fluoroquinolones..Norfloxacin/ Ciprofloxacin, 2nd-generation Cephalosporins ..Cefrouxime .
 - Antibiotic prophylaxis against UTI should be given only in selected clinical cases.

Antimicrobial Treatment -2

- **Recurrence of UTI's** within 2-3 months require performing urine culture and antimicrobial susceptibility test.. Often infection associated with R- bacteria strains.

- Hospital acquired UTI's is often associated MDR bacteria.. require culture and susceptibility test.

- **Pyelonephritis** is more serious & difficult to cure..may be associated septicemia.. followed reoccurrence **UTI** due to relapse (treatment failure) or re-infection, mostly with the same bacteria spp.

- **Serious UTI** : Patients experiencing high fever, shaking chills or abdominal pain with symptoms of lower UTI, should be hospitalized and treated with intravenous drugs.

Treatment & Prevention

- A large number of pregnant women develop **asymptomatic bacteriuria**.
- Up to 30% with asymptomatic bacteriuria will develop acute **pyelonephritis** if not treated.
- Treatment of asymptomatic bacteriuria in pregnant women decreases the risk of pyelonephritis, preterm birth & baby low birth weight.
- Urine samples should be obtained periodically from pregnant women to determine if they have bacteriuria.
- **Asymptomatic bacteriuria** in infants and Jung children might be observed by crying, abdominal pain or unexplained fever.