

Cystitis and pyelonephritis



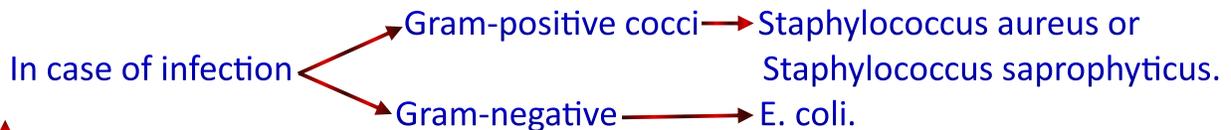
- Murphy's percussion test (costovertebral angle tenderness) can be done to see if the kidney is inflamed.
- Congenital urodynamic abnormality (increase the risk of developing **pyelonephritis**), ex: **vesicoureteral reflux (VUR)** "risk factor for recurrent pyelonephritis": occurs when one of the valves that prevent urine from flowing back into the kidneys during micturition (urination) is incompetent.
- Between cystitis and pyelonephritis, the causative organisms are similar but with an exception of **Proteus spp** (There is a correlation between Proteus infections and the presence of kidney stones) it's not that common in the bladder so it primarily causes **pyelonephritis** and not cystitis.
- **Constitutional** symptoms are present in **Pyelonephritis** NOT in cystitis.
- Risk factors AND symptoms are more severe in pyelonephritis than cystitis.
- **Women** have a higher risk of getting **cystitis** due to the proximity of the urethra to the vaginal cavity. The vaginal ecology plays an essential role in protecting against microbial infections, and normal microbiota like Lactobacillus helps to prevent UTIs.

↑ Sexual activity → ↑ the risk of UTI

Virulence factors in → **pyelonephritis: Flagella**
→ **Cystitis: capsule**

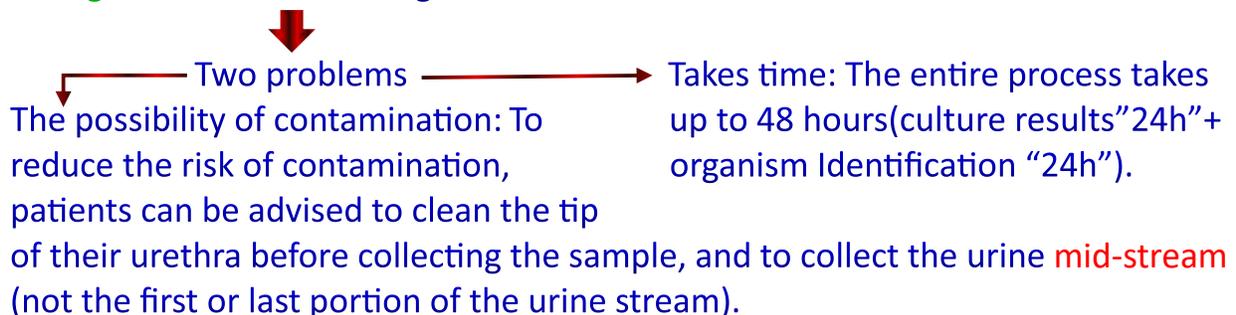
- The diagnosis of any of the UTI syndromes or ASB begins with a detailed history. (E.g. in women presenting with at least one symptom of UTI (dysuria, frequency, hematuria, or back pain) and without complicating factors, the probability of acute cystitis or pyelonephritis is 50%).

- If **vaginal discharge** and **complicating factors** are **absent** and **risk factors** for UTI are **present**, then the probability of UTI is close to 90%, and **no laboratory evaluation is needed** before initiation of therapy.
- Sexually transmitted disease—that caused by Chlamydia trachomatis in particular—may be inappropriately treated as UTI.
- Only members of the family **Enterobacteriaceae** convert **nitrate to nitrite**.
- When **voiding frequently**, the dipstick test or nitrite is **less likely to be positive**.
- Normally, there should be no bacteria in urine.



- ↑ White blood cells (WBC) and red blood cells (RBC) → progressive infection.
- >5 Epithelial cells → contamination from skin flora.
- Leukocyte esterase in urine → infection with higher sensitivity, but low specificity for UTIs.

- The normal pH of urine is acidic.
more basic urine → UTI.
- The dipstick test is a point-of-care test, which means that it does not require a specialized laboratory or a specialist to perform, ex: lateral flow immunoassay tests (to diagnose COVID-19).
- **A negative dipstick test is not sufficiently sensitive to rule out bacteriuria in pregnant women.**
- **Diagnosis:** urine culture “gold standard”



- The commonly used threshold for diagnosing a UTI is 10^5 CFUs per mL of urine. **Lowering this threshold** to 10^2 CFUs per mL of urine could **increase sensitivity and specificity**.
- The number of CFUs = Number of colonies * Dilution factor (=Amount of urine plated/ Total volume of urine in the sample).

- When contamination is persistent and urine culture is inconclusive, a suprapubic aspiration may be necessary (invasive procedure >>> last choice).
- Antimicrobial therapy is warranted for any symptomatic UTI.
- The choice of antimicrobial agent and the onset and duration of therapy depend on the site of infection and the presence or absence of complicating conditions.
- First choice: Nitrofurantoin + Trimethoprim or one of Fluro-quinones (They have good bioavailability in urine).
- **Ciprofloxacin** was found to be **most effective** antimicrobial agents against all isolated bacteria strains, while Oxacillin was found to be the least effective.

Complications of pyelonephritis:

- A single episode of acute pyelonephritis in an adult woman can lead to renal scarring.
- Pyelonephritis becomes potentially fatal when secondary conditions develop such as emphysematous pyelonephritis, perinephric abscess, or sepsis.
- Chronic pyelonephritis might develop following acute pyelonephritis in childhood in the context of (vesico-ureteric reflux) VUR.
- **Emphysematous pyelonephritis**: A severe, necrotizing, acute, multifocal bacterial nephritis, with extension of the infection through the renal capsule. **Gas** is found in the renal substance and perinephric space. Often happens in diabetics.
 - **Diagnosis**: CT scan.
 - **Treatment**: antibiotics, drainage, nephrectomy.
 - Mortality is high.
- **Xanthogranulomatous pyelonephritis**: A rare, serious, debilitating illness characterized by a chronic inflammatory mass originating in the renal parenchyma.
 - **Gross appearance**: mass of yellow tissue composed of lipid- laden macrophages and inflammatory cells regional necrosis, and haemorrhage.
 - **Associated with** infection by Proteus, E.coli, or Pseudomonas spp. in the context of chronic obstruction.
- Formation of large **stones**, most commonly with Proteus infection = Stacked horns = Stones obstructing the entire pelvis and there's complete obstruction of urine = hydro-nephrosis [The swelling of a kidney due to a build-up of urine.] and the pressure affect the blood supply leading to necrosis and haemorrhage.
 - **Tx**: Remove the kidney altogether.

Prostatitis

- Up to 50% of men will experience symptoms of prostatitis at some time in their lives.
- Prostatitis includes both infectious and non-infectious abnormalities of the prostate gland.
- There's no obvious reason why prostatitis happens.
- The symptoms of prostatitis are the same that happened in cystitis, it's a lower UTI after all (Dysuria, Frequency), except that the pain isn't in the suprapubic area it may be perineal or prostatic pelvic.
- **Acute bacterial prostatitis** presents as dysuria, frequency, and pain in the prostatic pelvic or perineal area. Fever and chills are usually present, and symptoms of bladder outlet obstruction are common.
 - The pathogens associated with acute prostatitis reflect the spectrum of organisms causing cystitis, urethritis, and deeper genital tract infections (such as epididymitis). Thus, gram-negative infections, especially with **Enterobacteriales**, are the most common.
 - The presence of typical symptoms of prostatitis should prompt digital rectal exam, and the finding of an **edematous and tender prostate on physical exam** in this setting usually establishes the diagnosis of acute bacterial prostatitis.
 - Urine Gram stain and culture should be obtained in all men suspected of having acute prostatitis. Gram stain of the urine, if positive, can be used as a guide to initial therapy
 - Treatment of acute prostatitis includes antimicrobial therapy and supportive measures to reduce symptoms.
- **Chronic/ recurrent bacterial prostatitis** occurs in young and middle-aged men. Risk factors include previous acute prostatitis, history of prior manipulation of the urinary tract, diabetes, smoking.