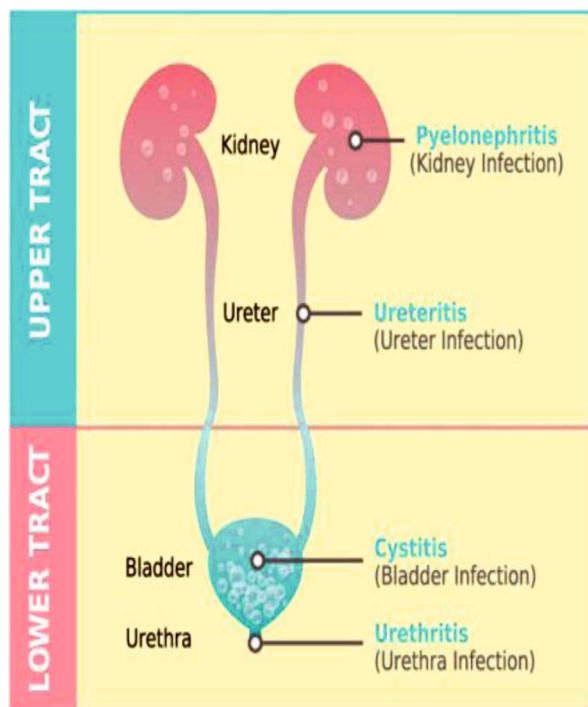


ROLE OF URINE CULTURE IN DIAGNOSIS OF UTI

Urinary tract infection (UTI) is one of the most commonly diagnosed infections in both outpatient and inpatient populations. Urine is the most common type of specimen received in clinical microbiological laboratory.



Urinary Tract Infection

Clinical Presentation of UTI

Cystitis/Lower UTI (involving bladder and urethra): The most common symptoms associated with lower UTI include dysuria or acute pain, frequent urination, urgency, and incontinence. Occasionally, hematuria, cloudy urine, or foul-smelling urine may be present. **Pyelonephritis / Upper UTI** (involving kidney and ureter): Compared with cystitis, pyelonephritis often has a more severe, systemic presentation. In addition to the urinary symptoms seen in cystitis, patients may also present with suprapubic pain, costovertebral angle tenderness (flank pain), fever, chills, nausea, and vomiting.

Children with UTI commonly present with nonspecific symptoms like vomiting, fever, pain in abdomen etc. Febrile infants younger than 2 months constitute an important subset of children who may present with fever without a localizing source. Therefore, the workup of fever in these infants should always include evaluation for UTI.

Cystitis is the most common type of UTI. Urinary tract infections are more common in females than males due to a short urethra. Urine examination is done for diagnosis of UTI which involves microscopic examination (Urine analysis) and semi quantitative culture of urine. In order to make an accurate diagnosis, it is essential to understand the value and limitations of urine analysis and urine culture. Use of these tests in conjunction with an assessment of urinary symptoms help in diagnosis of UTI.

Precautions during Collection & Transportation of urine For culture, urine should always be collected in sterile wide mouth container. Early morning urine is preferred, although urine collected at other

times of the day are acceptable. A "mid-stream clean catch" urine sample is necessary for culture so that any bacteria present around the urethra and on the hands do not contaminate the specimen. Urine should be transported within two hours of collection. Microorganisms grow very rapidly in urine at room temperature.

This may give false positive culture report. Therefore, Urine should be refrigerated at 2^o- 8^oC if delay in transportation is expected and submitted to the laboratory within 24 hours of collection. Urine collected in sterile urine container with preservative should be processed within 24 hours. (No refrigeration required)

In catheterised patient, urine should not be collected from collection bag. Urine

should be collected by syringe & needle with all aseptic precautions after clamping catheter for half an hour. Foley's catheter tip is unsuitable for culture because they are invariably contaminated with urethral flora and may give false positive report.

What is the Difference Between Urine analysis and Urine Culture? Urine Analysis reveals the appearance, concentration and content of urine, while urine culture reveals the infections in the urinary tract. Urine analysis uses reagent strips while urine culture use culture media to grow bacteria present in urine. Urine analysis report is available on the same day but but urine culture report takes two days for its result.

Urine Analysis (Urine Routine & Microscopy) Interpretation



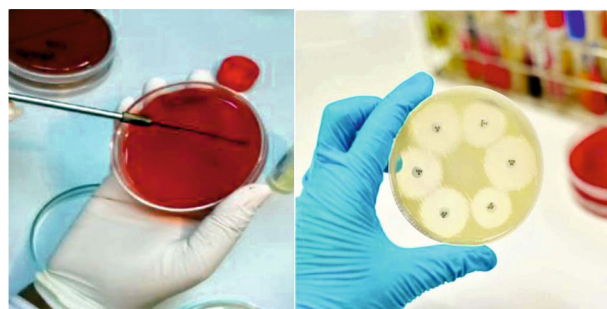
Pus cells on Microscopy

Test	Normal Range	Indicator of infection
pH	4.5-8	Increased pH if urea splitting organisms like Proteus is present
Leucocyte esterase	Absent	Positive if Pyuria present
Nitrite	Absent	Positive in presence of bacteria that reduce nitrite
Pus cells (WBCs)	<5/HPF	Pyuria (>10/HPF)
RBCs	<5/HPF	Hematuria common in infection
Epithelial cells	<5/HPF	<5= good urine sample
Bacteria	Absent	Any count

HPF- High power field

Urine Culture

Urine aerobic culture is done by semiquantitative method on culture plates by standard loop. Plates incubated at 37°C for 24 Hours. A negative culture takes 24 hours for no growth report. Positive culture requires 48-72 hours for report since antibiotic sensitivity test is performed from growth of the organism. Positive culture report also mentions colony count (Colony Forming Unit/ml) of respective organism



Common Uropathogens

- Escherichia coli
- Other Enterobacteriaceae (Klebsiella, Enterobacter, Proteus, Citrobacter species)
- Pseudomonas aeruginosa
- Enterococcus species
- Staphylococcus saprophyticus
- Staphylococcus aureus
- Streptococcus species (Group B)
- Candida species.

What is Significant Bacteriuria? Presence of $\geq 10^5$ (1,00,000) Colony Forming Unit / ml of uropathogen, suggestive of UTI.

Interpretation Of Positive Urine Culture Report

Colony Count	Interpretation
$10^4 - >10^5$ CFU/ml single &/ two potential pathogen	Significant Bacteriuria suggestive of urinary tract infection
$10^3 - 10^4$ CFU/ml Single potential pathogen	Can be considered significant in symptomatic patient.
$10^2 - 10^3$ CFU/ml Insignificant growth	Probable contamination during urine collection
Any Count (suprapubic aspirate /freshly inserted urethral catheter)	Absence of contamination may be assumed and the presence of even small numbers of bacteria must be regarded as significant
≥ 3 organism types with no predominant pathogen	Possibility of contamination during collection of urine

Sometimes patients with sign and symptoms of UTI show pus cells in urine microscopy but no growth on culture. This may be due to patient taking antibiotics or there may be infection with organism that does not grow on routine culture media. In such cases it may be important to consider genitourinary TB or gonococcal infection, and infection with nutritionally exacting or anaerobic bacteria.

Low counts can be considered significant in patients on antimicrobial therapy, diuretics and growth of pure culture of Staphylococcus aureus.

Any growth of yeast may be correlated clinically and repeat culture should be done for identification and sensitivity if clinically indicated.

What is Asymptomatic Bacteriuria?

Presence of uropathogens in culture without sign and symptoms of UTI. Asymptomatic bacteriuria is clinically significant in pregnant women, children with congenital urinary tract anomaly, Vesicoureteral reflux and should be treated with antibiotics. Asymptomatic bacteriuria in adults without obstructive uropathy is not clinically significant.

Conclusion Treatment of a UTI should never be initiated based upon urinalysis alone; patient history and subsequent urine culture results are extremely important for diagnosing UTI and treating patient with appropriate antibiotic.

- Dr. Hema Mathurkar