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Bacterial Spectral in UTI in a Hospital Environment

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Abstract

Urinary tract infections (UTIs) represent a significant public health issue, primarily caused by a variety of pathogens such as Escherichia coli, Klebsiella pneumoniae, Proteus mirabilis, Enterococcus faecalis, and Staphylococcus saprophyticus. UTIs contribute substantially to illness and complications in individuals with pre-existing health conditions and account for a large portion of hospital visits globally. UTIs are usually self-limiting in people with no structural or functional problems, but they do tend to recur. Uropathogens possess specialized traits that enable them to colonize and infect the urinary tract. They can be transmitted between individuals and potentially through contaminated food or beverages. Treatment of UTIs with antibiotics results in a faster cure of symptoms and a higher likelihood of clearing bacteriuria, but it also picks for resistant uropathogens and commensal bacteria, as well as having a detrimental effect on the gut and vaginal microbiota. Because uropathogens are growing increasingly resistant to presently accessible antibiotics, it may be time to consider other UTI management options. A growing concern is the increase in antimicrobial resistance, particularly in E. coli, which has shown resistance to trimethoprim-sulfamethoxazole. Physicians identify UTIs from several other infections with typical clinical presentations using a small series of tests, neither of which have neither appropriate sensitivity nor specificity when used separately. Urinalysis is primarily used to diagnose and rule out bacteriuria. For outpatients with uncomplicated UTIs, a urine culture may not be necessary, but it is essential for evaluating outpatients with recurrent UTIs, treatment failures, or complex UTIs, as well as inpatients who develop UTIs. Because antibiotic susceptibility testing requires a minimum of 48 h to complete, an empirical antibiotic treatment is usually used to treat UTI. Furthermore, this treatment technique results in the formation of tolerance to a number of first-line antimicrobial medicines, a phenomenon known as multidrug resistance, which is causing widespread dilemma around the world. Specialists advise that resistance levels to antibacterial medications must not surpass 10–20% when initiating empirical treatment to combat the rising prevalence of antibiotic resistance.

Keywords: Urinary tract infections (UTIs), public health, pathogens, *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus mirabilis*, *Enterococcus faecalis*, *Staphylococcus saprophyticus*, illness, complications, hospital visits, recurrence, uropathogens

INTRODUCTION

Urinary tract infections (UTIs) are inflammatory conditions of the urinary tract resulting from abnormal bacterial growth within the urinary system. UTIs can lead to short-term issues like fever, painful urination, and lower abdominal pain, as well as permanent kidney scarring. These infections occur due to a combination of bacterial virulence and the host's biological and behavioural factors, which overcome the body's typically effective defence mechanisms. Bacteria can enter and propagate via the urinary tract through two different routes: hematogenous and ascending routes [1, 2].

Urinary tract infections can present in various forms: asymptomatic, acute, chronic, complicated,

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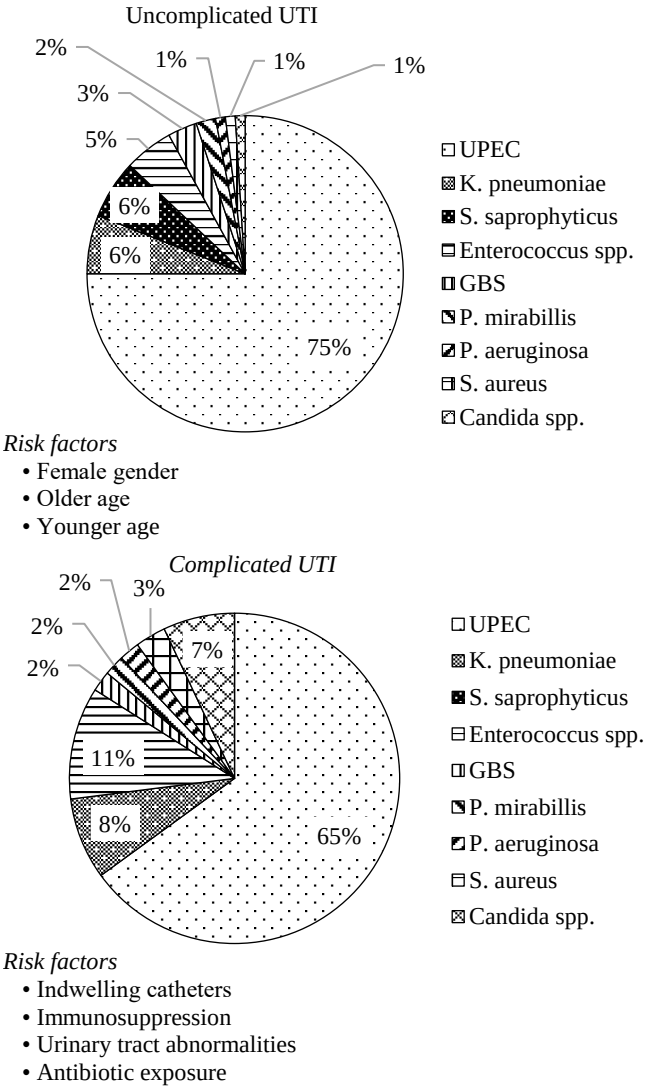

Figure 1. Overview of urinary tract infections (UTIs).

or uncomplicated (Figure 1). The clinical symptoms depend on the part of the urinary tract affected, the organisms causing the infection, the infection's severity, and the patient's immune response capability. UTIs, both asymptomatic and symptomatic, are a severe danger to public health, lowering quality of life and leading to job absence [3, 4].

UTIs can be caused by both Gram-negative and Gram-positive bacteria, as well as some fungi. Uropathogenic *Escherichia coli* are the most frequent cause of both uncomplicated as well as complicated UTIs (UPEC). *Klebsiella pneumoniae*, *Staphylococcus saprophyticus*, *Enterococcus faecalis*, group B Streptococcus (GBS), *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and *Candida spp*. are the most common agents involved in simple UTIs. *Enterococcus spp., K. pneumoniae, Candida spp., S. aureus, P. mirabilis, P. aeruginosa*, and GBS are the most prevalent causal agents causing complicated UTIs, with UPEC being the most prevalent.

ETIOLOGY

UTIs are classified as either uncomplicated or complicated in clinical terms. Uncomplicated UTIs affect people who would otherwise be healthy and have no structural or neurological problems in their urinary system. They are divided into lower UTIs (cystitis) and upper UTIs (urethritis) (pyelonephritis). Risk factors for cystitis include being female, having had a previous UTI, sexual activity, vaginal

infections, diabetes, obesity, and genetic predisposition. Additionally, the use of spermicides, diaphragms, and sexual activity are all risk factors for UTIs. The presence of anatomical anomalies of the urinary tract, as well as frequent pelvic exams, can predispose one to a UTI. Complicated UTIs can result from urine blockage, urinary retention due to neurological disease, immunosuppression, renal failure, renal transplantation, pregnancy, or the presence of foreign bodies such as kidney stones, indwelling catheters, or other drainage devices. CAUTIs (catheter-associated urinary tract infections) are the most common cause of subsequent bloodstream infections, involving higher morbidity and death. Prolonged catheterization, feminine gender, older age, and diabetes are all major risk factor for CAUTI [5–8].

Risk Factors for UTIs

Reduced Urine Flow

- Outflow obstruction with incomplete bladder emptying (prostatic hyperplasia, prostatic carcinoma, urethral stricture, pelvic organ prolapse, or foreign body).
- Bladder neurogenic.
- Insufficient fluid intake.
- Voiding difficulties.

Encourage Colonization

- Increased inoculation due to sexual activities.
- Enhanced spermicide binding.
- Increased binding due to oestrogen depletion.
- Reduced indigenous flora due to antimicrobial agents.

Facilitate Ascent

- Catheterization (chronic or intermittent).
- Urinary incontinence.
- Incontinence of the bowels.
- Bladder wall ischemia and leftover urine.

MEDIA USED FOR ROUTINE URINE CULTURE

According to standard guidelines, the most commonly recommended and used media for routine urine cultures are blood agar (a non-selective medium) and MacConkey agar (a selective and differential medium for Gram-negative rods). Conventional media such as cysteine lactose electrolyte-deficient (CLED) agar or chromogenic agar have been proposed as alternatives. Additionally, Sabouraud agar should be used to culture the urine of patients in specific care units or when yeasts have been identified through microscopic examination. Mostly Nutritional agar, MacConkey agar and glucose-topped MacConkey agar are recommended for routine urine culture in this guideline. The choice of medium for routine urine culture, on the other hand, should be decided locally depending on available resources as well as the intended identification technique. Because Gram-negative pathogens often account for the bulk of predicted infections, blood agar is replaced with nutritional agar to keep expenses down. Blood agar is reserved for Level-2 advanced bacterial identification of Gram-positive bacteria when needed. Other bacterial cultures, such as those from pus and cerebrospinal fluid, are routinely cultured on MacConkey agar [9–13].

MacConkey agar supplemented with glucose facilitates rapid differentiation: glucose-fermenting bacteria, mainly *Enterobacterales*, form pink colonies regardless of their lactose fermentation capability, while non-fermenters like *Pseudomonas* spp. and *Acinetobacter* spp. produce colourless colonies. Importantly, our methodology does not seek to diminish the importance of CLED or Chromogenic Agar, rather, it offers a different perspective [14–18].

SAMPLE COLLECTION METHOD

The importance of urine analysis in identifying the likelihood of infection cannot be overstated. To distinguish between contamination and actual colonisation, the manner of urine collection is critical. There are three common collection methods: Clean capture midstream voided urine, catheterized urine, and suprapubically aspirated urine are the three types of urine. Suprapubic aspiration is the most effective way to avoid bacterial contamination of specimens in the distal urethra. Because it is not indicated clinically (save in rare instances), it is intrusive and painful, and it takes too much time and resources to be practical, this collecting procedure is employed sparingly. The midstream voided urine is the most vaiable of the three, especially in females, where urine contamination by vaginal or perineal organisms is typical during collection. This treatment offers several benefits: it is non-invasive and painless, simple and cost-effective, adaptable to almost any clinical environment, avoids the risk of introducing bacteria through catheterization, and presents no associated complications. Colony counts from urine specimens taken this way match ones from those collected via suprapubic aspiration or direct catheterization quite well. The appropriate collection of samples from older patients, as well as those with physical or other sorts of impairments, may be difficult, which emphasises the significance of carefully collecting specimens to avoid contamination [19, 20].

Specimen Processing Using the Calibrated Loop/Surface Streak Method

The criterion for diagnosing UTI is urine culture (Figure 2). Since the 1960s, various adaptations of the calibrated loop or surface streak method have been employed to semi-quantify, isolate, and begin presumptive identification of microorganisms in urine samples. It is important to note that all samples should undergo dipstick testing and microscopic examination for nitrites, white blood cells, red blood cells, or microorganisms. In the semi-quantitative method, routine urine cultures should be plated using calibrated loops, which enables the identification and susceptibility testing of isolated colonies.

1. To re-mix the urine sample, tip the container over.
2. Remove the cap and dip the end of a sterile 1 µl inoculating loop into the urine, making sure there is no urine up the loop before vertically removing it.
3. Spoon the inoculum onto the surface of a normal nutritional agar plate prepared according to the manufacturer's instructions.
4. Make a single streak down the centre of the plate. Then, uniformly distribute the inoculum to the primary streak in a cross-zigzag pattern.
5. Re-dip the end of the same 1 µl loop into the urine and withdraw it vertically, ensuring that no urine has risen up the loop.
6. Spread the sample evenly across the surface of a MacConkey agar plate supplemented with glucose, following the instructions provided earlier. Prepare the MacConkey agar plate with the glucose coating as follows:
    i. Using a cotton ball or pad soaked in 70% isopropyl alcohol, disinfect the port of a 1000 ml bag of 5% glucose intravenous infusion solution and allow it to dry.

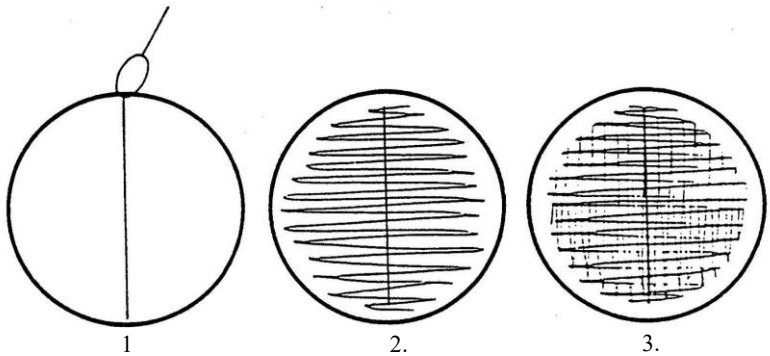

Figure 2. Diagnostic criteria and methods for urinary tract infections (UTIs).

ii. Using a sterile needle and syringe, withdraw 2 ml of the 5% glucose solution.
iii. Drop the aspirated solution onto the surface of a standard MacConkey agar plate, which has been prepared according to the manufacturer's instructions.
iv. Tilt the plate in different ways to spread it out.
v. Allow a minimum of 1 h for the solution to infuse and for the plate surface to dry after placing it on the bench at room temperature.

7. Re-dip the ends of the same 1 µl loop into the urine and withdraw it vertically, ensuring that no urine has risen up the loop.
8. Place the inoculum on the surface of a normal MacConkey agar plate prepared according to the manufacturer's instructions. Spread out as directed above.
9. Followed by incubation the plates aerobically for 18–24 h at 35–37°C.
10. Check the amount of colonies on the surface of each medium the next day. Each colony on the agar plate indicates one colony forming unit (cfu)/l (depending on the loop size), which equals 1000 cfu/ml. Keep in mind that nutrient agar is the most common medium for colony counts.

Because most pathogenic yeasts thrive well on blood agar plates, using specific fungal media for urine cultures, also for samples from individuals with suspected funguria, is unnecessary. Selective fungal media may be used when there is a strong clinical suspicion that a UTI is caused by a particularly aggressive yeast or mould. Patients with probable mycobacterial UTIs should have their urine treated and plated to the appropriate mycobacterial media.

NONCULTURE METHODS FOR UTI DIAGNOSIS IN THE LAB

Microscopy (or another way of evaluating cellular components) and quantitative culture are usually used in the laboratory to investigate UTI (or an alternative non-culture method such as a semi-automated urine analyser). Except in a few patient categories, culture results are interpreted based on clinical presentation, the presence or lack of pyuria (a sign of infection), and the presence or absence of squamous epithelial cells (SECs) (which indicate contamination).

Clinicians can consult a reference guide for the diagnosis of UTIs. The patient's clinical examination aids in the interpretation of laboratory results and the diagnosis of UTI. Internal control methods must be adequate, especially when chemical tests are performed away from the laboratory and where culture is not performed on the patient on the basis of negative results [21].

There have been several non-culture approaches for testing for bacteriuria and pyuria developed and reviewed, but none have been published recently. The majority of urine analyser systems and chemical approaches are not sensitive enough to identify low amounts of bacteriuria that could be clinically important [22].

To enable for early reporting, urine analysers can be used to test for 'negatives'. Irrespective of the screening outcome, all specimens from minors, pregnant women, immunocompromised patients, and demands for repeat culture, should be cultured. Non-infected patients may be excluded using techniques that detect both pyuria and bacteriuria.

Urine Microscopy is Used to Detect Bacteriuria

Bacteriuria can be detected using microscopic methods such as Gram staining of both uncentrifuged and centrifuged urine specimens, or through direct detection of bacteria in urine samples. Gram staining of uncentrifuged urine specimens is a simple and direct method for this purpose. A small amount of urine is placed to a glass microscope slide, which is then permitted to air dry before being dyed with Gram stain and inspected under a microscope. The urine leukocyte excretion rate is the most reliable microscopic approach for quantifying pyuria. Urinary leukocyte excretion rates in patients with symptomatic UTIs are as high as 400,000 leukocytes/h.

The Nitrite Test can be Used to Identify Bacteriuria

Whenever bacteria make nitrite from nitrate, bacteriuria can be recognised chemically. The nitrite test detects a biochemical reaction linked with *Enterobacteriaceae* (the pathogens most frequently responsible for UTIs), however the test's utility is restricted because nitrite output is not connected with urinary-tract pathogens such as *S. saprophyticus, Pseudomonas species*, or enterococci.

Urine Microscopy is Used to Diagnose pyuria

Pyuria, the presence of white blood cells in urine, can be identified and quantified using microscopic methods such as counting leukocytes with a haemocytometer, assessing leukocyte levels in urine samples through Gram staining, or enumerating leukocytes in centrifuged urine specimens. The urine leukocyte excretion rate is by far the most reliable microscopic approach for quantifying pyuria. Urinary leukocyte excretion rates in patients experiencing symptomatic UTIs are around 400,000 leukocytes/h. However, since the test is impracticable for clinical usage, laboratories must rely on alternative procedures. Counting urine leukocytes with a haemocytometer is a simple and affordable option. According to comparisons between haemocytometer counts and urine leukocyte excretion rates, a count of 10 or more leukocytes/mm³ corresponds to a urinary leukocyte excretion rate of 400,000 leukocytes/h. Additionally, in individuals with symptomatic UTIs and bacterial concentrations exceeding 10^5 colony-forming units per millilitre (cfu/ml), urine leukocyte counts of 10 or more leukocytes/mm³ are typically observed based on haemocytometer counts and urine colony counts.

CULTURES AND THE LABORATORY DIAGNOSIS OF UTIs

Routine Bacterial Urine Cultures

As part of the examination of outpatients having uncomplicated UTIs, urine culture might not even be required. Outpatients with recurring UTIs, treatment setbacks, or complicated UTIs, on the other hand, require urine cultures. Urine cultures are frequently required for inpatients who acquire urinary tract infections (UTIs). The bacterial culture remains crucial in UTI diagnosis, serving not only to confirm infection but also to identify the specific pathogenic microorganisms and conduct antibiotic susceptibility testing. This really is especially the case in light of the rising prevalence of antibiotic resistance.

Cultures of Anaerobic Bacteria in Urine

Anaerobic bacteria are abundant in the natural flora of the large intestine, vaginal canal, and skin. Recovering anaerobic bacteria from urine cultures holds little therapeutic significance for most UTI patients, as anaerobic bacteria rarely cause UTIs except in rare instances. Urine cultures for anaerobic bacteria must only be performed on individuals who have anatomic anomalies (e.g., enterovesicular fistulae) that enhance the risk of anaerobic bacteria infection. Hudac *et al*. discovered that anaerobic bacteria were recovered in 0.8% of 10 760 urine sample (27 instances) [10]. Numerous researchers have indicated the isolation of anaerobes in UTIs, but most lack adequate clinical bacteriologic description to assess the data's reliability; nonetheless, there are a few well-documented cases of infections in adults of all types.

Cultures of Fungi in Urine

As previously indicated, standard bacterial media can be used to detect almost all cases of funguria microbiologically. There is really limited information on the use of non-culture testing to diagnose funguria. Irrespective as to whether patients had simultaneous bacteriuria or an indwelling urinary catheter, found that pyuria did not interact with funguria. According to work, 354 (54.6%) of 648 patients having funguria whose urine specimens were analysed had pyuria and 230 (35.5%) had haematuria. Only 410 of the 648 patients provided urine specimen records with a statement about the prevalence or absence of yeasts; 247 (60.2%) of these 410 patients had yeast-positive urine specimens. Based on these findings, and the fact that the nitrite test is useless in the diagnosis of funguria, urinalysis seems to be of little utility in the identification of funguria at this time. One such judgement may alter when more data about the clinical prognosis of funguria patients, the findings of urine specimen testing, and the impacts of chemotherapy becomes available.

ANTIMICROBIAL SUSCEPTIBILITY TESTING

The expense of healthcare rises and the quality-of-care declines as a result of incorrect antibiotic prescriptions. Microbiology laboratories should create AST processes with quick response times to prevent the administration of broad-spectrum antibiotics and to optimise antibiotic treatment.

As a result, microbiologists have been attempting to shorten the turnaround time of bacterial identification and susceptibility tests for several years. At first, microscopic, chemical, and modern automated approaches for identifying bacteriuria presented quick and cost-effective alternatives to traditional culture procedures. Gram staining of concentrated urine samples has shown to have a good sensitivity and positive prognostic value for the detection of UTIs. Recently, real-time PCR and matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS) have been introduced for direct identification of bacterial species from urine samples.

Urine culture typically takes 18–48 h to identify microbiological pathogens that cause urinary tract infections (UTIs). Furthermore, antimicrobial susceptibility testing (AST) takes 18–24 h. The pathogens' rapid identification and AST enable quick and accurate therapy. All urine samples given for culture were prepared in the laboratory by plating and streaking. The initial 10 ml urine aliquot was plated for culture on UTI agar, blood agar, and MacConkey agar plates using 10 ml sample loops. The plates were placed in a 37°C incubator for 24 to 48 h in an oxygen-rich environment. Urine samples showing UTI pathogen growth exceeding 10,000 colony-forming units per millilitre (cfu/ml) were classified as positive. Once one species' bacterial load was $>10^4$/ml and the other's was lower, the species with the predominant proliferation was regarded as clinically important.

Samples containing over two microorganisms, on the other hand, were declared contaminated. With each urine sample, single colonies were recorded on blood agar plates, and the bacterial concentration (cfu/ml) was determined. The VITEK 2 Compact system validated strains with non-reliable identification (NRI) readings. The VITEK 2 Compact system was utilized for antibiotic susceptibility testing (AST). Specifically, AST-GN13, AST-GN09, and AST-GP67 VITEK cards were used for *Enterobacteriaceae*, non-fermenting Gram-negative bacilli, and *Staphylococci/Enterococci*, respectively, following the manufacturer's instructions. Quality control included testing with *Escherichia coli* 25922, *Pseudomonas aeruginosa* 27853, *Enterococcus faecalis* 29212, and *Staphylococcus aureus* 29213 ATCC strains to ensure the reliability of AST results.

INTERPRETATION OF URINE CULTURE

When analysing urinalysis for infection signs, there seem to be various aspects to address. The presence of bacteria in urine is a primary indicator of bacterial infection, typically quantified by the number of organisms per high-power field (HPF). In symptomatic patients, any level of bacteria in urine may suggest a UTI, but traditionally, bacteriuria is defined as 5+ (approximately 100,000 cfus/ml). An alternate definition, such as 2+ (indicating 100 cfu/ml) on urinalysis, may be considered positive in specific cases, such as catheterized or severely symptomatic patients. Microbiologists assess the need for further identification and antibiotic susceptibility testing based on the microbiological significance of growth observed on culture plates. Most culture results are straightforward, indicating either no growth, significant contamination, or the presence of common pathogens exceeding 10^5 cfu/ml of urine. For specimens collected via suprapubic aspiration or direct catheterization, the analysis of cultures that give pure growth in smaller numbers is similarly obvious. Also, interpreting urine cultures that contain mixed flora in different amounts might be challenging. However, a variety of algorithms have been created to aid in the interpretation of urine cultures, the vast amount of potential pairings of microorganisms, in changing quantities, as well as the necessity to connect these results with various forms of UTIs restricts the utility of any method. Regardless of the algorithm utilized for interpretation, laboratories should include interpretive guidelines with culture findings to help physicians assess the clinical relevance of results. Clear and definitive culture results should be reported accordingly. Test

reports for cultures yielding mixed flora in varying proportions should specify the microorganisms isolated, the quantity of each microorganism recovered, and their potential clinical significance.

Pyuria, which would be characterized as a urine WBC>10 or a positive leukocyte esterase, indicates that inflammation is present. Pyuria, on the other hand, does not always indicate that the inflammation is caused by an infection. Pyuria has limited accuracy and a positive predictive value, but its absence strongly indicates the absence of infection, with a negative predictive value of approximately 90%.

Nitrites in urine indicate the presence of nitrate-reducing organisms. However, not all urinary pathogens are capable of reducing nitrate. While a positive nitrite test is highly accurate for bacterial infection, a negative result does not reliably rule out infection, indicating low sensitivity. Additionally, exposure of the dipstick to air or medications like phenazopyridine (e.g., Pyridium, AZO), commonly used for urinary pain relief, can lead to false-positive nitrite results [23].

Table 1 summarizes the interpretation of urinalysis, focusing primarily on the first four tests that are commonly assessed to diagnose UTIs. A reflex urine culture is frequently ordered when any of the initial four tests described in Tables 1 and 2 yield positive results. This can result in a situation where antibiotic treatment may be initiated based on a positive urine culture, even if the patient shows no symptoms. A frequent issue is overtreatment of asymptomatic bacteriuria, which can be avoided by following guideline-based guidelines carefully.

Table 1. Urinalysis results.

Test	Usual range	Indicators of infection	Accuracy
Bacteria	Absent	Any amount	Low sensitivity, high specificity
Leukocyte esterase	Absent	Positive pyuria, presence of WBCs in urine	High sensitivity, low specificity
WBC	<5	Pyuria: WBC>10	High sensitivity, low specificity
Nitrite	Absent	Positive presence of bacteria that reduce nitrate	Low sensitivity, high specificity
RBC	<5	Haematuria common in infection	Low sensitivity, high specificity
Epithelial cells	<5	<5= good urine sample	High epithelial cells indicate contamination with skin flora
pH	4.5–8	pH↑ if urea-splitting organism (e.g., Proteus mirabilis) is present	Low specificity (there are many other causes of alkaline urine)

**Sensitivity likelihood of positive test when disease is present.*
**Specificity likelihood of negative test when disease is not present.*

Table 2. Microscopic examination results of urine samples from patients.

S.N.	Patient	Gender	Age	Sample	Microscopic examination
1.	Patient 1	Female	10 years	Urine	Puss cells=1–2
2.	Patient 2	Male	2 years	Urine	Puss cells=1–2
3.	Patient 3	Male	49 years	Urine	Puss cells=1–2, no growth
4.	Patient 4	Male	51 years	Urine	Puss cells=3–4, no growth
5.	Patient 5	Female	75 years	Urine	Puss cells=12–15, no growth
6.	Patient 6	Male	70 years	Urine	Puss cells=2–3, no growth, pseudomonas 10^2. *Suggestion:* Remove/change catheter
7.	Patient 7	Female	71 years	Urine	Puss cells=10–12, mixed growth of GNB (gram-negative bacteria)
8.	Patient 8	Female	30 years	Urine	Puss cells=10–15, no growth
9.	Patient 9	Male	71 years	Urine	Puss cells=20–25, *E. Coli* 10^3 cfu/ml
10.	Patient 10	Female	50 years	Urine	Puss cells=6–8, no growth

RESULT

According to the results, UTI incidence was more frequent among female patients compared to male patients. The highest occurrence of UTI was observed in patients aged 48 years and older (63.51%), followed by those aged 26–36 years (58.11%), 15–25 years (54.55%), and 37–47 years (39.19%). Additionally, females had higher rates of UTI across all age groups than males. The age range 26–36 years had the highest occurrence of UTI in females; while, the age group 48 years had the most vulnerability to UTI in males.

With a prevalence rate of 42.58%, *Escherichia coli* were determined to be the most common bacteria among all identified uropathogens. *Klebsiella pneumoniae* was the second most common isolate, followed by *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Proteus spp*., and *Enterobacter spp.*

The analysis demonstrated a higher prevalence of UTI in females (73.57%) than in males (35.14%), which is consistent with prior findings showing UTI is more common in females than in males. The increased prevalence of UTIs in females is linked to factors including the proximity of the urethral opening to the anus, the shorter length of the urethra, sexual activity, urinary incontinence, and insufficient hygiene practices in the bathroom.

CONCLUSION

Currently, hospital settings rely mostly on laboratory analysis using the urine culture reference method; this methodology necessitates a significant amount of work and can take up to 3 days to get results. It can also lead to unnecessarily high antimicrobial usage, which encourages the evolution of resistance. Using the correct antibiotic for the appropriate duration is essential. In these cases, practitioners should not hesitate to seek infectious disease specialty services to help optimize antibiotic use.

The majority of individuals with simple acute cystitis possess clinically simple presentations that may not require any laboratory tests beyond urinalysis. Yet, for a large proportion of individuals, the clinical history and physical evidence may not be enough to make a conclusive UTI diagnosis. Laboratory testing is required for those individuals, as well as those with severe UTIs, in addition to making the diagnosis and offer particular information about the pathogen's identification and antibiotic susceptibility pattern. The technique of collection should be specified on test requisition forms. Both the laboratory and clinical interpretations of test results must consider the method of sample collection used.

Despite significant progress in creating innovative tactics that may one day be effective in the treatment and prevention of UTIs, more effort is required. If left untreated, UTI can become a significant public health issue. The prevalence of UTI was higher among females of reproductive age who reported with symptoms of UTI. The signs of a urinary tract infection (UTI) can cause a lot of pain for patients, resulting in a lower quality of life. UTIs can be diagnosed and treated early to avoid consequences. Early detection and treatment will lower the possibilities of establishing further UTI complications, as well as the patient's pain, hospital stay, and financial loss. The effective management of UTIs in affected women would enable them to live a healthy and economically beneficial life in the future.

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