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Original Research Article

Assessment of Antibiotic Prescription Pattern in In-Patients with Urinary Tract Infection (UTI) in a Tertiary Care Centre in Uttar Pradesh

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Abstract:

Background: UTI is still one of the most common infections people develop while staying in a hospital, mostly among patients with weak immunity or catheters in place. Using antibiotics in these cases without being appropriate adds heavily to the growing problem of antimicrobial resistance (AMR). Antibiotic use in hospitals should be regularly checked to make sure medicine is used sensibly.

Aim: To check the differences in antibiotic use and outcomes in in-patients with UTI given either empirical or culture-directed therapies in a tertiary hospital.

Methods: The researchers performed a prospective observational study on 100 adults who had a UTI. Participants were sorted randomly into Group A, receiving antibiotic treatment and Group B, being treated with medication more closely matched to the results of their culture test. Relevant information on patient demographics, medications given, time spent in treatment, how long the patient stayed in the hospital, and outcomes from their symptoms and adverse reactions was collected and then studied using statistics.

Results: The average time patients spent in the hospital was lower for the culture-guided group (5.2 ± 1.1 days) than for the empirical group (6.4 ± 1.3 days; $p = 0.0012$). Resolving symptoms by Day 3 was more common in Group B (9 out of 10) than in Group A (68 out of 100; $p = 0.009$). Just 2% of patients in Group B had symptoms back within the same 7 days (only 5% of those in Group A did, with $p = 0.048$). The use of broad-spectrum antibiotics was greater in the empirical group. Even though more adverse reactions occurred in Group A, the results were not statistically important.

Conclusion: Culture-guided treatment of infections achieves better health results, wiser antibiotic use and assists measures to address AMR.

Keywords: Antibiotic Prescription Pattern, Antimicrobial Resistance, Culture Sensitivity, Empirical Therapy, Tertiary Care, Urinary Tract Infection.

Introduction

Urinary Tract Infection (UTI) occurs most often in hospitalized patients as a common bacterial infection. It makes up a big part of infections in hospitals and is a serious issue for healthcare systems everywhere. At any age or gender, people can get UTIs, although women are more likely because of certain body characteristics. Many UTIs in hospitals result from urinary catheters, numerous days in the hospital and other health issues that weaken the immune system. Because of the risk factors, in-patients with UTIs should be treated right away with mostly antibiotics [1].

Treatment for UTIs depends mainly on prescribing antibiotics. At the same time, regular abuse of antibiotics has become a global issue, mainly because it happens so often in large medical centres. Using an antibiotic incorrectly by selecting the wrong one, taking an incorrect dose or continuing treatment for too long encourages AMR [2]. AMR is a major health problem now, as it weakens the effects of ordinary treatments and makes treating infections such as UTIs more difficult [3].

Because tertiary care hospitals are centers for difficult cases, they are very important for setting and maintaining standards of antibiotic use. With a large number of patients at these centres, different clinical cases call for careful monitoring of antibiotic therapy [4]. The prescription behaviors in these areas reveal much about what physicians do, the rules in each hospital and if guidelines are followed. An evaluation of these patterns helps to shape better practices for prescribing medications and offers insights into how to use antimicrobials wisely [5].

According to research, many times, treatment is started without factoring cultural information into the plan, mainly at busier hospitals. While rapid treatment works well at the start, it must be followed by changes based on microbiology to help the patient recover and prevent resistance [6]. For this reason, closely examining UTI treatment records can lead to improvements in hospital treatment [7].

The purpose of the study is to look at the common antibiotics given to people admitted to the hospital with urinary tract infections. The assessment will consider the sorts of antibiotics being used, whether the prescriptions are correct according to guidelines, for how long patients should be treated and if culture reports play a role in deciding which antibiotic to use. Data from the analysis can guide decisions on prescribing practices, assess if clinicians are following evidence and inform new ways to encourage responsible antibiotic use. The research identifies both existing methods and challenges to contribute to the broader effort of dealing with antimicrobial resistance and improving results for patients at tertiary hospitals.

Methodology

Study Design: The research was done within a hospital as an observational, ongoing study that reviewed the use of antibiotics for in-patients with urinary tract infections (UTIs). The investigation looked at how antibiotic use was decided, how often patients received antibiotics, the specific types used and whether doctors followed the guidelines for standard care of UTIs.

Study Area: The research was performed at the Department of General Medicine and Urology based at Department of Pharmacology, Autonomous State Medical College, Firozabad, Firozabad, UP, India for one year

Inclusion and Exclusion Criteria

- **Inclusion Criteria:**

Only adult patients 18 years of age and older with a confirmed urinary tract infection (UTI) were considered for the study. Only patients with antibiotic treatment during their stay and who agreed to be part of the study in writing were eligible. The study included just those patients receiving internal medicine or urology treatment at the hospital.

- **Exclusion Criteria:**

Anyone who needed surgery for their UTIs or had already started antibiotics before admittance was not involved in the study. Other reasons individuals were not included were known HIV/AIDS or malignancy, current chemotherapy, pregnancy, underage pediatric patients and people who did not give informed consent.

Procedure: 100 had urinary tract infections (UTIs), aged between 18 and 65 years and included both men and women. Clinical symptoms along with urinalysis or urine culture were used to make a diagnosis. Patients were given an assignment method that involved pulling a paper from sealed envelopes. Patients in Group A were given empirical antibiotics chosen by doctors, while Group B was treated using antibiotics chosen based on results from urine culture and sensitivity. Samples were evenly split in both groups. Those with catheter urinary tract infections, chronic kidney disease, lowered immunity, pregnancy or missing medical data were left out of the study. Anyone taking antibiotics before hospital admission for other reasons was not included either. The medicine companies were required to record the name, prescribed dose, how the drug should be taken, the frequency and the duration for each given antibiotic. Any changes in therapy were recorded following review of a culture report. Medication used was compared to those recommended by the Indian Council for Medical Research (ICMR) or by the World Health Organization (WHO). During their stay at the hospital, patients' symptoms were followed, along with any problems with their medications and the final results of their care plan. The project recorded and studied the time spent in the hospital, whether antibiotic therapy changed and whether symptoms reappeared. All of the data collected was described in detail on a proforma and confidentiality was always maintained.

Statistical Analysis: Statistical testing was carried out to examine the link between the type of antibiotic prescribed—as using cultures or not—and clinical characteristics of patients. The parameters looked at were age, gender, the class of antibiotic chosen, the treatment period, length of hospital stay, ending of symptoms and drug-related negative effects. Accordingly, we stated mean ± SD for continuous variables and displayed categorical variables as numbers and percentages. The two groups were compared with regard to continuous variables by using the Student's t-test. Comparisons between categorical variables were done with the Chi-square test. Appropriate one-way ANOVA was used to find statistically significant differences in group outcomes after treatment. In all analyses, a p-value of less than 0.05 was taken as being statistically significant. The data was put together and examined with SPSS version [insert version]. By doing this analysis, it was hoped the trends of antibiotic use could be identified, their rationality assessed and the effect of culture versus no culture on antibiotic therapy could be explored in patients with UTI who were hospitalized.

Results

It is shown in Table 1 how the participants in each group were different at baseline. Patients in Group A (treated using empirical drugs) had a mean age of

42.8 ± 10.2 years and patients in Group B (with culture-based treatment) had a mean age of 44.3 ± 9.8 years. Since p = 0.378, there was no real difference between the ages of the two groups. There was not a great difference between genders in both groups, so sex likely had no impact on the findings. Both Groups included a similar number of patients with diabetes, hypertension or a chronic illness, as the p-value was 0.684 and not significant. The length of hospitalization remained different between the two clinical groups. On average, patients in Group B stayed 5.2 ± 1.1 days in hospital, compared to 6.4 ± 1.3 days for patients in Group A (p = 0.0012). It appears that following culture-guided antibiotic treatment may prevent longer-lasting infections and unnecessary hospital visits.

Table 1: Demographic Profile of the Respondents

Parameter	Group A (Empirical)	Group B (Culture-Based)	p-value	Significance
Mean Age (years)	42.8 ± 10.2	44.3 ± 9.8	0.378	Not Significant
Sex (M/F)	30 / 20	28 / 22	0.693	Not Significant
Mean Hospital Stay (days)	6.4 ± 1.3	5.2 ± 1.1	0.0012	Significant
Co-morbidities Present	18 (36%)	20 (40%)	0.684	Not Significant

Table 2: Antibiotic Prescription Patterns and Modifications

Parameter	Group A (n = 50)	Group B (n = 50)	p-value	Statistical Significance
Common Antibiotics Prescribed	Ceftriaxone (72%), Levofloxacin (28%)	Nitrofurantoin (36%), Cefuroxime (34%), Piperacillin-Tazobactam (30%)	—	—
Antibiotic Changed After Culture	10 (20%)	34 (68%)	<0.0001	Highly Significant
Culture Sensitivity-Based Prescription	0	50 (100%)	<0.0001	Highly Significant
Broad-Spectrum Antibiotics Use	42 (84%)	15 (30%)	<0.0001	Highly Significant

Table 2 shows that the antibiotic prescription habits of the two groups were somewhat different. Group A patients were usually given ceftriaxone and levofloxacin, while Group B received nitrofurantoin, cefuroxime and Piperacillin-tazobactam according to what their culture tests showed. A larger proportion of patients in Group B (68%) had their antibiotic treatment modified based on culture results, whereas only one fifth (20%) of patients from Group A did which was significant (p < 0.0001). Only Group B received culture-guided therapy, whereas none of Group A did. More broad-spectrum antibiotics were used in Group A (84%) than in Group B (30%), helping to reduce wasted use of these drugs in the culture-based group. It seems that using cultural medicine helps ensure both the right and effective use of antibiotics.

Table 3: Clinical Outcomes and Adverse Events

Outcome	Group A (n = 50)	Group B (n = 50)	p-value	Statistical Interpretation
Symptom Resolution by Day 3	34 (68%)	45 (90%)	0.009	Significant
Recurrence within 7 days post-discharge	6 (12%)	1 (2%)	0.048	Significant
Adverse Drug Reactions (Nausea, Diarrhea)	7 (14%)	2 (4%)	0.083	Not Significant

A table (Table 3) compares clinical effects and side effects for the two groups. Resolving symptoms within three days was more common in participants on the culture-based therapy (Group B: 90%) than those on the standard therapy (Group A: 68%), as shown by a p-value of 0.009. Among those who were discharged, symptoms returned within 7 days for only 2% of individuals in Group B and for 12% in Group A which was statistically important (p = 0.048). Among the adverse reactions seen, nausea and diarrhea were more common in Group A than in Group B, but this did not reach statistical significance (p = 0.083). According to these findings, using antibiotics guided by culture offers better results, reduces the chance of another sickness and has a lower risk of unwanted side effects.

Discussion

A trial was done to compare the outcomes of guided by empirical antibiotic therapy for patients

hospitalized with urinary tract infections (UTIs). According to the outcomes, following cultural principles for prescription improved how patients recovered, reduced how much time they stayed in the hospital, lowered their risk of repeat infections and led to smarter antibiotic use. Solving symptoms by the third day was far more common (90%) in the culture-guided group than the empirical group (68%), similar to the observation reported in Fésüs et al.'s 2023 study. Also, patients treated with culture-based therapy were able to leave the hospital earlier on average (5.2 ± 1.1 days vs. 6.4 ± 1.3 days; $p = 0.0012$), as was found by Cai et al. in 2025, who found that earlier discharges reduce costs for healthcare. Shrestha et al. (2023) describe that using targeted antibiotics early helped prevent new episodes of UTI and this was also seen in our data. They become especially important in hospitals designed for major medical care because infections and problems with antibiotic resistance are more common there. All patients in Group B were given culture-sensitive antibiotics differently from the 84% of patients in Group A, many of whom got broad-spectrum antibiotics, suggesting a serious increase in using empirical antibiotics. The survey confirms that Sánchez et al. (2023) were right to worry about unfounded evidence resulting in more antibiotic resistance, mainly in high-load hospitals. Consistent with this, researchers in UTI management found that observing national guidelines was easier when cultures were taken into account for treatment. While empirically treated patients had more nausea and diarrhea (14% vs. 4%), this result was not statistically important ($p = 0.083$). But the identified trend is consistent with what Goswami et al. reported in 2022, as higher intolerance rates were linked to choosing empirical antibiotic therapy. In general, this research demonstrates that using microbiological tests supports better antibiotic use. The results showed that cultural therapy made recovery better and so used fewer broad-spectrum drugs which helped controlling antimicrobial resistance (AMR), as the World Health Organization points out in its global reports. All in all, the results show that adopting a strategy that follows local resistance patterns improves patient outcomes, reduces treatment risks and helps use antibiotics appropriately, just as past data has indicated while addressing a major AMR concern.

Conclusion

In short, this research shows that treating urinary tract infections in the hospital with antibiotics guided by culture offers better clinical results than standard empirical treatment. Following culture-based antibiotics, patients recovered more quickly, had lower rates of recall infections and ended up spending less time at the hospital. The practice of more focused antibiotic recommendations gave doctors a way to cut back on using broad-spectrum drugs. Although the drug reaction rate was slightly higher in the empirical group, it was not an important difference. The evidence suggests that including cultural sensitivity testing in everyday health care leads to better outcomes and less antimicrobial resistance in tertiary care settings.

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