

# Antibiotic Usage and its Culture Sensitivity Pattern in Urinary Tract Infections at Tertiary Hospital in Eastern Nepal

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## Citation

Panday DR, Amar A, Subedi A, Hussain Md S, Gupta M, Rauniar GP. Antibiotic Usage and its Culture Sensitivity Pattern in Urinary Tract Infections at Tertiary Hospital in Eastern Nepal. *Kathmandu Univ Med J.* 2017;60(4):332-5.

## ABSTRACT

### Background

The presence of microbial pathogen in the urinary tract is Urinary Tract Infection (UTI). In BP Koirala Institute of Health Sciences (BPKIHS), each year there are around 1000 cases of UTIs. Antibiotic is empirically started after sending culture/sensitivity (c/s) with intention to change antibiotic if c/s demands.

### Objective

To see the antimicrobial prescribing pattern and c/s pattern of UTI inpatients of BPKIHS together with their socio-demographic and laboratory profile.

### Method

It was a Record-Based Retrospective Descriptive Study of past one-year. All available inpatient-records from Medical-Record Section were extensively searched for the keyword "UTI" diagnosis. The relevant data were entered in Microsoft Excel-sheet and analyzed with IBM SPSS 21. Ethical clearance was obtained from the IRC before study.

### Result

There were 86 cases from four different wards. There was slight female preponderance (51.16%). Fifty-five (63.95%) cases were complicated. Fever (75.51%) was the most common symptom. Only 20% were tachycardic but 90% were tachypnic. Leucocytosis (59.26%), urine albumin within 30-100 mg/dl (33.85%) and >5 Urine WBC/hpf (80.26%) were seen. Ceftioxone (53.16%) was the most commonly prescribed empirical antibiotic, followed by Cefixime (6.32%). Fourteen (16.27%) cases were culture positive. *E. coli* was the most (78.57%) common pathogen grown. In culture sensitivity study, *Amikacin* (42.85%) was the most sensitive antibiotic.

### Conclusion

Eighty-six UTI inpatients were identified last year. Fever and Tachypnoea were very common. Leucocytosis, 1+ proteinuria and urine WBC>5/hpf were frequently seen. *Ceftioxone* was the most common antibiotic prescribed. *E. coli* was the most common pathogen grown and *Amikacin* was the most sensitive antibiotic.

## KEY WORDS

*Antimicrobial, Inpatients, Urinary tract infection*

## INTRODUCTION

Urinary Tract Infections (UTIs) are a group of diseases with the presence of microbial pathogens in the urinary tract. UTI developing in normal genito-urinary tract with no prior instrumentation is uncomplicated and those developing in people having structural and functional abnormalities, is complicated.<sup>1</sup> Specific subpopulations are at increased risk, including infants, pregnant women, elderly and immune-deficient.<sup>2</sup>

Worldwide, about 150 million people are diagnosed with UTI each year, costing in excess of 6 billion dollars.<sup>3</sup> Urinary tract disorders in Nepal are estimated to be about 7% and UTI constitutes majority of these disorders.<sup>1,7</sup> In BPKIHS alone, each year there are around 1000 cases of clinician diagnosed UTI.<sup>4</sup>

Antibiotic resistance is a global public health issue.<sup>5</sup> The antimicrobial resistance are constantly evolving.<sup>6</sup> At times rational prescribing, defined as prescribing appropriate drug for appropriate indication in appropriate patient through appropriate route for appropriate duration with adequate monitoring, is lacking.<sup>7</sup>

The study was conducted to see the socio-demographic and laboratory data of UTI inpatients in the past one year along with common uropathogen grown, their culture sensitivity pattern, antibiotic prescribing and susceptibility pattern. The result may help shape the antibiotic policy of BPKIHS regarding UTI.

## METHODS

It was a Record-Based Retrospective Descriptive Study carried out in BPKIHS from 17<sup>th</sup> April, 2016 to 14<sup>th</sup> May, 2016. Ethical clearance was obtained from the Institutional Review Committee prior to the study. All past one-year inpatient-records (1<sup>st</sup> April 2015-1<sup>st</sup> April 2016) from Medical-Record Section were extensively searched for the keyword "UTI" diagnosis and were included. Patients known to use antibiotics before the urine sample collection were excluded. Appropriate permission from the respective department was taken as and when required and confidentiality of the participants were strictly maintained. The relevant data were entered in Microsoft Excel sheet and analyzed with IBM SPSS 21.

## RESULTS

Total 86 clinician-diagnosed UTI inpatient files were enrolled. Empirical antibiotic state of 79 inpatients were retrieved. *Ceftriaxone* (53.16%), followed by *Cefixime* (6.32%), *Amikacin* (5.53%) and *Piperacillin* (5.53%) were the most commonly used empirical antibiotics (fig. 1).

In our study, 16.27% (14/86) UTI cases were culture positive. *E. coli* was the most (78.57%) common pathogen grown (fig. 2). In those culture positive cases (Table 1), *Amikacin* was

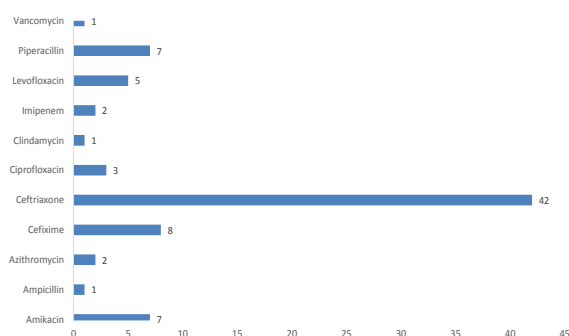


Figure 1. Empirical antibiotics among UTI patients in BPKIHS

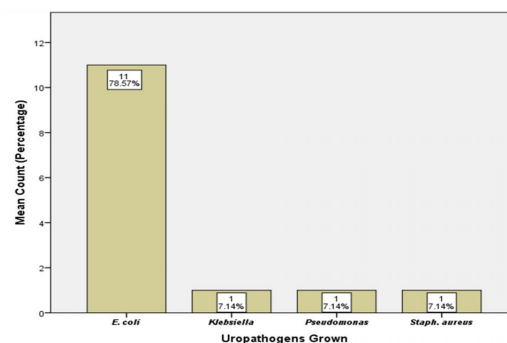


Figure 2. Bar-diagram showing 14 Uropathogens grown

found to be the most sensitive (42.85%) antibiotic followed by *Nitrofurantoin* (28.57%) and *Imipenem* (21.42%).

Among the culture positive cases, *Ceftriaxone* was the most common antibiotic prescribed empirically (30.76%) as well as after c/s test (23.07%). In 46.15% (6/13) culture positive cases, same antibiotic was continued after c/s report (Table 2).

Maximum cases (71.76%) were from medicine ward (fig. 3). Slightly more cases (51.16%) were seen in female. Majority i.e. 63.95% (55/86) cases were complicated. Fever (75.51%), burning micturation (36.05%), pain abdomen (25.58%) and vomiting (13.95%) were respectively the most common symptoms of UTI. Mean fever duration at presentation was 4.3±2.7 days. Majority had normal diastolic and systolic blood pressure. Around 20% patients were tachycardic however, 90% were tachypnic. Leukocytosis was detected in 48 (59.26%) patients however 1(1.23%) was leucopenic. Renal function was deranged (creatinine>1.4 mg/dl) in 53.75% of patients. In 80.26% patients, WBC in urine microscopy was equal to or more than 5/hpf. Many (40.82%) showed hematuria. In most patients (33.85%) urine albumin was '+' i.e. within 30-100 mg/dl (fig. 4).

## DISCUSSION

Culture positivity in our case was 16.27%. which was slightly higher than in the study done in Jawahar Lal Nehru Medical College And Hospital, Aligarh, India.<sup>8</sup> However, another similar study from Nepal itself revealed 21% culture positivity.<sup>9</sup> As in a north-east Ethiopian study and others, the most common uropathogen grown was *E. coli*.<sup>10,11</sup>

**Table 1. Culture sensitivity report of 14 culture-grown uropathogens**

Uropathogen cultured	Ceftriaxone	Ofloxacin	Amoxicillin	Amikacin	Imipenem	Nitrofurantoin	Norfloxacin
<i>E.coli</i>	S	S	S	R	R	R	S
<i>E.coli</i>	R	R	R	S	R	R	R
<i>Pseudomonas</i>	R	R	R	S	R	R	R
<i>E. coli</i>	R	R	R	R	R	S	R
<i>E.coli</i>	R	R	R	S	S	S	R
<i>E.coli</i>	R	R	R	R	S	S	R
<i>E.coli</i>	R	R	R	S	R	S	R
<i>E.coli</i>	R	R	R	R	S	R	R
<i>E coli</i>	R	R	R	S	R	R	R
<i>E.coli</i>	S	R	R	S	R	R	R
<i>Klebsiella</i>	S	R	R	R	R	R	R
<i>E.coli</i>	R	R	R	R	R	R	R
<i>Staph aureus</i>	R	R	R	R	R	R	R
<i>E coli</i>	R	R	R	R	R	R	R
Percentage Sensitivity of the given antibiotic among the 14 microbes cultured.	21.42% (3/14)	7.14% (1/14)	7.14% (1/14)	42.85% (6/14)	21.42% (3/14)	28.57% (4/14)	7.14% (1/14)

S=Sensitive to the drug, R=Resistant to the drug

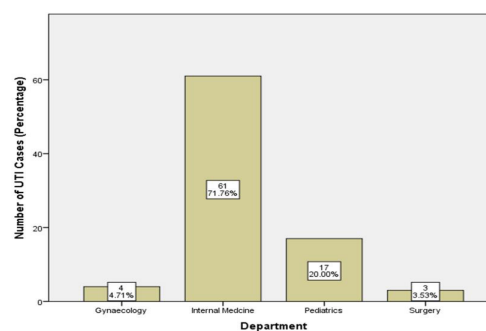
**Table 2. Antibiotic used before and after culture sensitivity test**

Uropathogens cultured	Antibiotics before	Antibiotics after c/s
<i>E.coli</i>	Ceftriaxone	Ceftriaxone
<i>E.coli</i>	Piperacillin	Clavulanic Acid
<i>Pseudomonas</i>	Ceftriaxone	Ceftriaxone
<i>E.coli</i>	Piperacillin	Nitrofurantoin
<i>E.coli</i>	Amikacin	Amikacin
<i>E.coli</i>	Imipenem	Imipenem
<i>E.coli</i>	Amikacin	Nitrofurantoin
<i>E.coli</i>	Ceftriaxone	Ciprofloxacin
<i>E.coli</i>	Ceftriaxone	Ciprofloxacin
<i>E.coli</i>	Cefixime	Amikacin
<i>Klebsiella</i>	Ceftriaxone	Ceftriaxone
<i>E.coli</i>	Metronidazole	Metronidazole
<i>Staph aureus</i>	NA	NA
<i>E.coli</i>	Piperacillin	Levofloxacin

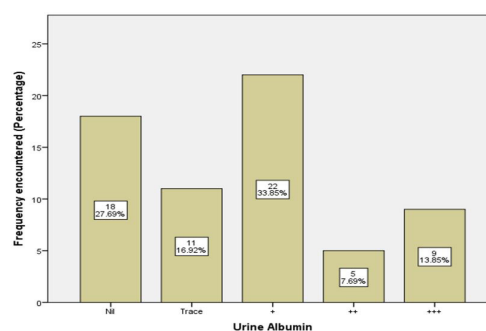
NA: Data not available

In our study, antibiotic with least resistance was found to be *Amikacin*, however, study from Tehran showed that lowest resistance rate of microorganisms was against ciprofloxacin.<sup>12</sup> In our hospital, Antibiotic susceptibility against *Ciprofloxacin* was not seen. *Ceftriaxone* followed by *Cefixime* seems to be the most common empirical antibiotics in BPKIHS. When second antibiotic was added *Levofloxacin* was the most common antibiotic. Empirical therapy guidelines should be updated periodically to reflect changes in antimicrobial resistance of uropathogens.<sup>13,14</sup>

Most cases were present in Medicine ward and female had slightly more preponderance of UTI than male like seen in most of the studies.<sup>8,11,15</sup> Our study sample mainly



**Figure 3. UTI in different departments of BPKIHS**



**Figure 4. Urine albumin among UTI patients in BPKIHS**

comprised of complicated UTI since the data comprised of inpatients. Study revealed fever to be more common presenting symptom even more common than burning micturation. Most patients were tachypnic. It may be attributed to fever.<sup>16</sup> One Polish study showed that Fever is an alarming symptom of UTI in children.<sup>17</sup> Almost half the patients had deranged Renal Function Test. It may be because of excessive number of complicated UTI with renal involvement in our case. As anticipated, urine microscopy revealed equal to or more than 5 pus cells/hpf in about 4/5<sup>th</sup> diagnosed hospital UTIs. A study by Munyi et al. showed

that presence of pyuria, defined as five or more pus cells per high power field, had a sensitivity of 80%, specificity of 97.1% and a positive predictive value of 70.6% while comparative values associated with a positive nitrite test were 60%, 97.7% and 96%.<sup>18</sup> Mild Proteinuria (30-100 mg/dl) was seen in 1/3<sup>rd</sup> cases followed by no proteinuria. In the comparison of patients with and without leukocyturia, it is seen that proteinuria ( $p=0.06$ ) and bacteriuria ( $p < 0.002$ ) were more common in the women with pus cell in urine.<sup>19</sup>

The study was retrospective so it may not reflect current trend. Again things might be missing from records which at times are unavoidable. This was a cross-sectional study. So, we only gave the picture of UTI inpatients at BPKIHS but cannot associate causality. The fact that the patients might have been using antibiotics even before giving sample for

c/s, cannot be negated. Antibiotic susceptibility against all important antibiotics were not performed. Only inpatients, mostly with complicated UTIs, were included.

## CONCLUSION

One year retrospective inpatient data of clinically diagnosed UTI in BPKIHS reveals that *Ceftriaxone* is the most common empirical antibiotic prescribed. *E. coli* is the most common uropathogen grown. In 16% patients with culture positivity, *Amikacin* was the antibiotic with least resistance. Most cases were from Medicine ward. Patients were mostly female and fever was the most common presenting symptom.

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