

Urinary Tract Infection: Analysis of Prescribing Pattern of Antibiotics

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Abstract

Antibiotics are one of most common drugs prescribed in hospital today. It has been estimated that up to one-third of all patients receive at least one antibiotics during hospitalization. The cost involved is therefore correspondingly high and up to 40% of a hospital's drug expenditure may be devoted to the purchase of antibiotics¹. The objective of this study was to analyze the prescribing pattern of antibiotics in Urinary Tract Infection (UTI). A prospective cross sectional and observational study was conducted on patients diagnosed with UTI. The study was carried out in the OBG and Urology departments of both in-patients and out-patients, for a period of 5 months (Aug 2011 to Dec 2011). Patients diagnosed with UTI and who were above age group of 15-years were included in the study. A suitable data collection form was prepared to collect the required data. Among 162 patents, 54 were in-patients and 108 were out-patients. Most of the in-patients were prescribed with Ciprofloxacin 13(22.8%), and Ceftriaxone 19(33.3%). In out-patients, Ciprofloxacin 25(23.8%), Norfloxacin 15(14.3%) and Ceftriaxone 14(13.3%) were prescribed frequently. The study found that gram negative organisms like *E. coli* and *Klebsills* was the most predominant organisms associated with infection. It was also found that Cephalosporin's were most commonly used and Quinolones were the second most commonly used drugs for the treatment of UTI.

Key words: UTI, Prescription pattern, Antibiotics, Clinical pharmacist

Introduction

Urinary Tract Infection (UTI) is defined as the presence of micro organisms in the urine that cannot be accounted by contamination. These organisms have the potentiality to invade into the tissues of the urinary tract and adjacent structures². Urinary tract infection is an extremely common condition that occurs in both males and females of all ages³.

UTI is the second most common infectious disease in the community medical practice. Worldwide, about 150 million people are diagnosed with UTI each year, costing an excess of 6 billion dollars. The resistance pattern of community acquired uropathogens has not been extensively studied in Indian subcontinent^{4,5}.

UTIs account for more than 100,000 hospital admissions annually, most often for pyelonephritis. They also account for at least 40% of all hospital acquired infections; the majority of these cases are catheter associated⁵.

UTI may lead to life threatening complications like sepsis and renal scaring. Renal scaring is the most common cause of hypertension in later childhood and renal failure in adults. Recognition of UTI in children should be made as early as possible to prevent these complications. Therefore, investigations for early diagnosis of UTI are of most importance⁷. Two clinical entities are recognized in patients with symptomatic UTI: lower UTI (cystitis) and upper UTI (pyelonephritis)⁶.

It is an area in which a pharmacist's knowledge/expertise's is valued by the health care professionals can be recognized and appreciated. Clinical pharmacists are able to provide a very valuable role in screening of interactions and advising in its management either at the patient's bedside or in the dispensing process or sale of a medicine⁸.

The medical audit improves the standards of medical treatment at all levels of health care delivery system. So, the medical audit is necessary for rationality. The study of prescribing pattern is a component of medical audit

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which seeks monitoring, evaluation and necessary modifications in the prescribing practices of the prescribers to achieve rational and cost effective medical care. It is necessary to define the prescribing pattern and to identify the irrational prescribing habits to drive a remedial message to the prescribers⁹.

Providing patient education helps in avoiding potential drug interactions. Verbal advice should be given to all patients, and particularly to those who are illiterate. The patient information leaflets can be useful or a simple warning message printed on the medication chart, will help for better understanding or usage¹⁰.

Apart from economic factors, the problem of selecting/choosing an antibacterial agent for pregnancy UTI is the possible confusion between a well established, well tolerated drug, empirically known to be harmless to the foetus, and also a drug which is having a low level of bacterial resistance.

Material and Methods

This was a prospective cross sectional and observational study conducted in the OBG and Urology departments of Basaveshwara Medical College Hospital and Research Centre; Chitradurga, for a period of 5 months (Aug 2011 to Dec 2011). Information which was considered during the data collection were: age, sex, occupation, educational level, indications for antibiotic use, co-morbid conditions, whether the investigations were done or not, whether the investigations which were done were relevant for the diagnosis and whether the results were out before the commencement of the antibiotics. The information on the types of investigations and the sensitivity pattern, types, dosages, duration and the drug combinations of the antibiotics prescribed were also collected. The results of culture and sensitivity testing were entered into the patient indicator form. The antibiotics prescribed for parental use and indications for their use were also analyzed separately.

Sources of data:

Patient case sheet,

Medication chart, and

Lab reports

Study procedure:

Prescriptions of out-patients and the treatment charts of in-patients were reviewed for the treatment of the UTI in different departments like OBG and Urology.

Results and Discussion

Essential drug offer a cost effective solution to many health problems in a developing country. Prescribers can only treat patients in a rational way if they have access to an Essential Drug List (EDL) and essential drugs are available in a regular basis as mentioned previously, WHO has selected a core of drug use indicators to access the scope of improvement in rational drug use in outpatient practice. Regarding the use of antibiotics relatively high levels of availability and consumption of antibiotics in developing countries have led to higher incidence of inappropriate use and greater levels of resistance than in developed countries⁷.

Table 1: Gender wise distribution

IP/OP	Female	Male	Total	
	N	N	N	%
Inpatient	39	15	54	33.3
Outpatient	90	18	108	66.7

In our study we found that, out of 162 patients, males were 57 and females were 105 as shown in table 1. The greater number of patients in female group is due to the structural and anatomical differences in the females due to shorter urethra. The same observations were made by Tomas Greibling in his studies and also a text book on Urinary tract infection in males and also in the text books of Pharmacotherapeutics by Herfindal and Roger walker^{3, 11, 9}.

Out of total 162 patients, 54 were in-patients and 108 were out-patients. Out-patients were more and may not require to get admit in the hospital. Out-patients were asked to visit for the follow up after one week which is denoted in table 2.

Table 2 : distribution of inpatients and out patients

Gender	Number of patients	%
Male	57	35.1
Female	105	64.9
Total	162	100

Most of the females visited OBG 72(44.5%) and least 16(36.3%) was in Urology department. Thirty nine (84.8%) females and 7(15.2%) males visited the department of general medicine. Twenty eight males (63.7%) visited urology department. As denoted in the table 3.

Table 3: Distribution of patients based on the department wise

Department	Male		Female		Total	
	N	%	N	%	N	%
OBG	0	0	72	100	72	44.50%
Urology	28	63.7	16	36.3	44	27.10%
Medicine	7	15.2	39	84.8	46	28.40%

Among 162 study population, males 14 (24.6%) have higher education level, females 31 (29.5%) are illiterate. Seven (12.3%) males and 9(8.6%) females have completed primary education and 21(36.8%) males and 43(41.0%) females have completed secondary education. Eleven (7.7%) males and 14(12.4%) females educated up to PUC and 14 (25.6%) males and 8(7.2%) females were under graduates. Education provides the basic concepts of many factors in health and hygiene; due to improper maintenance of hygienic factors the incidence of UTI in females may be relatively high as shown in table 4.

Table 4: Distribution of patient's education level

Education	Male		Female		Total	
	N	%	N	%	N	%
Illiterates	4	7	31	29.5	35	21.6
Primary	7	12.3	9	8.6	16	9.9
Secondary	21	36.8	43	41	64	39.5
PUC	11	19.3	14	13.3	25	15.4
Under Graduates	14	24.6	8	7.6	22	13.6
Total	57	100	105	100	162	100

The prescribing pattern of antibiotics was studied in in-patients and out-patients. Among the 10 types of drugs prescribed, Ciprofloxacin was prescribed to only 13(22.8%) in-patients whereas it is prescribed for 25(23.8%) out-patients. Ceftriaxone was prescribed to 19(33.3%) in-patients and 14(13.3%) of out-patients. Norfloxacin was prescribed to 4(7.0%) in-patients and 15(14.0%) out-patients. Nitrofurantoin was not at all prescribed in in-patients whereas in out-patients it was prescribed for 12(11.4%). Cefotaxim was prescribed to 4(7.0 %) of in-patients and 07(6.7%) of out-patients. Among the total of 07 Amoxicillin prescriptions, 03(5.3%) were prescribed to in-patients and the rest 04(3.8%) were given to out-patients as denoted in table 5.

Table 5: Distribution of prescribing pattern of antibiotics

Prescribing pattern of antibiotics	Male		Female		Total	
	N	%	N	%	N	%
Amoxicillin	3	5.3	4	3.8	7	4.3
Amikacin	4	7	2	1.9	6	3.8
Cefepime	2	3.5	7	6.7	9	5.5
Cefixime	5	8.8	9	8.6	14	8.6
Ciprofloxacin	13	22.8	25	23.8	38	23.4
Cefotaxime	4	7	7	6.7	11	6.8
cefadroxil	3	5.3	10	9.5	13	8
Ceftriaxone	19	33.3	14	13.3	33	20.4
Nitrofurantoin	0	0	12	11.4	12	7.4
Norfloxacin	4	7	15	14	19	11.8
Total	57	100	105	100	162	100

It was also found that Cephalosporins 33(57.9%) and Quinolones 17(29.8%) were most commonly prescribed for the treatment of UTI, similar results also seen in a study on Community acquired urinary tract infection: etiology and bacterial susceptibility by Jose A D et al. which also states that Gram-negative agents are the most common cause of UTI⁴⁸. Fluoroquinolones remains the choice among the orally administered antibiotics, followed by second and third generation Cephalosporins. In another study on Current antibiotic therapy for isolated urinary tract infections in women by Kallen AJ et al. found that Quinolones were more commonly prescribed¹³.

Based on the disease characteristics and symptoms presented by the patients the disease is divided into two types that are symptomatic and asymptomatic. Among 57 male patients 26 (24.8%) of them are symptomatic and 31(54.3%) were asymptomatic. Among 105 female patients 79(64.8%) were symptomatic and the remaining 26(45.7%) were asymptomatic.

Table 6: Distribution of UTI type

Symptomatic/ Asymptomatic	Male		Female		Total	
	N	%	N	%	N	%
Symptomatic	26	45.8	79	75.2	105	62.8
Asymptomatic	31	54.3	26	24.8	57	35.2
Total	57	100	105	100	162	100

The table 6 shows that females are more symptomatic than males. Symptomatic UTIs can occur essentially in all members of the population but are most prevalent in females. The same observations have been identified which is also mentioned in the text book of pharmacotherapeutics by Herfindal in the epidemiology of urinary tract infection¹⁰.

Table 7 shows that the incidence of pus cells was significantly more associated with in-patients 24(42.2%) and it was much lower in out-patients with 22(20.9%) patients. This may be due to the indwelling catheters in the inpatients, the presence of pus cells and epithelial cells were more observed.

Table 7 shows that the presence of pus cells in the range of 1-5 is more in out-patients than in-patients. The presence of 6-10 pus cells is shown more in in-patients (8) than out-patients (7). Equal number of in-patients and out-patients shown to have more than 10 pus cells in their urine and are presented with this feature.

Table 7: Urine analysis: Reports of Pus cells in the inpatients (IP) and the outpatients (OP)

Urine analysis: Pus cell	IP		OP		Total	
	N	%	N	%	N	%
Nil	19	33.33	53	50.5	72	44.4
Present	24	42.1	22	21.0	46	28.4
1 to 5	2	3.5	19	18.1	21	13.0
6 to 10	8	14.0	7	6.7	15	9.3
>10	4	7.0	4	3.8	8	4.9
Total	57	100	105	100	162	100

Table 8 shows the incidence of epithelial cells is more associated with in-patients 23(40.3%). The incidence of epithelial cells in out-patients was 19(18.1%) which is much lower than in-patients.

Table 8: Urine analysis: Reports of Epithelial cells in the inpatients (IP) and the outpatients (OP)

Urine analysis: Epithelial cells	IP		OP		Total	
	N	%	N	%	N	%
Nil	27	47.4	72	68.6	99	61.1
Present	23	40.4	19	18.1	42	25.9
1 to 5	4	7.0	4	3.8	8	4.9
6 to 10	2	3.5	8	7.6	10	6.2
>10	1	1.8	2	1.9	3	1.9
Total	57	100	105	100	162	100

Conclusion

Cephalosporins and Quinolones were the most commonly prescribed antibiotics in this study. Present findings together with previous ones are suggestive of need of periodic monitoring of antibiotic sensitivity pattern of the bacterial isolates to provide effective treatment and thereby to make it more cost effective particularly in the developing countries like India.

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