Research article   **Open Access**

Drug utilization study in urinary tract infection in a tertiary care hospital: a prospective study

Rushika S. Modi[1], Sagun V. Desai[2]

[1]*Assistant Professor, Department of Pharmacology, Banas Medical College & Research Institute, Palanpur, Gujarat*

[2]*Professor, Department of Pharmacology, Sbks Medical Institute & Research Centre, Piparia, Vadodara, Gujarat*

*Corresponding author: Rushika S. Modi

Email: rushika_modi@yahoo.com

ABSTRACT

Introduction

Urinary tract infection (UTI) is one of the most common infections in outpatients setting as well as in acute and long term care hospital patients. Successful treatment and prevention of recurrence of UTI require bacteriological identification, its sensitivity to antimicrobials, selection of appropriate antimicrobials and their appropriate application.

Methodology

In present study 212 patients have been included from Medicine, Surgery and Obstetrics & Gynaecology Department over one year period.

Result

Each patient have been given on an average 1.68 ± 0.77 and 0.86 ± 1.04 medicines by branded and generic names. Fluoroquinolones were the most commonly used antibacterials followed by cephalosporins. 47.13% medicines were listed in the 19th model list of essential medicines (WHO, 2015). 89.64% medicines prescribed rationally. All 541 (100%) medicine uses were found to be appropriate or most appropriate.

Conclusion

Fluoroquinolones and cephalosporins were the most commonly prescribed antibiotics. The need to adhere to standard treatment guidelines and prescribing from the essential drug list, using generic names have to be impressed upon treating physicians.

Keywords: Urinary tract infection, Drug Utilization, Antimicrobials

INTRODUCTION

Urinary tract infection (UTI) is defined as the presence of bacteria in urine along with symptoms of infection. UTI is one of the most common infections in outpatients setting as well as in acute and long term care hospital patients [1]. Drug utilization is defined by the WHO as the "marketing, distribution, prescription and use of drugs in society with special emphasis on the resulting medical, social and economic consequences." Drug utilization studies help to recognize and report irrational prescribing which adds on to patient morbidity and economic burden [2]. Successful treatment and prevention of recurrence of UTI requires bacteriological identification, its sensitivity to antimicrobials, selection of appropriate antimicrobials and their appropriate application with regard to dosage form, route of administration, dose, frequency of administration and duration of administration. Moreover, the drugs used must be safe enough and available at affordable cost [3].

There is a need to study and evaluate these treatment aspects of UTI. To the best of our knowledge, there is paucity of data on this kind of study. Therefore, we undertook the present study to gather the relevant data on drug utilization in patients attending to the outpatient departments and admitted to medicine, surgery and obstetrics and gynecologydepartments of Dhiraj Hospital- a tertiary care teaching rural hospital in Gujarat.

MATERIAL AND METHODS

The cross sectional, prospective and observational study were carried out during March 2014 to February 2015 including 212 patients diagnosed with urinary tract infection from Medicine, Surgery and Obstetric&Gynecology Department of Dhiraj General Hospital of the SumandeepVidyapeeth University (30-40 patients from outpatient and indoor of each department). Demographic profile, disease pattern, profile of medicine, essentiality and rationality of medicines and appropriateness of use of medicines were analyzed. Appropriate statistical methods like chi-square test, population test or t-test were employed to analyze data throughout the study. "p" value equal to or less than 0.05 were considered as significant.

RESULTS

Data from 212 patients were completely extracted and analyzed. Each OPD and IPD patient received an average of 2.15 ± 1.22 and 2.78 ± 0.80 medicines per day respectively. All 212 patients were prescribed 29 formulations, culminating into a total of 541medicine uses. Each patient had received on an average 1.68 ± 0.77 and 0.86 ± 1.04 medicines by branded and generic names, respectively (Table1).

Table 1: Nomenclature of medicines prescribed (n=541)

Medicine Nomenclature	Number of medicines prescribed n (%)
Branded	358 (66.17%)
Generic	183 (33.82%)
Total	541(100%)

The most commonly prescribed medicines included Sodium citrate (100,18.48%), Sodium citrate + Potassium citrate (66,12.19%), Ciprofloxacin (65,12.01%), Cefixime (56,10.35%), Ferrous fumarate + Folic acid + Zinc (44,8.13%), Norfloxacin (36, 6.65%), Calcium (33,6.09%) etc.; followed by Ranitidine (27,4.99%), Pantoprazole (26,4.80%), Ceftriaxone (24,4.43%). Of the 541 medicine uses, 385(71.16%) were exclusively for urinary tract infection in which 219 (40.48%) were antibiotics and rest 156 (28.83%) were for other purposes. With regard to antibacterial use fluoroquinolones were the most commonly used antibacterials both in OPD (63, 58.87%) and in IPD (55, 52.38%); followed by cephalosporins, in 34 (31.77%) and 46 (43.80%) OPD and IPD patients respectively. However, nitrofurantoin was used in 10 OPD patients which was significantly more (p=0.05) than in 3 IPD patients (Table 2).

Table 2: Types of Antibacterials and Chemotherapeutic agents used

Antibacterials / Chemotherapeutic Agents	OPD Patients n (%)	IPD Patients n (%)	Chi Square (x^2)	'p' value
Fluoroquinolones	63 (58.87%)	55(52.38%)	0.90	0.34
Cephalosporins	34 (31.77%)	46 (43.80%)	3.26	0.07
Others	13 (12.14%)	7(6.66%)	1.86	0.17
Total	110	108	--	--

Of the total 29 medicines used, 16 (55.17%) were listed in the 19th model list of essential medicines (WHO, 2015), 5 (17.24%) were substituted essential and 8 (27.58%) were nonessential medicines. From 541 medicine uses, 255 (47.13%), 67 (12.38%) and 219(40.48%) medicine uses were by essential, substituted essential and nonessential medicines, respectively. Use of rational medicines was in 485 (89.64%) medicine uses leaving only 56 (10.35%) as by irrational (IR) medicine uses (Table 3).

Table 3: Extent of usage of Essential and Rational medicines (n=541)

	Essential (E)	Substituted Essential (SE)	Non-Essential (NE)	Rational (R)	Irrational (IR)
No of times prescribed (%)	255 (47.13%)	67 (12.38%)	219 (40.48%)	485 (89.64%)	56 (10.35%)

Most commonly used essential and rational medicines were Ciprofloxacin [65 (12.01%)] &Cefixime [56 (10.35%)], substituted essential and rational medicines were Norfloxacin [36 (6.65%)], Pantoprazole [26 (4.80%)] and Ofloxacin [9 (1.66%)], non-essential and rational medicines were Sodium citrate [100 (18.48%)] & Sodium citrate + Potassium citrate [66 (12.19%)], non-essential and irrational medicine was Ferrous fumarate + Folic acid + Zinc [44 (8.13%)].

Of the 29 medicines used, 7 (24.13%) were fixed dose combinations (FDCs); used 122 times in 116 patients. All are non essential and considered irrational on the basis of WHO criteria except sodium citrate + potassium citrate which was rational. [Fig1].
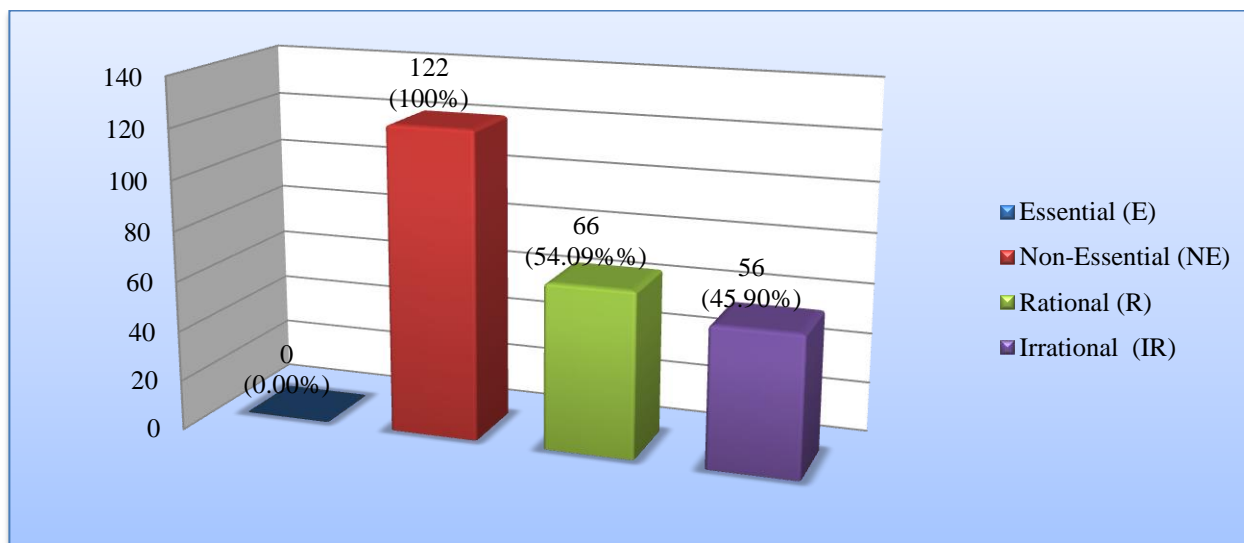

Figure 1: Extent of use of Essential and Rational FDCs (n=122)

In all 541 (100%) medicine uses, the dosage form, route of administration of medicine, dose, frequency of administration and duration of therapy were found to be appropriate or most appropriate.

DISCUSSION

Carefully planned and executed drug utilization study of any disease can enhance our understanding of therapeutics and improve its quality in given disease condition. One of the most common diseases affecting a community is urinary tract infection [4]. All 29 medicine formulations were used for 541 times. There was statistically no significant difference between the mean number of medicines given to OPD patients and IPD patients (t=0.45, p >0.99). Of the total 541 medicine uses, 358 (66.17%) and 183 (33.82%) times the medicines were prescribed using brand and official names with an average of 1.68 ± 0.77 and 0.86 ± 1.04. In contrast to our finding, Nathia D *et al* found that 89.86% of medicines were prescribed by their generic names [5]. The wishful thinking should be to prescribe all 100% medicines by their official/generic names in favor of the patient.

The most preferred antibacterial agent, for the treatment of UTI is a fluoroquinolones on account of its efficacy, good safety profile, convenient oral administration and cost of therapy [6]. In our study 118 (55.66%) patients were prescribed fluoroquinolones; ciprofloxacin, norfloxacin, ofloxacin and levofloxacin. The next preferred antibacterial group was cephalosporin in 80 (37.74%) patients; which were Tab. Cefixime followed by Inj. Ceftriaxone. Both were third generation cephalosporins in comparison of fluoroquinolones equivalent in efficacy and safety in pregnant women. The retrospective studies of Pandey *et al* and Chowta M had reported Cephalosporins as the most commonly used antibacterials, in 53% and 72.7% patients, respectively [7,8]. Thus our finding that fluoroquinolones was the most common group of antibacterials used is in sharp contrast of above 2 studies. The other antibacterial commonly used was nitrofurantoin in 13 (6.13%) patients. It is a time tested, effective, safe and cheap antiseptic for use in lower UTI due to Gram negative bacilli [9]. Clotrimazole (vaginal tab.) was used in 4 (1.88%)

patients. Fungal infection of vagina can sometime coexist in a patient of UTI and hence the use of clotrimazole, along with the use of an antibacterial, is justifiable [10].In our study only 5 (2.36%) patients required use of more than 1 antibacterial. Pandey *et al* showed that 47% of UTI patients received a combination therapy [7].

Seventy eight (36.78%) patients were given treatment for anemia and calcium. Considering that 77 (36.22%) patients were of Obs. &Gynecology, several of whom could be pregnant and overall two thirds of all patients being women, the use of antianemia preparations and calcium supplement appears to be reasonable [11]. Sixteen (7.55%) patients required the use of one or another analgesic/NSAID or combinations thereof. As fever and pain in the loin are common features of UTI, this use of analgesics/NSAID appears logical [12]. One fourth of the patients were given an antiulcer agent; Ranitidine or Pantoprazole with the assumption that they will prevent the possible gastrointestinal intolerance to antibiotics or/and NSAIDS. There is no rationale of such practice on evidence based [13].

It is necessary to use the medicines on the principles of rational use for effective and successful medicine therapy [14]. Of the 29 medicine formulations, 23(79.31%) were found to be rational (R) and only 6 (20.68%) as irrational (IR). The study of Nathia D showed that 89.18% antimicrobials were listed in National list of Essential Medicines [5]. As against this a total of 11 antimicrobials were used in our study of which 9 were essential and 2 were substituted essential, thus making all 100% antimicrobials as essential and rational medicines. The appropriateness of use of selected medicines was analyzed using a structured scoring system. All 541 (100%) medicines were used appropriately or most appropriately. This is a very encouraging outcome of the study. In the present study the most common route was oral. Rational use of medicines dictates that the use of FDCs should be minimum and only when needed, using rational FDCs only [15]. In our study out of 29 formulations, 7 (24.13%) were FDCs. Six were irrational and one was rational.

CONCLUSION

Our study reveals that fluoroquinolones and cephalosporins were the most commonly prescribed antibiotics. The need to adhere to standard treatment guidelines and prescribing from the essential drug list, using generic names has to be impressed upon treating physicians. The number and extent of use of essential and rational medicines should be increased.

The continuous monitoring and reporting of prescribing pattern of antibiotics will surely help the physicians for effective treatment.

Acknowledgement

REFERENCES

[1]. Pallett A, Hand K. Complicated urinary tract infections: practical solutions for the treatment of multiresistant Gram-negative bacteria. Journal of Antimicrobial Chemotherapy. 65(3), 2010, 25-33.

[2]. Truter I. A Review of Drug Utilization Studies and Methodologies. Jordan Journal of Pharmaceutical Sciences. 1(2), 2008, 91-104.

[3]. Al-Badr A, Al-Shaikh G. Recurrent urinary tract infections management in women: a review. Sultan Qaboos University Medical Journal. 13(3), 2013, 359.

[4]. Tan CW, Chlebicki MP. Urinary tract infections in adults. 57(9), 2016, 485.

[5]. Nathiaya D, Pandey K, Sharma RK. A Study on Drug Utilization Pattern of Antimicrobials in outpatient departments of Medicine at Tertiary Care Hospital. Int. J. Res Pharm Sci 4(2), 2014, 40-45.

[6]. Fourcroy JL, Berner B, Chiang YK, Cramer M, Rowe L, Shore N. Efficacy and safety of a novel once-daily extended-release ciprofloxacin tablet formulation for treatment of uncomplicated urinary tract infection in women. Antimicrobial agents and chemotherapy. 49(10), 2005, 4137-43.

[7]. Pandey D.K., Hardeep, Rauf M.J., Kumar R, Mohd F.M. Drug Utilization Pattern in Urinary Tract Infections: A retrospective Study. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 3(4), 2012, 1231-1235.

[8]. Chowta M.N. Drug Utilization Pattern in Urinary Tract Infections: A Retrospective Study. Instasci Journal of Medical Sciences and Clinical Research. 2011, 1(1).

[9]. Laurence DR in editor, D.N.Bennett and Brown MJ. Clinical pharmacology, Elsevier publication Newyork, Unwanted effects and adverse drug reaction. Clinical pharmacology 9, 135-136.

[10]. Behzadi P, Behzadi E, Yazdanbod H, Aghapour R, Cheshmeh MA, Omran DS. Urinary tract infections associated with Candida albicans. Maedica. 5(4), 2010, 277.

[11]. Ladipo OA. Nutrition in pregnancy: mineral and vitamin supplements. The American journal of clinical nutrition. 72(1), 2000, 280S-90S.

[12]. Kronenberg A, Bütikofer L, Odutayo A, Mühlemann K, da Costa BR, Battaglia M, Meli DN, Frey P, Limacher A, Reichenbach S, Jüni P. Symptomatic treatment of uncomplicated lower urinary tract infections in the ambulatory setting: randomised, double blind trial. bmj. 8, 2017, 359-4784.

[13]. Brunton L L, Chabner B A, Knollmann B C. Goodman & Gilman's The Pharmacological Basis of Therapeutics. McGraw-Hill Companies, Inc. United States of America, 12, 2011, 959-993.

[14]. Kshirsagar NA. Rational use of medicines: cost consideration & way forward. The Indian journal of medical research. 144(4), 2016, 502.

[15]. Dalal K, Ganguly B, Gor A. Assessment of rationality of fixed dose combinations approved in CDSCO list. Journal of clinical and diagnostic research: JCDR. 10(4), 2016, FC05.