Research Article

www.ijrap.net

MONITORING OF PRESCRIPTION PATTERN OF ANTIMICROBIAL AGENTS IN MEDICINE DEPARTMENT OF A TERTIARY CARE HOSPITAL

Prudhivi Ramakrishna *[1], Maddi Ramaiah [2], Krishna Pavan Kumar J [2]
[1]Department of Pharmacy Practice, Dayananda Sagar University, Bangalore, Karnataka, India
[2]Department of Pharmacy Practice, Hindu College of Pharmacy, Guntur, A.P., India

Received on: 10/08/16 Revised on: 14/09/16 Accepted on: 28/09/16

***Corresponding author**
E-mail: rampharma83@gmail.com

DOI: 10.7897/2277-4343.075224

ABSTRACT

Drug utilization review (DUR) programs are being conducted with the aim of improving the appropriateness of prescriptions. DURs have traditionally focused on drugs with frequent side-effects, high price tags or complicated dosing regimens. The main objective of the present study was to evaluate the antibiotic utilization pattern of antimicrobial agents and then to assess the prescriptions by the WHO prescribing indicators. This prospective and descriptive study was carried out in the medicine department of Guwahati Medical College & Hospital, Guwahati, India from Feb. 2015 to Dec. 2015.The data obtained was represented as mean ± SEM and percentages, as applicable. An appropriate statistical test (chi square test) was used for determining association between variable. The results are calculated from 425 patients' data. Out of 672 medicines, 500(74.4%) medicines were prescribed from National Essential Medicine List (NEML) 2015.There was a good tendency of prescribing by generic name. Use of injection was very high and percentage encounter with an injection prescribed was 92 % (391 cases).Ceftriaxone was the most frequently prescribed medicine (217 cases) followed by metronidazole (65 cases). The physicians prescribing habit was the main factor that directly influences the prescribing patterning. Introduction of an antibiotic policy and on-going education of hospital staff regarding the use of antibiotics are helpful to control spiralling expenditure on such agents, and the emergence of multi-drug resistant organisms.

Keywords: Drug utilization Review;Antimicrobial agents; Ceftriaxone; Metronidazole

INTRODUCTION

Prescription drugs constitute an important component of health care. However, using of appropriate medicines by physicians based on evidence can only benefit to patients. For improving appropriateness of prescriptions, drug utilization review (DUR) programs are being conducted.[1] A DUR study aims both at improving current prescribing patterns and at preventing inappropriate prescribing in the future. The purpose of a DUR is generally to detect possible problems with, and improve, drug use. DURs have traditionally focused on drugs with frequent side-effects, high price tags or complicated dosing regimens.

DUR programs help to ensure that prescriptions for patients are appropriate, medically necessary, and not likely to result in adverse medical consequences.[2] This objective is of assuring beneficiaries access to cost-effective, high quality health care. DUR programs use professional medical protocols, computer technology, and data processing to assist in the management of data regarding the prescribing and the dispensing of prescriptions. DUR can detect inappropriate and/or unnecessarily costly drug therapy by comparing actual drug use to predetermined standards. To monitor individual drugs and their use in specified diseases various monitoring programmes can be designed. Drugs considered being most problematic, if not used correctly[3] and hence DUR programs should be carefully planned by the medical and pharmacy staff. When problems are identified, interventions are designed and implemented to improve drug use. Educational programs, provision of drug information, changes in hospital policies and procedures, and changes in the drug formulary are some of interventions to follow.

DUR has been undertaken for as long as pharmacists have been practicing their profession. DUR is a technique used by prescription drug program administrators and PBMs to manage drug utilization. DUR is "a process used to assess the rightness of drug therapy by employing in the evaluation of data on drug use in a given health care environment against predetermined criteria and standards".[4,5] If therapy is determined to be inappropriate, interventions may be needed with specific patients or providers to optimize drug therapy. Appropriately selected criteria for medication use are "predetermined" elements of drug use supported by labelling approved by the U.S. Food and Drug Administration, compendia, and peer-reviewed literature, developed by qualified health professionals against which aspects of quality, medical necessity, cost effectiveness, and clinical outcomes of drug use may be compared. There are several challenges in implementing the DUR systems more useful. These can be grouped into those involving (a) the technical aspects of health care systems and (b) how health care providers, particularly pharmacists, interpret and respond to potential drug therapy problem alerts generated by the systems.[4] The effectiveness of DUR programs has yet to be established. The few evaluation studies of those programs conducted until now have been criticized for lack of rigor. In general, there are no adequate control groups and prior trends in the quality of prescribing are not taken into account. The present study was designed to avoid those limitations to improve the quality of physician drug prescriptions in hospital settings.

The main objective of the present study was to evaluate the antibiotic utilization pattern in the medicine department of a public teaching hospital Guwahati Medical College & Hospital (GMCH) Guwahati and then to assess the prescriptions for the WHO prescribing indicators.

MATERIALS AND METHODS

The study of drug utilization pattern was carried out in the medicine department of GMCH, Guwahati with following materials and methods from Feb. 2015 to Dec. 2015. Ethical clearance was obtained before the study.

Design: The present study was designed using prospective and descriptive study methods.

Participants: Patients admitted in the medicine department of GMCH

Inclusion criteria: All patients prescribed for medicines with age more than 18 years of both sexes.

Exclusion criteria: Prescriptions with incomplete information; Patients advised to consult any other specialist; pregnant women and feeding mothers; patients with diseases having specific treatment plans (Helminthiasis, Leprosy etc.) and critically ill patients will be excluded.

Testing tool: The prescription indicators recommended by the WHO was used to assess the
drug utilization pattern.

Data analysis: The data was analysed for the average number of medicines per encounter per day, percentage of medicines prescribed from NEML, percentage of medicines prescribed by generic name, percentage of encounters with an injection prescribed.
The prescribing and utilization pattern of the medicines was carried with reference to National Essential Medicines List, 2015. The data was organized using ATC/DDD methodology. The data was analysed with respect to the age and sex of the patients.

Statistical Analysis

Descriptive statistics was used for the analysis of data. The data obtained was represented as mean ± SEM and percentages, as applicable. An appropriate statistical test (chi square test) was used for determining association between variable.

RESULTS

The results are calculated from 425 patients data obtained from the inpatient ward of Medicine Department of Guwahati Medical College & Hospital, Guwahati. Out of 425 patients 73.4% (312 Patients) were male and 26.6 % (113) were female (Table 1).
All the patients were divided into six age groups: 20 to 29 years (Group A), 30 to 39 years (B), 40 to 49 years (C), 50 to 59 years (D), 60 to 69 (E) and above 70 years (F).

Prescribing indicators

The prescribing indicators were calculated for all the patients and for the six age groups to determine any differences in prescribing between these age groups.

Average number of medicines (antibiotics) per prescription

A total of 672 medicines (antibiotics) were prescribed to 425 patients. Mean ± SEM of medicines prescribed were 1.56 ±0.05. Mean ± SEM of medicines prescribed for male patients were 1.57 ± 0.06, and for female patients1.52 ± 0.09. For different age groups average number of medicines per prescription was 1.76, 1.57, 1.69, 1.53, 1.21 and 1.46 respectively for group A, B, C, D, E and F. It can be noted that average number of medicines per prescription was highest for age group 20 to 29 yrs. It was found that in most of the prescriptions one antibiotic was prescribed (Table 2).

Percentage of medicines prescribed from NEML

Out of 672 medicines, 500(74.4%) medicines were prescribed from National Essential Medicine List (NEML) 2015.

Percentage of medicines prescribed by generic name

There was a good tendency of prescribing by generic name. 72.62% (488 medicines) were prescribed by generic name and antibiotics constituted the major proportion of medicines prescribed by generic name.

Percentage encounter with an injection prescribed

Use of injection was very high and percentage encounter with an injection prescribed was 92 % (391 cases).

Other parameters

Top ten medicines

Ceftriaxone was the most frequently prescribed medicine (217 cases) followed by metronidazole (65 cases) (Figure 1). The diagnostic characteristics of the patients were shown in Figure 2. Antibiotics were used in all cases and 31 different antimicrobial agents were prescribed. In more than 28 % of cases, Ceftriaxone was prescribed which was followed by Metronidazole.

Utilization of different dosage form

A significant number of medicines were prescribed as injection followed by infusion and tablet (Figure 3).

Prescribing differences between male and female patients

On correlating data with respect to male and female patients it was found that there was no difference in prescribing between the two groups with respect to number of drugs prescribed (P = 0.573).

Table 1: Average age of the patients

	Number of patients	Average age ± SEM	Range
Global	425	43.55 ± 0.11	20 – 80 yrs.
Male	312	44.39 ± 0.12	20 – 80 yrs.
Female	113	41.25 ± 0.21	20 –72 yrs.

Table 2: Average number of medicines per prescription

Number of Drugs Per Prescription	Number of Prescriptions (%)
One	237 (4.5)
Two	138 (18.2)
Three	43 (21.9)
Four	7 (26.9)

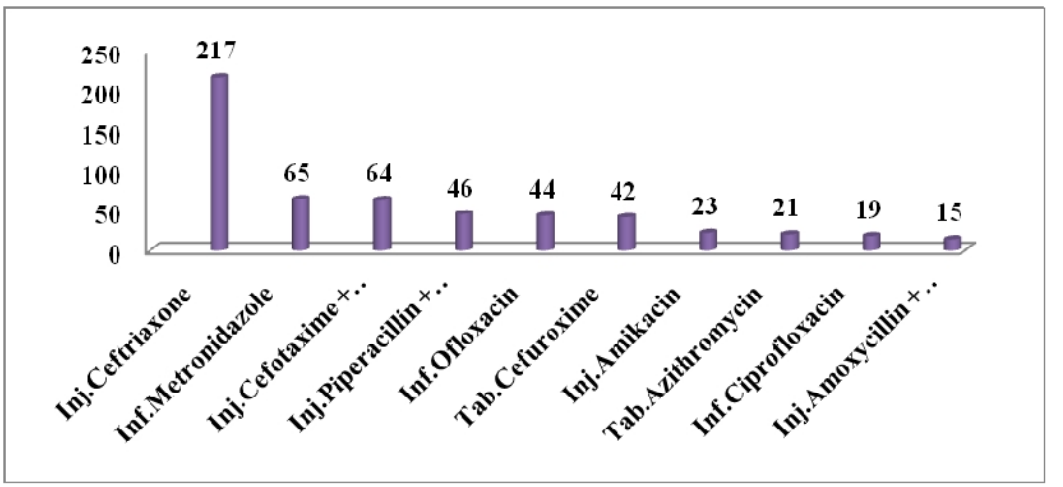

Figure 1: Usage of antimicrobial agents

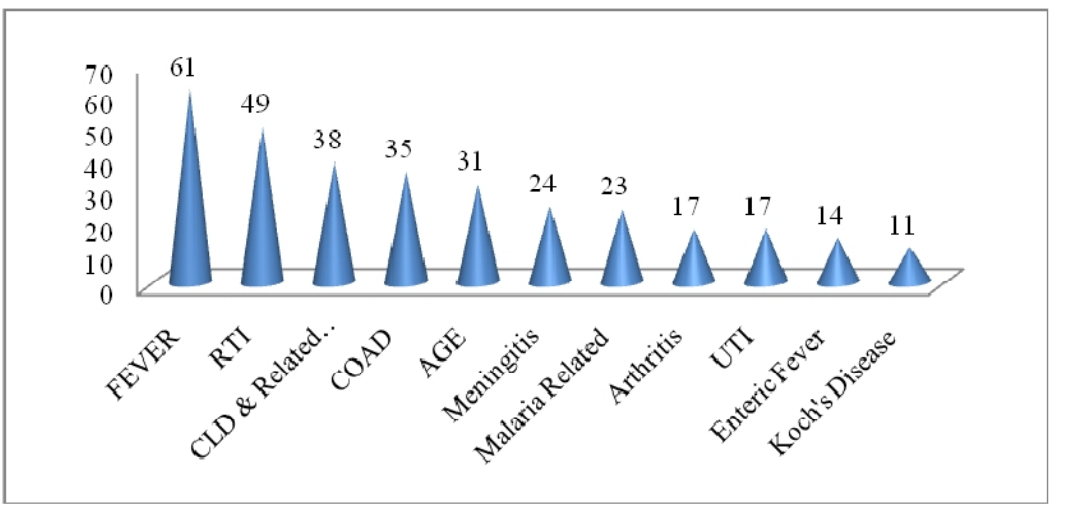

Figure 2: Diagnostic Characteristics of the Patients

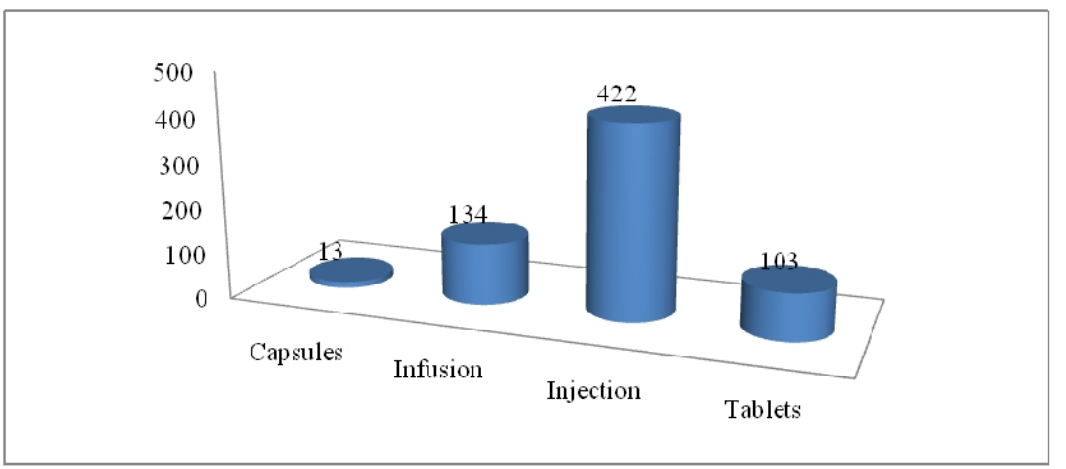

Figure 3: Utilization of Different Dosage Forms

DISCUSSION

WHO has selected a core of drug use indicators to assess the scope of improvement in rational drug use in clinical practice. Regarding the use of antibiotics, relatively high levels of availability and consumption in developing countries have led to higher incidence of inappropriate use and greater level of resistance than in developed countries.

Guwahati Medical College & Hospital (GMCH) with its 5 male units and 1 female unit (total-6 units) reflects all patients attending Medicine IPD and the prescriptions of patients prescribed with antibiotics are included in the sample. Therefore, data reported in this study may be easy to compare to other studies in India as well as other developing countries.

The main finding in this study was that the international differences in the hospital use of antibiotics were not in the intensity of use, but in the prescription preferences. The wards of similar medical specialities used similar number of antibiotics, but from different pharmacological subgroups and, thus, with different microbiological activities. Other comparable features of this study includes,

Type of use of Antimicrobials: The type of use of antimicrobials in the present study was similar to that in developing countries as most of the antibiotics were prescribed empirically. Ideally, the selection of antibiotic drugs should be based on the microbiological data on bacterial sensitivity and on prevalence of resistance in the respective hospitals. This consensus is well recognized, but difficult to adhere to, as illustrated by the empirical initial treatment with antibiotics in 85% of infection cases shown in a recent survey in the 5 largest European countries. Rational prescribing can only be expected if the prescriber is aware of the most likely infecting agent[6].

Site of Infection: Moss *et al* found that most of the prescribers in their study based therapy only on the anatomical site of putative infection and lower respiratory tract was the most frequently targeted site[6]. Apparently this holds true for this study and also that by Kulshrestha and Agarwal[7].

Route of administration: Route of administration of an antimicrobial is influenced by the site and severity of infection as well as the cost of the treatment[8]. Since, this study was conducted in in-patient setting most of the antibiotics were prescribed as injectable forms (injections and infusions).

Use of individual antimicrobial agents: This kind of statistic forms the most important index of on-going antimicrobial audit programs as it indicates the changes in pattern of usage and in susceptibility patterns of microbes and also the introduction of newer antimicrobials. The pattern of use observed, in that ceftriaxone was the most frequently prescribed, is aclear departure from that recorded in other Indian studies of this nature all of whom quote Penicillin-group on top[9,10]. Obviously, this is due to the wider choice of drugs now available as well as the settings where and the time period when these studies were conducted.
Since ceftriaxone has a broad spectrum of activity including Entero-bacteriaceae and is the β-lactam antibiotic of choice for most cases of hospital-acquired aerobic sepsis, it justifies its position on top. Also, ceftriaxone requires less frequent dosing and may offer cost and convenience benefits.

This study has strengths and limitations. As strength, this study was conducted in the context of current clinical practice with no attempt from the investigators to impose the selection of the drug or to enhance compliance of pharmacist in delivering DUR interventions. Limitations include lack of local guidelines and appropriateness should be evaluated as an adherence with these predefined guidelines, rather than as an objective fact; emergence of bacterial resistance was not investigated; No information on prescribing physicians was collected as it was not possible to describe physician characteristics in each units of IPD and test their comparability; the DUR study lasted only four months. The effect of this type of DUR could therefore have been greater if assessed a program implemented on a longer term.

CONCLUSION

In conclusion, the present study was conducted in the routine clinical practice setting with no intervention in the clinical process. The medical team is the determinant factor for Infectious Disease Specialist advice or strategies established to control excessive antibiotic use and the development of antibiotic resistance. The most indicated strategy would be a multi-disciplinary approach involving cooperation between infection control, nursing, pharmacy and medical staffs. These programs should focus on promoting rational antibiotic prescription and utilization aimed at minimizing the future emergence of bacterial resistance.

Since hospital guidelines or formulary or an antibiotic policy did not exist, the physicians prescribing habit was the main factor that directly influences the prescribing patterning. A useful measure could be the introduction of an antibiotic policy for the appropriate use of anti-microbial drugs. Instead of conducting a descriptive, prospective DUR, a concurrent DUR with direct feedback to prescribers seems effective to improve the appropriateness with regard to the indication for use. Nevertheless, it may have negative effects on other component of the quality of the prescriptions. Since the effect of DURs varies with both the type of interventions conducted and the criterion applied, there is a need for further research in other settings and with other drugs.

REFERENCES

1. Introduction to drug utilization research / WHO International Working Group for Drug Statistics Methodology,WHO Collaborating Centre for Drug Statistics Methodology, WHO Collaborating Centre for Drug Utilization Research and Clinical Pharmacological Services. ISBN: 924156234X, World Health Organization, printed in Oslo, Norway, 2003.
2. Jean-Pierre G, Jocelyne M, Louise P, Isabelle C, Rene V, Alain M. Effect of drug utilization reviews on the quality of in-hospital prescribing: A quasi-experimental study.BMC Health Serv. Res.2006;6:33-36.
3. Fulda TR, Lyles A, Pugh MC, Christensen DB.Current status of prospective drug utilization review.J Manag Care Pharm.2004; 10(5): 433-41.
4. Donald B, Folke S. Introduction to Drug Utilization Research, WHO booklet, ISBN 92 4 156234X, published by WHO Office, 2003.
5. Drug Utilization Review- a Canadian process and methodology for studies of community based drug therapy: Canada's Research Based Pharmaceutical Companies; 2001[cited 2016 March 19]. Available from http://www.camr-rcam.gc.ca.
6. Moss F, McNicol MW, McSwiggan DA, Miller DL. Survey of antibiotic prescribing in a district general hospital. I. Pattern of use. Lancet. 1981; 2 (8242): 349-352.

7. Ajay MK, Shakeel MMB, Savya G, Sheethal A, Kishor AB.Prescription pattern of antimicrobial agents in a teaching hospital of South India. Int J Basic ClinPharmacol. 2013; 2(5): 567-570.
8. Srishyla MV, Naga Rani MA, Damodar S, Venkataraman BV, Nandakumar HJ. A preliminary audit of practice: antibacterial prophylaxis in general surgery in an Indian hospital setting. Indian J PhysiolPharmacol. 1994; 38: 207-210.
9. Vishwanathan N, Gandhi IS, Shashindran CH, Adithan C. Drug utilisation study of antimicrobial agents. Indian J Med Res. 1981; 74:772-778.
10. Kumar H, Gupta U, Garg KC, Agarwal KK. A study of trend of drug usage in a hospital unit. Indian J Pharmacol. 1986; 18: 50-54.

Cite this article as:

Prudhivi Ramakrishna, Maddi Ramaiah, Krishna Pavan Kumar J. Monitoring of prescription pattern of antimicrobial agents in medicine department of a tertiary care hospital. Int. J. Res. Ayurveda Pharm. Sep - Oct 2016;7(Suppl 4):78-82 http://dx.doi.org/10.7897/2277-4343.075224

Source of support: Nil, Conflict of interest: None Declared