



ISSN: 0976-3031

Available Online at <http://www.recentscientific.com>

CODEN: IJRSFP (USA)

International Journal of Recent Scientific Research
Vol. 8, Issue, 7, pp. 18589-18593, July, 2017

**International Journal of
Recent Scientific
Research**

DOI: 10.24327/IJRSR

Research Article

ASSESSMENT OF PRESCRIBING PATTERN OF ANTIMICROBIAL AGENTS IN TERTIARY HEALTH CARE HOSPITALS

**Parvathy R Panicker., Nimisha K Chacko., Niranjana ES., Krishnaveni K*.,
Shanmuga Sundaram R and Sambathkumar R**

Department of Pharmacy Practice, JKK Nattraja College of Pharmacy,
Komarapalayam, Tamilnadu-638183

DOI: <http://dx.doi.org/10.24327/ijrsr.2017.0807.0535>

ARTICLE INFO

Article History:

Received 18th April, 2017
Received in revised form 10th
May, 2017
Accepted 06th June, 2017
Published online 28th July, 2017

Key Words:

Hospitals, antimicrobials, prescribing
practice, antimicrobial resistance.

ABSTRACT

Higher incidence of infections leads to higher use of antimicrobials, contributing to an overall increase in healthcare costs, as well as potentially severe adverse drug reactions. The purpose of the present study was to evaluate the rate and pattern of antimicrobial prescribing in inpatient department of tertiary health care hospitals. The prescriptions containing antimicrobials were collected from the inpatients excluding pregnancy and lactation. A total of 200 antimicrobial prescriptions were collected. Out of this, 56.5% were male and 43.5% were female. About 80% of physicians prescribed antimicrobials to more than half of their patients. The antimicrobials were more frequently prescribed for the patients presenting with infectious diseases (23.6%) and the highest rate was observed in patients aged between 60-80 years. Patients of high income category received antimicrobials frequently (20.7%). Cefotaxime (23.07%), ciprofloxacin (13.58%) and ampicillin (12%) were prescribed commonly in tertiary care hospitals. The antimicrobial therapy was rational to only 25% of patients. In conclusion antimicrobials were prescribed frequently as empirical therapy and also without assessing the antimicrobial susceptibility. Proper intervention should be introduced to control the emergence of antimicrobial resistance, side effects and to minimize the cost of the treatment.

Copyright © Parvathy R Panicker et al, 2017, this is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Prescribing practices can be defined as the ability of health professionals to differentiate and discriminate among the various choices of drugs and determine the ones that will be most effective and beneficial to their patient. Patient's quality of life can be improved by enhancing the medical standards at all level of the health care delivery system; hence, assessment of the quality of care through performance review has become a part of everyday clinical practice. The assessment of standards of medical treatment at all levels is over seen by medical audit. Studies on prescribing patterns are conducted to evaluate, monitor and suggest modifications in prescribing practice in order to make medical care rational and cost effective.

Antimicrobial resistance is a major public health issue and have a significant effect in patient treatment and outcomes worldwide. However increased levels of antimicrobial usage are associated with increased levels of antimicrobial resistance (Bronzwaer SL et al., 2002; Bozgunehiev M et al., 2011). All

the information regarding antimicrobial usage pattern should be collected and monitored so as to prevent problems that may arise from the multiple antimicrobials available. Developing countries often have a higher cost of health care which is a matter of major concern. This situation is very much similar in India. Reports on antimicrobial utilization at an institutional level include both cross sectional and longitudinal studies of prescribing patterns.

Nowadays patients in hospitals are mostly older, more severely ill, and more immune-compromised than was the case two or three decades ago, and are predisposed to contracting bacterial infections requiring frequent antimicrobial therapy (Greenberg A et al., 2001). Increased antimicrobial prescriptions are one of the reasons for increased prescribing errors which are commonly seen now a day. This includes treatment of colonization, suboptimal empiric therapy, inappropriate combination therapy, dosing as well as duration errors and mismanagement of apparent antimicrobial failures. Studies have shown that antimicrobials being prescribed inappropriately for prophylaxis as well as treatment (Aron DC

*Corresponding author: **Krishnaveni K**

Department of Pharmacy Practice, JKK Nattraja College of Pharmacy, Komarapalayam, Tamilnadu-638183

et al., 2003; Budur H et al., 2003; Hogerzil HV et al., 1995). Lack of proper monitoring of the potential antimicrobial resistance, tissue penetration, drug interactions, side effects, and cost are among the factors which influence the prescription pattern and effectiveness of antimicrobial therapy (Cunha BA et al., 2010).

In developing countries antimicrobials are prescribed for 44-97% of hospitalized patients often unnecessarily or inappropriately (Chukwuani CM et al., 2002; Bhanji Z et al., 2009). Several socio economic and behavioural factors are thought to contribute to the inappropriate use of antimicrobials and consequently, to the increased incidence of microbial resistance in developing countries (Edelman R et al., 1993). The spread of microbial resistance in those countries is associated with complex and interconnected factors, such as excessive and unnecessary prescribing of antimicrobials, increased self-prescribing by the people, poor quality of available antimicrobials, failure to implement simple infection control practices and the dearth of routine susceptibility testing and surveillance (Awad AI et al., 2006). The lack of funds combines with other factors such as ignorance, inadequate education, inaccessibility to proper health and diagnostic facilities (Lindtjorn B et al., 2006). Though the reported factors are complex, an excessive and inappropriate prescribing of antimicrobials is at least partially responsible of increased rates of resistance worldwide. These problems can be taken care of by implementing strict antimicrobial drug policies.

Given that background, this study was conducted in tertiary care hospitals to assist the pattern of antimicrobial prescriptions in terms of the prevalence of a variety of antimicrobial uses including frequency, doses, and intervals, rate of administration and appropriateness of the choice of antimicrobials.

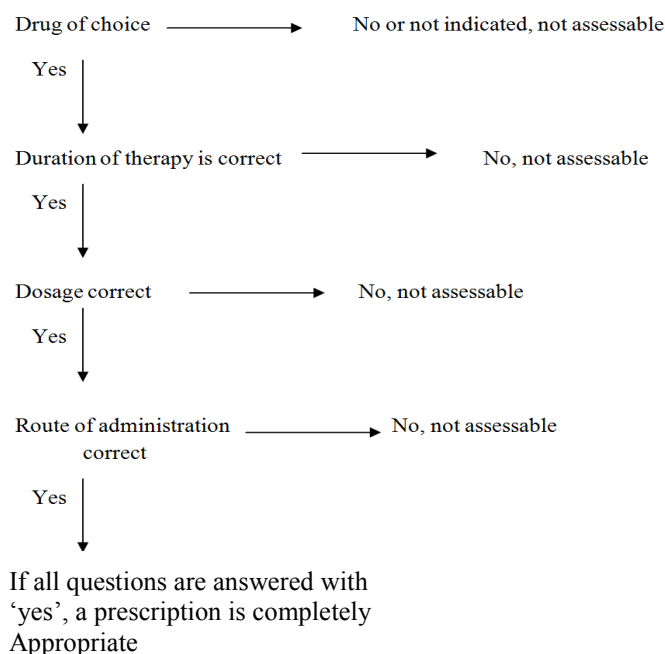


Fig. 1 Assessment criteria for Quality-of-use evaluation for antimicrobial prescription

MATERIALS AND METHODS

The study was designed to be a prospective observational study conducted over a period of 6 months. The antimicrobial

prescription pattern was studied in a tertiary care hospital of Erode, Tamil Nadu, India.

Ethical committee approval was obtained from the institution and hospital ethical committee. The prescriptions containing antimicrobials were collected from the inpatients excluding pregnancy and lactation. The following wards were randomly selected from the hospital-pediatric ward, general ward, infectious ward, post-operative ward, burns ward, ophthalmic ward, cancer ward, ICU (Intensive Care Unit), etc.

From the selected wards, pediatricians, general practitioners, chest physicians, ENT specialists, surgeons, ophthalmologists, oncologists, etc were included. Figure.1 shows the quality of antimicrobial use that was accessed according to the method of Gyssens IC et al., 1992 and their original criteria in order to be able to evaluate each parameter of importance associated with antimicrobial.

Demographic variables were analyzed including sex, age, length of stay as well as variables for prescribing antimicrobial such as dosage, duration (interval between start and stop), and reason for switching or stopping.

Patients presenting with any of the symptoms, running (or blocked) nose, cough, ear pain, diarrhoea or fever, infectious diseases, cancer, and other cardiovascular and respiratory diseases were included. Pregnant women, lactating mothers, patients who died during their hospital stay or those who underwent incomplete treatment were also excluded.

RESULTS AND DISCUSSION

A total of 200 antimicrobial prescriptions were collected. In general the outpatient work load of public or government health facilities was much more than that of the inpatients, because all the public or government health care centers had the infrastructure to stop the medication including antimicrobials for dispensing free of cost to the patients. In this study, a total of 40 physicians were enrolled with an average of 15 prescriptions per physicians. 80% of physicians prescribed antimicrobials to more than half of their patients. A categorical analysis was done classifying the physicians into 'high' and 'low' (antimicrobial) prescribers. Those who prescribed antimicrobials to more than 50% of their patients were designated as "high prescriber" and the rest as "low prescriber". It was found that around 70% of high prescribers were relatively high in urban and private settings compared to rural and public/government settings respectively. Out of 200 antimicrobial prescriptions 56.5% were male and 43.5% were female (Fig. 2).

Several antimicrobials had been prescribed to the patients, but the most commonly used antimicrobials were cefotaxime (23.07%), ciprofloxacin (13.58%) and ampicillin (12.05%, Table 1). Antimicrobials were prescribed for various indications. However the majority of indications included fever, infections and respiratory symptoms. Therefore the most common indications were fever (6.8%), bronchitis (4.8%), gastroenteritis (4.1%), urinary tract infections (4.1%) etc (Table 2). Out of 200 patients about 107 (53.3%) patients has been prescribed with 2 antimicrobial drugs per prescription (Table 3). It was seen that rather than the type of illness presence of fever showed significant association with higher rate of antimicrobial prescription. Antimicrobials were prescribed

relatively higher in the age group of 60-80 years. Out of 390 drugs 239 (61.28%) were given in injection form (61.28%), tablets (26.41%) and capsules (14.61%, Fig. 3).

The findings of the survey indicated that antimicrobials were widely prescribed for even uncomplicated infections. Consistent with early reports wide regional variation in antimicrobial prescription rate was observed in the study (Camargo CA Jr *et al.*, 2006). In India there is a great diversity in socio-cultural, economic and health indices between regions. A significant difference was observed in antimicrobial prescription rates between different practice settings. The prescription rate was higher in public or government hospitals compared to urban and private hospitals.

Antimicrobials were considered as the second most prescribed drugs in the world, only next to the drugs indicated for cardiovascular diseases (Algun U *et al.*, 2000). In this study higher rate of antimicrobial prescription was observed for age group between 60-80. This sort of age related difference in antimicrobial prescription had been reported by other authors as well. Physicians in government hospitals, commonly prescribed antimicrobials in injected forms, they are also willing to prescribe in tablets and capsules. Inappropriate intra venous therapy increases the cost of care while also exposing the patient to the risk associated with intra venous catheters (Baker LJ *et al.*, 2004). In government hospitals the parenteral administration of antimicrobials was more common than the oral administration and sometimes they may be prescribed in the same ratio in people with different disease conditions.

Although fever was a common manifestation of viral infections, it was observed that physicians consistently prescribed antimicrobials to patients presenting with fever (table 1). There was a general belief that fever was an indicator of bacterial infection. Physicians would have taken a defensive attitude that in presence of fever, bacterial infection cannot be ruled out (Chandy SJ *et al.*, 2008).

It has been demonstrated that cefotaxime (third generation cephalosporin) or ciprofloxacin (second generation fluoroquinolones), ampicillin (penicillin) were the most frequently used antimicrobials in government hospitals (table 2). Penicillin and cephalosporin have continued to be a main stay of therapy in hospitals because of their broad spectrum activity, clinical efficacy and favorable tolerability profiles (Borg MA *et al.*, 2008; Bascetti S *et al.*, 2007). However the recent surveys in Europe and US have found that the most frequently prescribed antimicrobials were fluoroquinolones, penicillin's, and amino glycosides (Al Niemat *et al.*, 2008, Erdeljic V *et al.*, 2004). Physicians have prescribed cefotaxime for patients with a wide range of diseases such as those of fever, respiratory and urinary tract infections.

Data analyses in our study showed that number of prescription with two antimicrobial agents was high as compared with single and more than two antimicrobial agents (table 3). This indicates a large number of prescription were for multiple drugs. This may indicate empirical nature of therapy. A study carried out in Kathmandu valley (2004) reported that, a high percentage (93%) of patients were prescribed at least one antimicrobial (Palikhe N *et al.*, 2004).

It is possible that the poor infrastructure and excess workload of physicians in public or government health facilities could be a main factor impeding them to take a judicious approach in antimicrobial prescription. The major limitation of the study was it is a clinic based study in which self-medication and outpatient prescriptions were not taken into consideration (Duolao W *et al.*, 2008). The data from the prescription did not include information on the patient's recovery, and the outcome of the drug utilization could not be analyzed in the present study. The results of the study also pointed towards irrational prescribing pattern of antimicrobials in health facilities. In a country like India where incidence and mortality due to bacterial infections is very high, spread of antimicrobial resistance against these precious antibiotics could bear serious consequences and may create a situation akin to pre antimicrobial error. On contrary the unwanted utilization of antimicrobial may leads to high antimicrobial resistance and side effects.

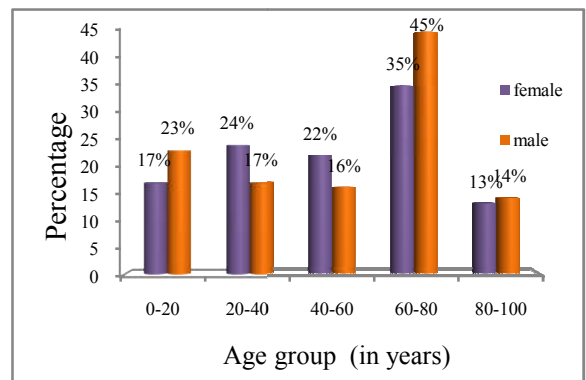


Fig. 2 The gender and age distribution of the patient admitted to the hospitals

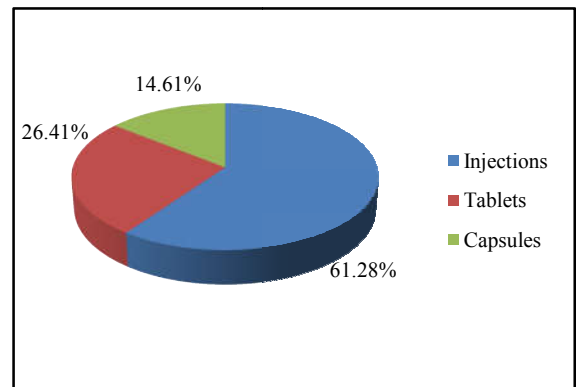


Fig. 3 Percentage distribution of patients based on dosage form

Table 1 Percentage distribution of patients based on indication

Indications	No. of patients (%)
Fever	6.8%
Bronchitis	4.8%
Gastroenteritis	4.1%
Urinary tract infection	3.9%
LRI	3.2%
Bronchial asthma	2.8%
Peptic ulcer	2.5%
Tuberculosis	1.9%
Diabetic foot ulcer	1.5%
Scabies	1.0%
Cellulitis	0.8%

Table 2 The prescribing frequency of antimicrobials during study

Sl no.	Antimicrobials	Patients	Percentage usage
1.	Cefotaxime	90	23.07%
2.	Ciprofloxacin	53	13.58%
3.	Ampicillin	47	12.05%
4.	Amoxicillin	36	9.23%
5.	Metronidazole	35	8.97%
6.	Amikacin	21	5.38%
7.	Clarithromycin	21	5.38%
8.	Gentamycin	17	4.35%
9.	AKT ₄	16	4.10%
10.	Azithromycin	11	2.82%
11.	Ofloxacin	10	2.56%
12.	Cefixime	8	2.05%

Table 3: Number of antimicrobials prescribed per prescription

Antimicrobial prescription	No. of patients	Percentage
1 antimicrobial drug	56	28%
2 antimicrobial drug	107	53.5%
3 antimicrobial drug	37	18.5%

CONCLUSION

In conclusion, the result indicates that the antimicrobials were used frequently and the antimicrobial choice mainly comprises of 12 antimicrobials in common use. It results that antimicrobials were prescribed frequently for any infectious diseases without identifying the causative organism and assessing the antimicrobial susceptibility in patients. Proper intervention (educational programmes for proper use of antimicrobials and culture sensitivity test) should be introduced to control the emergence of antimicrobial resistance, side effects and to minimize the cost of the treatment. The study indicates the inappropriateness in the prescriptions which leads to higher incidence of antimicrobial resistance.

Acknowledgement

We thank the Head of the department and departmental staffs for the suggestions and support for completion of this work.

References

1. Algün U, Atman UC, Dinç G, Ozbakkaloglu B, Tünger O. Evaluation of rational antibiotic use. *International Journal of Antimicrobial Agents*. 2000; 15: 131-5.
2. Al-Niemat SI, Bloukh DT, Al-Harasis MD, Al-Fanek AF, Salah RK. Drug use evaluation of antibiotics prescribed in a Jordanian hospital outpatient and emergency clinics using WHO prescribing indicators. *Saudi Medical Journal*. 2008; 29: 743-748.
3. Aron DC, Donskey CJ, Hecker MT, Lehmann MK, Patel NP. Unnecessary use of antimicrobials in hospitalized patients: current patterns of misuse with an emphasis on the antianaerobic spectrum of activity. *Archives of Internal Medicine*. 2003; 163:972-978.
4. Awad AI, Baraka OZ, Eltayeb IB. Changing antibiotics prescribing practices in health centers of Khartoum State, Sudan. *European Journal of Clinical Pharmacology*. 2006; 62:135-142.
5. Baker LJ, Davey PG, Finch RG, Metlay JP. Educational interventions to improve antibiotic use in the

community: report from the International Forum on Antibiotic Resistance (IFAR) colloquium, 2002. *Lancet Infect Diseases*. 2004; 4: 44-53.

6. Bassetti S, Battagay M, Bingisser R, Fluckiger U, Mettler J, Sendi P, Simcock M, Widmer AF. Empirical use of antibiotics and adjustment of empirical antibiotic therapies in a university hospital: a prospective observational study. *BMC Infectious Disease*. 2007; 7: 21.
7. Bergman U, Dumpis U, Lagergren A, Griskevicius L, Gulbinovic J, Struwe J. Differences in antibiotic prescribing in three university hospitals in the Baltic region revealed by a simple protocol for quality assessment of therapeutic indications. *International Journal of Clinical Pharmacology & Therapeutics*. 2007; 45: 568-576.
8. Bhanji Z, Culmer L, Hariharan S, Harper-McIntosh K, McIntosh D, Pillai G. Prescribing patterns and utilization of antimicrobial drugs in a tertiary care teaching hospital of a Caribbean developing country. *Fundamental & Clinical Pharmacology*. 2009; 23:609-615.
9. Bodur H, Cevik MA, Colpan A, Erbay A, Ergonul O, Samore MH. Evaluation of antibiotic use in a hospital with an antibiotic restriction policy. *International Journal of Antimicrobial Agents*. 2003; 21:308-312.
10. Borg MA, Ferech M, Goossens H, Zarb P. Antibiotic consumption in southern and eastern Mediterranean hospitals: results from the ARMed project. *Journal of Antimicrobial Chemotherapy*. 2008; 62: 830-836.
11. Bozgunchiev M, Harun R, Junichi S, Kambarialieva B, Zurdinov A. An assessment of antibiotics prescribed at the secondary health care level in the Kyrgyz Republic. *Nagoya Journal of Medical Science*. 2011; 73:157-168.
12. Bronzwaer SL, Buchholz U, Cars O, Degener JE, Goettsch W, Molstad S, Sprenger MJ, Veldhuijzen IK. A European study on the relationship between antimicrobial use and antimicrobial resistance. *Emerging Infectious Diseases*. 2002; 8:278-282.
13. Camargo CA JR, Gonzales R, Kersey AS, Levin SK, MacKenzie T, Maselli J. IMPAACT Trial Investigators. Antibiotic treatment of acute respiratory infections in acute care settings. *Academic Emergency Medicine*. 2006; 13:288-94.
14. Chandy SJ, Jeyseelan L, Kumari Indira KS, Rashmi Kumar, Saradha Suresh. Antimicrobial prescription patterns for common acute infections in some rural and urban health facilities of India. *Indian Journal of Medical Research*. 2008; 128: 165-171.
15. Chukwuani CM, Onifade M, Sumonu K. Survey of drug use practices and antibiotic prescribing pattern at a general hospital in Nigeria. *Pharmacy World & Science*. 2002; 24:188- 195.
16. Cunha BA. *Antibiotic Essentials*. 2010, Jones and Barlette Publisher.
17. Duolao W, Hong YLD. Antibiotic prescribing patterns in village health clinics across 10 provinces of Western China. *Journal of Antimicrobial Chemotherapy*. 2008; 62:410-415.
18. Edelman R, Lamikanra A, Okeke IN. Socioeconomic and behavioural factors leading to acquired bacterial

- resistance to antibiotics in developing countries. *Emerging Infectious Disease*. 1999; 5:18-27.
19. Erdeljic V, Francetic I, MacolicSarinic V, Huic M, Mercep I, MakarAusperger K. Evaluation of justification for antibiotic use at the Internal Medicine Clinic of the Clinical Hospital in Zagreb. *Acta Medica Croatica*. 2004; 58: 293-299.
20. Greenberg A, Levy Y, Raveh D, Rudensky B, Schlesinger Y, Yinnon AM. Longitudinal surveillance of antibiotic use in the hospital. *QJM: an International Journal of Medicine*. 2001; 94:141-152.
- method for antimicrobial drug use evaluation. *Journal of Antimicrobial Chemotherapy*. 1992; 30:724-727.
22. Hogerzeil HV. Promoting rational prescribing: an international perspective. *British Journal of Clinical Pharmacology*. 1995; 39:1-6
23. Lindtjorn B. Essential drug list in a rural hospital. Does it have any influence on drug prescription? *Tropical Doctor*. 1987; 17:151-155.
24. Palikhe N. Prescribing pattern of antibiotics in paediatric hospital of Kathmandu valley. *Journal of Nepal Health Research Council*. 2004; 2: 6-12.

How to cite this article:

Parvathy R Panicker *et al.* 2017, Assessment of Prescribing Pattern of Antimicrobial Agents in Tertiary Health care Hospitals. *Int J Recent Sci Res*. 8(7), pp. 18589-18593. DOI: <http://dx.doi.org/10.24327/ijrsr.2017.0807.0535>

21. Gyssens IC, Hekster Y, Kullberg BJ, Van den Broek PJ, Van der Meer JW. Optimizing antimicrobial therapy: A