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Research article

## STUDY OF PRESCRIBING PATTERN OF ANTIMICROBIAL AGENTS IN AN IPD OF A TERTIARY CARE HOSPITAL IN AHMEDNAGAR

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### ABSTRACT

**Objectives:** To evaluate the pattern of use of Antimicrobial drugs in IPD patients admitted for various illnesses.

**Materials and Methods:** It is a retrospective and observational study, conducted during the period of January, 2011 to December, 2011. Prescription record of 252 patients admitted in IPD of Medicine & Surgery departments of the PDVVPF's Medical College & Hospital, Ahmednagar were studied. These data were obtained from Medical Record Department (MRD) of the hospital. The study was conducted after obtaining permission from the Institutional Ethics Committee (IEC) of the college. Data were analyzed for- average number of antimicrobials prescribed per prescription, the relationship between patient age and sex, percentage usage of various antimicrobial groups and percentage use of individual antimicrobials. **Results:** It was observed that 75 % of patients were prescribed 1-2 antimicrobial agent and 25 % were prescribed 3 or more than 3 antimicrobials. Cephalosporins were the most preferred antimicrobials followed by quinolones and aminoglycosides. Fluconazole was found to be most commonly prescribed antifungal whereas Artesunate and Metronidazole were most preferred antimalarial and antiamebic drugs. **Conclusion:** It can be concluded from the present study that physicians preferred to prescribe 2 or more than 2 antibacterial agents in a prescription. To treat various infections Cephalosporins and quinolones were observed to be most prescribed antibacterials. Fluconazole, Artesunate & Metronidazole were found to be commonly prescribed antifungal, antimalarial and antiamebic agents. Uses of Macrolides, Tetracyclines & Vancomycin were very low. However, aminoglycosides were commonly prescribed to young males and Cephalosporins to young female patients.

**Keywords:** Drug utilization, Antimicrobial agent, Prescription

### INTRODUCTION

As per data by All India Origin Chemists and Distributors-Advance Working, Action & Correction System (AIOCD-AWACS) market research firm, antibiotics therapy rank as the 1<sup>st</sup> in all the super groups in pharmaceutical market with 14.8% growth in the month of February 2012. It occupies around 19 % in over 60,000 cr market. However they are the least studied drugs in terms of drug utilization studies.<sup>1</sup> The principal aim of drug utilization research is to facilitate appropriate use of drugs in patient

populations, minimize the adverse event and drug interactions leading to better patient outcome. Drug utilization studies are powerful exploratory tools to ascertain the role of drugs in the society. They create a sound sociomedical and health economic basis for making health care decisions.<sup>2</sup> Drug utilization is defined as marketing, distribution, prescription and the use of drugs in society, with special emphasis on the resultant medical, social and economic consequences.<sup>3</sup> Often, drugs are not used, keeping in mind their safety

and efficacy.<sup>4</sup> Rational drug prescribing is the use of the least number of drugs to obtain the best possible effect in the shortest period and at a reasonable cost.<sup>5</sup> Irrational prescribing and disparity between the prescription and the consumption of medicines may offset the benefits which are demonstrated by randomized controlled trials on drug efficacy.<sup>6-9</sup>

The present study was planned to examine the patterns of drug prescription of Antimicrobials in the IPD of the internal medicine and surgery in the PDVVPF's Medical College Hospital, Ahmednagar a tertiary care hospital.

## MATERIALS AND METHODS

**Study Design:** A retrospective, observational study.

**Study Duration:** 1 year from 01/01/2011 to 31/12/2011

**Study Population:** Medical Record (MR) data were obtained from MRD department; consisting of prescription records of 252 patients that admitted in the internal medicine and surgery in the PDVVPF's Medical College Hospital, Ahmednagar a tertiary care hospital in Ahmednagar district.

**Procedure:** The study was conducted after the permission from the Institutional Ethics Committee. Total 327 patients' data were screened and analyzed as per the inclusion and exclusion criteria and 252 patients were selected for this study. Patient related information like age, gender, diagnosis, month of admission, drug related information like number of drugs prescribed were collected on a customized data collection sheet.

**Inclusion criteria:** All patients who were admitted in the IPD of the Medicine and Surgery departments and were prescribed on the antibiotics for various infections.

**Exclusion criteria:** Incomplete data.

**Parameters studied:** Following parameters were taken in the study

1. Average number of antimicrobials prescribed per prescription.
2. Percentage usage of various antimicrobials
3. Percentage usage of drugs in each antimicrobial group
4. Frequency of systemic infection at different months
5. Relationship between patient demographics and prescription pattern

**Statistical analysis:** The data were subjected to descriptive analysis using Microsoft Excel. Utilization

of different classes of drugs as well as individual drugs was analyzed and presented as a percentage.

## RESULT

The total number of prescriptions analyzed was 252. The numbers of drugs per prescription varied from one to more than four (Table-1)

**Table 1: Number of antimicrobials per prescriptions in number and percentage**

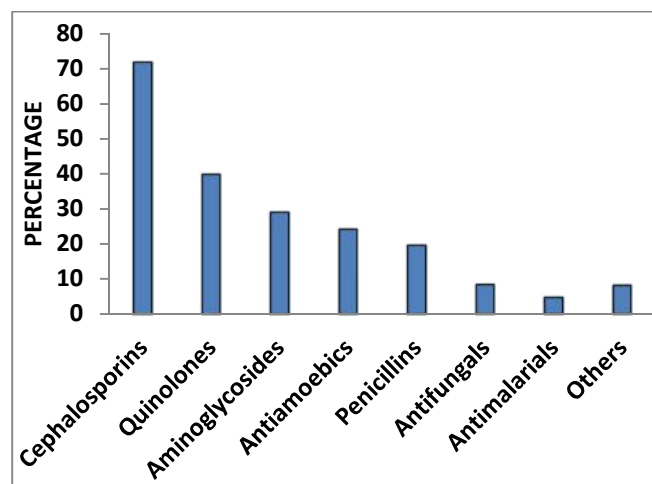
Number of antimicrobials per prescriptions	No of pts ( % )
One	112(44.44)
Two	80 (31.74)
Three	36(14.28)
Four or more than four	24( 9.52)
Total no of prescriptions studied	252

**Table 2: Percentage usage of drugs in each antimicrobial group**

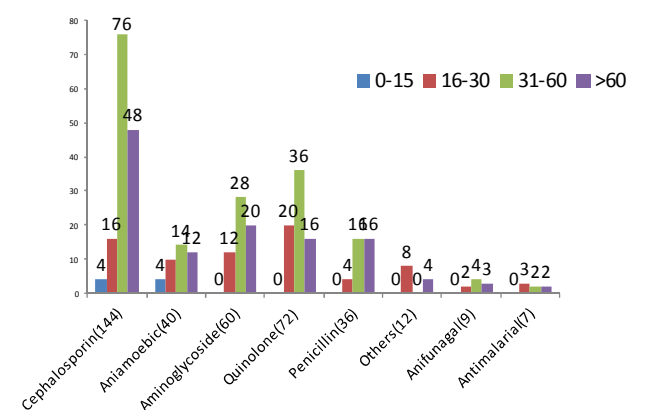
Drug class	Drug	(%) of prescriptions
<b>Cephalosporins</b>	Cefuroxime	33.3
	Cefotaxime	25.3
	Ceftriaxone	6.32
	Cefoperazone	1.58
	Cefixime	1.58
	Cefepime	1.58
<b>Quinolones</b>	Ciprofloxacin	14.28
	Ofloxacin	12.69
	Levofloxacin	7.92
	Norfloxacin	4.75
<b>Aminoglycosides</b>	Amikacin	20.62
	Gentamicin	4.75
	Streptomycin	3.17
<b>Penicillins</b>	Amoxicillin	11.1
	Penicillin - V	4.75
	Ampicillin	3.17
<b>Antifungals</b>	Fluconazole	4
	Itraconazole	2.7
	Ketoconazole	1.3
<b>Antimalarials</b>	Artesunate	2
	Chloroquine	1.7
	Primaquine	0.8
<b>Antiamoebics</b>	Metronidazole	13.6
	Tinidazole	6.4
	Ornidazole	4
<b>Others</b>	Macrolides	3.17
	Tetracyclines	3.17
	Vancomycin	1.58

**Table 3: Frequency of systemic infection in different months**

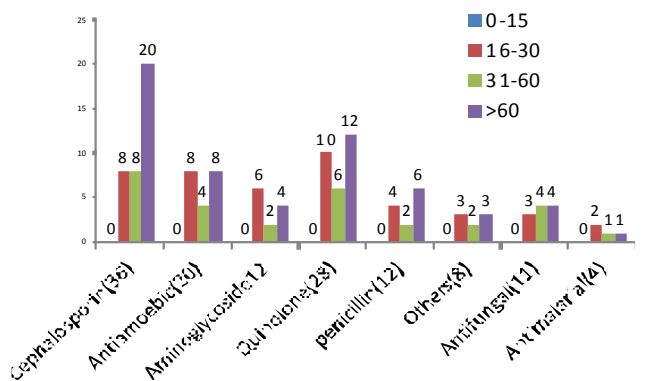
System Involved	Highest frequency	Lowest frequency
GIT	Sep (70%)	Feb (15%)
CVS	May (85%)	Jan (10%)
CNS	Feb (50%)	July (5%)
RS	Oct (70%)	Jan (10%)
OTHER	Aug (60%)	March (10%)



**Fig 1: Prescribing frequency of antimicrobial group of drugs**



**Fig 2: Age-wise prescribing frequency of antimicrobials in males**



**Fig 3: Age-wise prescribing frequency of antimicrobial in females**

It was observed that 1, 2, 3 & 4 or >4 Antimicrobials were prescribed to 44.44%, 31.74%, 14.28% & 9.52% respectively (Table-1). Among the Antimicrobials Cephalosporins was found to be prescribed to the largest number (71.42%) of patients, followed by Quinolone (39.68%), Aminoglycoside (28.57%), Antiamoebic (24%), Penicillins (19.04%), Antifungal (8%), Antimalarial (4.5%) & others were 8% (Fig-1). Among the cephalosporin's use of cefuroxime was highest (33.33%), followed by cefotaxime (25.39%), ceftriaxone (6.32%), Cefoperazone, Cefixime, Cefepime each were 1.58% respectively. Among the fluoroquinolones it was found Ciprofloxacin was mostly preferred (14.28%), followed Ofloxacin (12.69%), Levofloxacin (7.9%), Norfloxacin (4.79%). Amikacin among the Aminoglycosides was the most chosen drug (20.62%) followed by Gentamicin (4.75%), streptomycin (3.75%). Among Penicillins Amoxicillin was used to the extent of 11.1%, followed by Benzyl Penicillin 4.75% and Ampicillin 3.17%. Among the oral antifungal drugs Fluconazole was observed to be the most favoured to the extent of 4 % followed by Itraconazole 2.7% and Ketoconazole 1.3% . Artesunate was prescribed to 2 % . Chloroquine 1.7 % & Primaquine 0.8% as antimalarials. Among Antiamoebic drugs Metronidazole was used to the extent of 13.6% , followed by Tinidazole 6.4% & Ornidazole 4 % . Macrolides, Tetracyclines, Vancomycin were used in 3.1%, 3.1% & 1.5% respectively (Table-2) . Patients admitted due to CVS disease were observed highest among all the diseases (85%) in the month of May & lowest in the month of January (10%). Infections of the nervous system caused to the extent of 15 % in the February & 5 % in the July. Other infection were found 60% in August and the lowest occurrence was in March (10%) (Table-3). In young male patients Aminoglycosides & Antimalarials were found to be highest & lowest prescribed drugs respectively whereas Cephalosporins & Quinolone were highly preferred for younger as well as older female patients .Younger age male patients were mostly admitted for the CVS & endocrine disorders. However in younger & adult female patients were commonly associated with CVS & GI disorders. (Fig 2 & 3)

**DISCUSSION**

The clinical setting in the medical ward warrants the use of drugs from various drug classes. Rational prescription of drugs is essential for better patient

care. The first step in any intervention programme to improve drug utilization is to assess the extent of existing problem in prescribing. The objective of our study was to evaluate the drug utilization patterns among patients admitted to the IPD of a tertiary care hospital.

The demographic results of patients admitted to the IPD over a period of 12 months revealed a male preponderance with a mean age of around 50 years, similar to a study carried out in Nepal in 2005.<sup>10</sup> In contrast, Smythe et al (1993) showed an equal number of male and female patients admitted to the hospital with a mean age of 65 years.<sup>11</sup> Previous Indian studies also documented male predominance which suggests that more males are admitted in an Indian setting for infections.<sup>12</sup> The probable reasons for this finding could be the male to female ratio is higher in the state of Maharashtra and overall in the India. In the Indian scenario it is noticed that female populations are reluctant to utilize health care facilities even if they are critically ill and especially from lower socioeconomic strata.

A wide spectrum of clinical diagnoses was observed including sepsis, renal failure, acute respiratory distress syndrome, multi organ dysfunction, head injury, cvs related disorder and diabetes complication. Debilitating condition of the patients due to underlying disease, invasive diagnostic and therapeutic procedures and prolonged utilization of life support equipment predisposes these patients to infections

It was noticed that most of the antimicrobial agents were prescribed by brand name (60%) which requires revision of current prescribing practice. Extensive polypharmacy (> 90 %) that is more than five drugs were prescribed in all the patients. Polypharmacy is defined as concomitant use of five or more drugs and it could enhance drug interactions and drug related problems.<sup>13</sup> It is difficult to treat patients in the IPD with multiple co-morbidities with less number of drugs as they require drugs for treatment of specific conditions as well as for prophylaxis, but it is also essential to keep a balance between the number of drugs and effective pharmacotherapy.

High antimicrobial prescribing frequency was observed in our study inconsistent with earlier studies from Nepal<sup>14</sup> which documented 30%. More than one antimicrobial agent was prescribed among (69%) of the prescriptions. This could be expected since Diabetes, multi organ dysfunction, IHD, respiratory

tract infections was prevalent among the patients of the present study necessitating therapeutic as well as prophylactic utilization of antimicrobials. Antimicrobial protocol and guidelines; formulary based antimicrobial restrictions can be used to improve rational usage of antimicrobials. A multidisciplinary approach can be adopted in the ICU and IPD set up involving intensive care specialist, infectious disease control specialist, pharmacists and microbiologists can work together for more rational antimicrobial pharmacotherapy.

## CONCLUSION

It can be concluded from the present study that physicians preferred to prescribe 2 or more than 2 antibacterial agents in a prescription. To treat various infections Cephalosporins and quinolones were observed to be most prescribed antibacterials. Fluconazole, Artesunate & Metronidazole were found to be commonly prescribed antifungal, antimalarial and antiamebic agents. Use of Macrolides, Tetracyclines & Vancomycin was very low. However, aminoglycosides were commonly prescribed to young males and Cephalosporins to young female patients. In conclusion, a wide spectrum of clinical diagnosis and a variety of drugs were utilized for various drug classes. Overall, the scope for improving rational use of antimicrobial agents exists. Antibiotic resistance is increasing at an alarming rate leading to increasing morbidity, mortality and treatment cost. A key factor in the development of an antibiotic resistance is inappropriate use of antibiotics. The medical fraternity needs to understand that antibiotics are precious and finite resources, and unless conscious efforts are made to contain the problem of drug resistance, multidrug resistant organism untreatable by ever known antibiotic may emerge reversing the medical progress by ranking and returning as back to pre-antibiotic. Pharmacoeconomic studies in the hospital can encourage cost effective antimicrobial drug therapy. This will help in rationalizing prescribing practices based on the feedback from these studies and practices between institutions, regions and countries can be compared.

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