



## PRESCRIBING PATTERN OF ANTIMICROBIAL AGENTS IN MEDICAL INTENSIVE CARE UNIT OF A SUBURBAN TERTIARY CARE TEACHING HOSPITAL IN NORTH INDIA

### Pharmacology

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### ABSTRACT

**BACKGROUND :** This prospective observational study was conducted to evaluate prescribing pattern of antimicrobial agents (AMAs) in the Medical intensive care unit (MICU) of a suburban tertiary care teaching hospital in Haryana. The ultimate aim is to achieve rational prescription of AMAs so as to reduce resistance against AMAs.

**METHODS :** Records of 115 patients of MICU were evaluated over a period of one year from September 2018 to August 2019.

**RESULTS :** 24% of prescribed drugs in MICU were AMAs. Average number of AMAs used per patient were 3%. The most commonly prescribed AMAs were Cephalosporins (72%) followed by Amikacin (42%) and Piperacillin/Tazobactam (37%). Out of all prescribed AMAs 74% were from the essential drug list.

**CONCLUSION :** There is a need for forming guidelines at local level for rational prescribing of AMAs based on national guidelines. This will further help in preventing antimicrobial resistance.

### KEYWORDS

Prescribing Pattern, Antimicrobials, Medical ICU, Cephalosporins

### INTRODUCTION

Antimicrobial agents (AMAs) are amongst one of the most frequently prescribed medications in hospitals as well as in the community.<sup>1</sup> AMAs are also very commonly prescribed in Medical Intensive Care Units (MICU) for treatment of critically ill patients.<sup>2</sup> As several researchers have reported concern about the inappropriate and irrational use of AMAs, so it is extremely imperative to evaluate and monitor the prescribing pattern of AMAs. Regular evaluation of prescriptions enables in suitable modifications in prescribing patterns; to increase the therapeutic benefits and also to decrease the adverse effects for optimizing the health care services.<sup>3</sup> Monitoring and auditing of antimicrobial prescriptions is also a recommended strategy to reduce resistance against AMAs.<sup>4</sup>

Little is known about the prescribing pattern of AMAs in the MICUs in North India, more so in a rural setup. Such knowledge is important for health policy makers to identify targets for improving antimicrobial utilization and thus optimizing costs, therapy and disease management. There is no local data on prescribing trends of doctors at the MICU of SGT Medical College & Hospital, Budhera, Haryana.

Keeping these facts in mind, this study was planned to find the prescribing pattern of antimicrobials used in MICU patients with regard to:

- 1) Total number of drugs used per patient per day.
- 2) Number and percentage of AMAs used per patient per day.
- 3) Number and percentage of AMAs as per Essential Drug List.
- 4) Use of AMAs as per indication.

### MATERIAL AND METHODS

The present study was a prospective observational study conducted in the MICU of SGT Medical College & Hospital over a period of one year from September 2018 to August 2019. After obtaining approval from the Institutional Ethics Committee (IEC) patients admitted in MICU of either sex and of any age receiving antimicrobial therapy were enrolled and then followed up till the time of their stay in the ICU. Pregnant women and patient not willing to give consent were excluded from the study. Records of all the patients admitted in the ICU were observed. The number of patients who had antimicrobial prescribed were then counted separately which accounted to a total of 115 patients over a period of 12 months.

To evaluate the drug prescribing pattern a data collection proforma

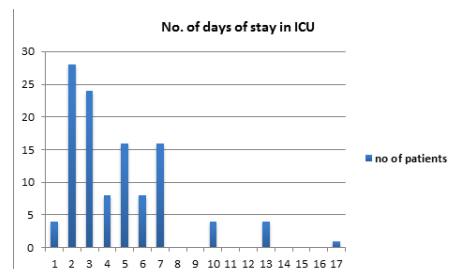
sheet was prepared. The proforma included details of patient like demographics (age, gender, residence), diagnosis, treatment received, duration of stay in the MICU. Details of treatment received (drug name, dose, frequency, duration and amount) and details of antimicrobials prescribed (prophylactic or therapeutic) were also recorded. Whether the antimicrobial prescribed was from the essential drug list of the hospital was also noted. No interference with the patient's hospital treatment was done. Descriptive statistics were used to describe the data. For categorical variables, frequencies and percentages were reported.

### RESULTS

The mean age of the patients was 55.5 and within the range from 17 to 94 years. The age range was 77 years (mean 55.5). A maximum of 41% (n=48) of patients belonged to the age group of 25-50 and minimum patients were in the age group of less than 25 years i.e. 8 patients (13%). Out of the 115 patients, 56% (n=64) were male with a male to female ratio of 1.25:1. The majority of patients 41.7% (n=48) were from suburban areas followed by rural areas 33.9% (n=39) and rest were from urban background.

### DURATION OF STAY IN ICU:

The minimum duration of stay was 1 day and the maximum was 17 days with the range of 16 days. The highest number of patients stayed in ICU for 2 days i.e. 28 patients.

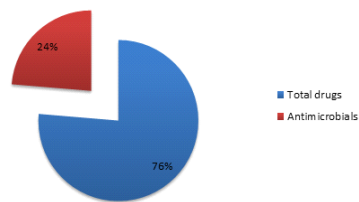


**Figure 1 : Relationship between number of patients and duration of stay in MICU**

### Treatment

Out of a total of 886 drugs that were prescribed during the period of stay in ICU 24% (n=275) were antimicrobial agents. Individual

antimicrobial prescribed were 25 in number out of 58 individual drugs. A total of 23.4% (n=27) patients were on single antimicrobial and rest 76.6% (n=88) were on two or more antimicrobials.



**Figure 2 : Percentage of antimicrobials within total drugs administered**

#### ANTIMICROBIAL USAGE

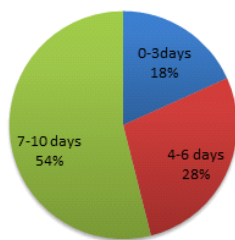
The most common antimicrobial agent used in patients was Cephalosporines as a whole group 72% followed by Amikacin (42%) and Piperacillin/Tazobactam (37%).

Antibiotic used	Percentage (%)
Acyclovir	3
Amikacin	42
Artemether	1
Artemether/Lumefanterine	2
Artesunate	2
Augmentin	28
Azithromycin	11
Cefaclor	3
Cefixime	8
Cefoperazone	7
Cefotaxime	21
Ceftriaxone	33
Clindamycin	11
Doxycycline	16
Ivermectin	1
Levofloxacin	13
Meropenem	14
Metronidazole	15
Ofloxacin	2
Oseltamivir	2
Piperacillin/Tazobactam	37
Primaquine	5
Rifaximin	3
Secnidazole	0.6

#### DURATION OF DRUG THERAPY

Overall the duration for which the patients received drug therapy varied from minimum 1 day to maximum 17 days. (mean=6.1). The minimum number of days of antimicrobial therapy was 1 day and the maximum was 10 days

**Duration of antimicrobial therapy**



**Figure 3 : Duration of antimicrobial therapy in days (Percentage wise)**

#### USE OF ANTIMICROBIAL AGENTS ACCORDING TO ESSENTIAL DRUG LIST (EDL) OF HOSPITAL

Overall most of the antimicrobial agents prescribed were from the essential drug list i.e. 74%. A total of 10 antimicrobials were not from the hospital EDL.

#### USE OF ANTIMICROBIAL AGENTS AS PER INDICATION

The indication for giving antimicrobial agents was confirmed clinically in 100% cases. Bacterial evidence of infection was confirmed in 18.2%.

#### DISCUSSION

Overall there were 64 male patients and 51 female patients included in the study. The male to female ratio was 1.25:1 and was in accordance with the previous studies<sup>5,6</sup>. Minimum number of patients were from age group of less than 25 years i.e. 8 patients. The average mean age was 55.5 years which is slightly higher than the previous studies (the average mean age in previous studies was 45-50 years).<sup>5,6</sup>

The average duration of ICU stay (5.2 days) is similar to study done by Shankar *et al*<sup>7</sup> and lower than the Shankar *et al*.<sup>6</sup>

The numbers of drugs administered to a patient varied in the range of 4 to 12. Out of which antimicrobial ranged from 1 to 5 in number. The average total number of drugs prescribed per patient is lower than the reported in previous studies.<sup>5,8</sup> The reason for this could be because comparatively less serious patients were admitted in this hospital MICU and most of the severely sick patients were referred to other hospitals. Antimicrobial drugs, Proton pump inhibitors and Diuretics were the commonly prescribed group of drugs similar to John *et al*.<sup>8</sup> However, cardiovascular drugs were the commonly used medicines in other studies.<sup>9,10</sup>

Cephalosporins, Aminoglycosides and Piperacillin + Tazobactam were the most commonly prescribed antimicrobials similar to previous studies.<sup>7,8,11</sup> However, Meropenem, Fluoroquinolones were the most utilized antimicrobial agents in other study group.<sup>6,12</sup> In our study Meropenem, Linezolid and Vancomycin were less used. The possible reason could be the higher cost of these drugs which were only prescribed to the patients who were having resistance like methicillin resistant staphylococcus aureus (MRSA).

Out of the all drugs most of the antimicrobial agents prescribed were from the essential drug list i.e. 74.4%. There was a positive association between the microbial evidence of infection and the antimicrobial agent used. Overall the antimicrobial were given for prophylactic indication in 23%, for therapeutic indication in 76% and for both in 1% patient. Compared to other study done in India, common indication for AMAs in the study done by Badar *et al* were 64.9% for infection, followed by symptomatic 24% and prophylactic 11%.<sup>13</sup>

#### LIMITATIONS

The study was conducted only in the Medicine ICU so comparison of data between other departments and wards could not be done. The sample size and duration of study was also limited. Selection of drugs and Line of treatment varied from the prescriber to prescriber and it provides no data for the same.

#### CONCLUSION

Antibiotics are commonly prescribed in critically ill patients and form a significant proportion of the total drugs consumed in the ICU. There is a need of forming guidelines for appropriate use of antimicrobial agents in hospital for improving utilisation of antimicrobials. Each healthcare establishment should also have a drug committee which should develop a local antibiotic policy based on national and local recommendations and it should monitor the implementation of the policy

It is also concluded that prescribing pattern followed in tertiary care teaching hospital is not in accordance with National Treatment Guidelines for use of Antimicrobials. Compliance to adopted national treatment guidelines is still a major challenge so there is an urgent need for following national antimicrobial policy.

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