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Original Research Article

Drug utilization pattern of antimicrobials in intensive care unit of a tertiary care teaching hospital

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ABSTRACT

Background: The intensive care unit is a setting where the multiple medications are prescribed to patients. Antimicrobials are heavily prescribed in the ICUs, which in turn enhance the risk of antimicrobial resistance, increase the side effects and increases the cost of treatment. Drug utilization study is a component of medical auditing that aims to monitor and evaluate the drug prescription patterns and to suggest necessary modifications in the prescribing practices to achieve rational therapeutic practice.

Methods: A cross-sectional study was conducted in which data of patients admitted to ICU during the period from June 2019 to August 2019 was collected from the Medical Record Section of the hospital. Drug utilization pattern of antimicrobials in ICU was analyzed.

Results: Out of 90 patients, 60 were males and 30 were females. The average duration of stay in ICU was 7.53 days. The most common antibiotic prescribed was ceftriaxone followed by piperacillin and tazobactam with DDD/100 bed days of 24.2 and 17.3 respectively.

Conclusions: In this study, the results appeared to be similar to those reported in previous studies. However, prescription protocols need to be addressed to guide appropriate use of antimicrobials in the ICU setting. Therefore, it is necessary to conduct drug utilization research to understand the drug consumption and for implementation of protocols to improve the quality of healthcare.

Keywords: Drug utilization, Defined daily dose, Antimicrobials, ICU

INTRODUCTION

The marketing, distribution, prescription and use of drugs in a society, with special emphasis on resulting medical, social, and economic consequences is known as drug utilization research.¹ It is an important tool to study the clinical use of drugs in populations and its impact on health-care system.^{1,2}

The intensive care unit (ICU) is a setting where multiple medications are prescribed to patients. Antimicrobials are

heavily prescribed in the ICUs, especially the broad spectrum ones. This bad practice enhances the antimicrobial resistance and increases the side effects of such drugs. On the other hand, it also increases the unnecessary treatment costs on the patients.^{3,4} Therefore, it is highly required to conduct drug utilization studies in order to formulate rational antibiotic prescription policy and their strict implementation to prevent extensive use of antibiotics. On this background, this study was undertaken with an objective to find out the drug

utilization pattern of antimicrobials in ICU of a tertiary care teaching hospital.

METHODS

Our study was a cross sectional study, done in the dept. of pharmacology and ICU of VSS institute of medical sciences and research (VIMSAR), Burla. The period of study was from June 2019 to August 2019. Data of 90 patients admitted to ICU during this period were collected from the Medical Records Section of the hospital after due permission of the Institutional Ethics Committee. Our study included all the patients admitted to ICU during this period. The data was analyzed for demographic distribution, disease pattern and antimicrobial drug use in terms of defined daily dose (DDD)/100 bed days and WHO core prescribing indicators.

DDD/100 bed days were calculated by using the formula:⁵

$$\frac{(\text{Total dose in mg during the study period}) \times 100}{\text{DDD of drug} \times \text{Sd} \times \text{Bs} \times \text{average bed occupancy rate}}$$

Where Sd is total study duration and Bs is bed strength.

The WHO core prescribing indicators were found out which included average number of drugs per encounter, percentage of encounters with an antibiotic, percentage of encounters with an antibiotic, percentage of drugs prescribed from essential drug list. Descriptive statistics was used for statistical analysis.

RESULTS

A total of 90 patients' data was collected out of which 60 were males and 30 were females (Figure 1). The maximum numbers of patients (64) were from age group 51-80 years (Figure 2). The most common indication for admission in ICU was Trauma followed by gastrointestinal diseases, cardiovascular disease, and poisoning (Figure 3).

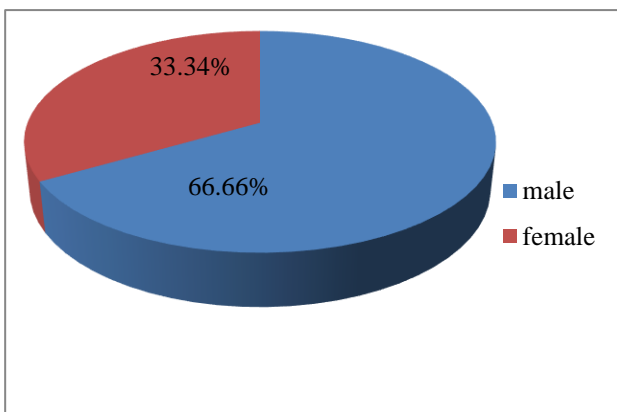


Figure 1: Gender wise distribution of patients.

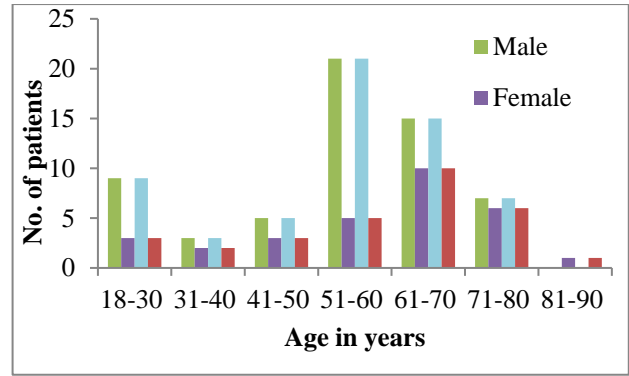


Figure 2: Age wise distribution of patients.

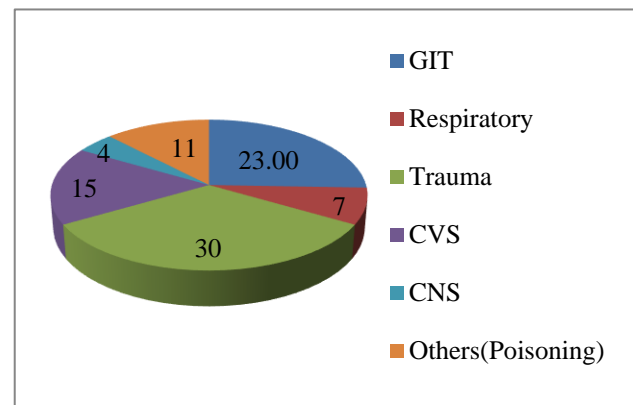


Figure 3: System wise distribution of patients.

The WHO core prescribing indicators are shown in (Table 1). Average number of drugs per encounter was found to be 7.36(≈7). Percentage of encounters with an antibiotic was 20%. Percentage of encounters with an injection was found to be 72%. Percentage of drugs prescribed from essential drug list was 63%.

Table 1: WHO core prescribing indicators.

Indicator	Parameter
Average number of drugs per encounter	7.36≈7
Percentage of patients encountered with an antibiotic	20%
Percentage of patients encountered with an injection	72%
Percentage of drugs prescribed from essential drug list	63%

DDD/100 bed days of commonly used antimicrobials are shown in (Table 2). The most commonly used antimicrobial agent was ceftriaxone, followed by piperacillin+tazobactam combination, metronidazole, amikacin, cefoperazone and meropenem in a descending order of use. 31.11% patients received one AMA (anti microbial agent), 28.88% received two AMAs, 3.33% were administered three AMAs, 15.55% were given four AMAs and 1.1% patients were given 5-6 AMAs.

Table 2: DDD/100 Bed Days of Commonly Prescribed AMA

Drugs	Defined daily dose/100 bed days
Ceftriaxone	24.2
Piperacillin+Tazobactam	17.3
Cefoperazone	12.7
Meropenem	5.23
Amikacin	16.84
Metronidazole	17

DISCUSSION

Out of 90 patients, 30 (~33.33%) were female and 60 (~66.66%) were males. The maximum number of patients=64 were from age group 51-80 years which corroborates with a study by Thomas et al.⁶

The most common indication for admission in ICU was trauma (33.33%) followed by gastrointestinal diseases, cardiovascular disease, and poisoning (26%, 17% and 12% respectively) which is similar to a study done in Oman by Al-Zakwani et al.⁷

The average number of drugs per patient (encounter) was 7.36 and percentage of encounters with AMA was 20% which is similar to a study done by Pattnaik et al.⁸ Percentage of injectable drug use was 72%, other ICU studies also document that parenteral route is the most frequent route of administration.⁸ A previous study documents that 50% of prescribed drugs in ICU either belong to WHO essential drug list or complementary drug list.⁹ But in our study, percentage of drugs prescribed from essential drug list was 63% which shows better level of adherence to prescribing from WHO essential drug list. DDD of ceftriaxone and cefoperazone is 24.2 and 12.7 respectively which is higher than the use of third generation cephalosporins, 13.74 DDD/100 bed days in a study by Shankar et al.⁴ The utilisation rate of metronidazole and piperacillin and tazobactam is 17 and 17.3 which is slightly more than a study by Thomas et al.⁶

There were certain limitations of our study. Being a retrospective study, the quality of data was dependent on available records. The sample size is relatively small which cannot be generalized for other settings and population as a whole. Moreover, the assessment of financial burden of drug consumption was not addressed in this study as most of the drugs are available by NIRAMAYA programme of Government of Odisha.

CONCLUSION

The high utilisation rates of antimicrobials are a matter of concern and warrants attention. Hospital antibiotic policy

should be formulated incorporating the core values of antibiotic stewardship.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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