Effect of educational session on antimicrobial consumption pattern in the medical intensive care unit of government tertiary care hospital, Jaipur, Rajasthan

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ABSTRACT

Background: Polypharmacy and inappropriate usage of antibiotics are common in an intensive care unit which may increase morbidity, mortality, antimicrobial resistance, and treatment cost. **Aims and Objectives:** The objective of the present study is to evaluate the Effect of Educational Session on Antimicrobial consumption pattern in the Medical Intensive Care unit (MICU) of Government Tertiary Care hospital, Jaipur, Rajasthan. **Materials and Methods:** An interventional study was conducted over a period of 18 months, and the data were obtained from Medical Record Department (MRD) and from the MICU after organizing an educational session, of a tertiary care hospital. All the data were tabulated in summery sheets and were analyzed using computer software SPSS version 20 and Microsoft Excel 2019. **Results:** A total 257 cases were reviewed during the study period; among these 46.77% were males and 53.23% were females in MRD group, out of 124 cases and 53.38% were males and 46.62% were females in MICU group, out of 133 cases. In MRD group mean age of patients was 56.16 and in MICU group mean age of patients was 56.00 years. Discussion: A total of 616 antimicrobial drugs were prescribed, out of which Amoxiclav was most frequently given in MRD group and Meropenem was most frequently given in MICU group. **Conclusion:** This study gave an overview of antimicrobial use in the MICU and helped to find out the consumption pattern that would spread awareness among the prescribers.

Key words: Antimicrobial resistance; Medical intensive care unit; Medical record department

INTRODUCTION

The WHO has declared that antimicrobial resistance (AMR) is one of the top 10 global public health threats facing humanity. Misuse and overuse of antimicrobials are the main drivers in the development of drug resistant pathogens. AMR occurs naturally over time through genetic changes.[1] In general, AMR as microorganism resistance to an antimicrobial drug that was once able to treat an infection by that microorganism.

With 700,000 people losing battle to AMR per year and another 10 million projected to die from it by 2050.[2] There are different factors that contribute to the increased emergence of AMR important ones among these include individual and collective antimicrobial use, easy access to medicines over the counter medical stores, self-medication, lack of culture, and sensitivity testing to guide appropriate antimicrobial prescription.[3]

Various approaches have taken place to improve antimicrobial use such as educational programs, development

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of restricted hospital formulary, controlled distribution and written justification for specific antimicrobial agents (AMAs) and/or requirement of expert approval before or after prescribing medications.[4]

Evidence suggests that majority of hospitalized COVID-19 patients were put on antimicrobials, to treat and to prevent superadded bacterial and fungal infections, regardless of a small percentage of these confections.[5]

Drug utilization study define the intensity and characterization of recent drug usage trends, optimal quality of drugs and compliance with regional or national guidelines like generic drugs, essential drug formulations. The optimum purpose of drug utilization studies is useful to assign the appropriate quality of drug therapy by identifying, documenting and analyzing problems in drug usage and monitoring the consequences of interventions.[6]

Aims and objectives
The aim of the study was to evaluate the effect of educational session in the Medical intensive care unit (MICU) of Government tertiary care hospital attached to RUHS College of Medical Sciences (CMS) by evaluating the changes in the pattern of consumption of antimicrobials.

MATERIALS AND METHODS

Study design
An interventional study was undertaken in the Department of Pharmacology, RUHS CMS; MICU and Medical Record Department (MRD) of Government R.D.B.P. Jaipuria Hospital, Jaipur, Rajasthan.

Study area
The study was conducted in District Jaipur (Raj.), India.

Study period
The duration of the study was of 18 months from January 2020 to June 2021.

Study setting
Inclusion criteria
All patients of either sex who are admitted in general intensive care unit during the study period and on treatment with antimicrobial drugs were included in the study.

Exclusion criteria
Patients who are <18 years of age were excluded from the study.

Study population
The present study included 257 cases. The study was divided into MRD group and MICU group. All the treating doctors were explained clearly about the nature and purpose of the study in the language they understand, and a written informed consent was obtained from them. The study was conducted in three phases, namely: Phase 1: Observation of current pattern of utilization of antimicrobials, Phase 2: Intervention in the form of feedback on current practices and educational sessions on ideal practices with provision of an antibiogram; and Phase 3: Observation of change in pattern of utilization of antimicrobials. In Phase 1 6 months data were collected from MRD as per the study Performa. In Phase 2 of 3 months, the findings from Phase 1 were analyzed and feedback was given to the prescribers on their current pattern of utilization of antimicrobials. Antibiogram was constructed and interactive educational sessions were organized by Departments of Pharmacology and Microbiology. All the treating consultants, postgraduates (Senior Residents and Junior Residents), nursing staff, and other concerned staff from various departments was invited to participate in the interactive sessions during which the following concepts was introduced, discussed, and reinforced:
- Antibiotic Resistance especially in ICU setting
- Culture and sensitivity tests and their significance
- Antibiotic Stewardship
- Reserve antimicrobials.[7]

In Phase 3 of 6 months, all data similar to Phase1 were noted and changes in the pattern of utilization of antimicrobials was observed and analyzed.

Statistical analysis
At the end of data collection, all data were tabulated in summery sheets and were analyzed using computer software SPSS version 20 and Microsoft Excel 2019. The data have been expressed as mean±standard deviation. $P<0.05$ was considered significant.

Ethical approval
Ethical approval (RUHS-CMS/Ethics Comm./2020/12) was taken from the Institutional Ethical Committee after explaining the aim and objectives of the study.

RESULTS

A total of 257 cases were reviewed during the study period. Among these 58 (46.77%) were males and 66 (53.23%) were females in MRD group, out of 124 cases and 71 (53.38%) were males and 62 (46.62%) were females in MICU group, out of 133 cases. The mean age of patients in MRD group was 56.16 and in MICU group was 56.00 years. In MRD group mean age of males was 56.95±21.34 years and females was 55.48±20.52 years and in MICU group mean age of males was 57.75±14.49 and females was 54.37±16.65 years (Table 1).

A total of 616 antimicrobial drugs prescribed during the period of study. Out of which a total of 255 drugs prescribed in MRD group and 361 drugs prescribed in MICU group. Amoxiclav (Amoxicillin and Potassium Clavulanate) was the most commonly used AMA by 20.78% patients, followed by Piperacillin and Tazobactam Injection combination (piptaz) in 18.04% of the patients and ceftriaxone by 14.90% patients in MRD group, also Meropenem was the most commonly used AMA by 15.51% patients, followed by Linezolid 13.30% and Ivermectin 12.47% patients in MICU group (Table 2).

The number of AMAs received by the patients. In MRD group 41.3% of the patient receiving AMAs were prescribed 1 AMA; another 25.81% received 2 AMAs, 20.16% patients received 3 AMAs, 12.10% were given 4 AMAs and 0.81% patients given 5 AMAs and in MICU group 16.54% of the patient receiving AMAs were prescribed 1 AMA; another 22.56% received 2 AMAs, 36.84% received 3 AMAs, 21.05% were given 4 AMAs, and 3.01% patients given 5 AMAs (Figure 1).

DISCUSSION

The ICU is recognized as resourceful part of health-care services. Antimicrobial utilization study can help encouraging the practice of rational use of antimicrobial drugs which means at right dose, right duration and cost. A total of 257 cases were reviewed. In the present study, result showed that 46.77% were males and 53.23% were females in MRD group, out of 124 cases and 53.38% were males and 46.62% were females in MICU group, out of 133 cases. Similarly a study carried out by Rangdal et al., showed 44% was males and 56% was females.[8] Another study suggests that 58% were male and 42% were females.[9] The mean age patients was 56.16, out of which mean age of males was 56.95±21.34 years and females was 55.48±20.52 years in MRD group and the mean age patients were 56.00 years, out of which mean age of males was 57.75±14.49 and females was 54.37±16.65 years in MICU group. It has been found an earlier study done by Panda et al., that mean age of study population was 44.70±14.814 with male and female ratio of 1.63:1.[10] Another study concluded that mean age of patients was around 53 years which was nearly equal for both males and females.[11] In the present study, a total of 616 antimicrobial drugs prescribed during the period of study. Out of which a total 255 drugs prescribed in MRD group and 361 drugs prescribed in MICU group, however a study carried out by Suraj et al., found that the average number of drugs received by patients was 8.6,[12] another study suggests that mean number of drugs received by patients was 10.4±2.[13]

In the present study, Amoxiclav was the most commonly used AMA by 20.78% patients, followed by Piperacillin and Tazobactam Injection combination (piptaz) in 18.04% of the patients and ceftriaxone in 14.90% patients in MRD group and Meropenem was the most commonly used AMA by 15.51% patients, followed by Linezolid 13.30% and Ivermectin 12.47% patients in MICU group while study
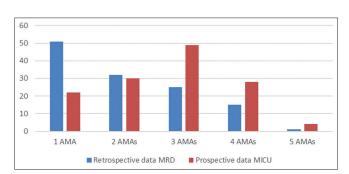
Table 1: General information of MRD group and MICU group of patients during the study period

Demographics	MRD group	MICU group
Gender		
Male	58	71
Female	66	62
Age (Years) (Mean±S.D.)		
Male	56.95±21.34	57.75±14.49
Female	55.48±20.52	54.37±16.65

MICU: Medical intensive care unit, MRD: Medical record department

Table 2: Consumption pattern of antimicrobial agents in the MRD and MICU during the study period

Antimicrobial prescribed	MRD		MICU	
	n	%	n	%
Amikacin	20	7.84	10	2.77
Amoxiclav	53	20.78	31	8.59
Azithromycin	14	5.49	16	4.43
Cefopara + Sulbactum	0	0.00	1	0.28
Ceftriaxone	38	14.90	26	7.20
Ciprofloxacin	2	0.78	1	0.28
Doxycycline	13	5.10	43	11.91
Ivermectin	0	0.00	45	12.47
Linezolid	7	2.75	48	13.30
Meropenem	13	5.10	56	15.51
Metronidazole	12	4.71	2	0.55
Ofloxacin	3	1.18	1	0.28
Piptaz	46	18.04	37	10.25
Remdesivir	0	0.00	44	12.19
Artesunate	2	0.78	0	0.00
Clindamycin	1	0.39	0	0.00
Fusidic acid	2	0.78	0	0.00
Gentamicin	1	0.39	0	0.00
Levofloxacin	17	6.67	0	0.00
Metrogyl	2	0.78	0	0.00
Osletamivir	9	3.53	0	0.00
	255	100.00	361	100.00

MICU: Medical intensive care unit, MRD: Medical record department

Figure 1: Number of antimicrobial agents received by the patients

done by Hedamba et al., concluded that most common antimicrobial drug prescribed was metronidazole (24.04%) followed by ceftriaxone (17.23%) and amoxiclav (11.16%).[14] Another study shows that maximum consumption was metronidazole (14.3%) followed by ceftriaxone (12.6%) and artesunate (10.8%).[15]

Result of the present study showed in MRD group 41.3% of the patient receiving AMAs were prescribed 1 AMA; another 25.81% received 2 AMAs, 20.16% patients received 3 AMAs, 12.10% were given 4 AMAs and 0.81% patients given 5 AMAs, and in MICU group 16.54% of the patient receiving AMAs were prescribed 1 AMA; another 22.56% received 2 AMAs, 36.84% received 3 AMAs, 21.05% were given 4 AMAs, and 3.01% patients given 5 AMAs. Similarly a study carried out by Patanaik et al., concluded that about 31.8% patients received one AMAs; another 31.8% received two AMAs, 6% were administered three AMAs, 29.3% were given four AMAs, and 5-6 AMAs were given to 1.1% patients,[16] similarly another study where 77% of the ICU patients were given 1-3 AMAs, 23% were given 4-8 AMAs.[17]

Limitations of the study

The major limitation of our study was ongoing pandemic of Covid 19 caused by severe acute respiratory corona virus (SARS-CoV2) which had great impact on conducting this research, collection of data was done from the records so our data analysis is limited only to the information available in the records. This study was done with small sample size that may affect the validity of the conclusions.

CONCLUSION

The study indicates that effect of educational session had no significant effect on the consumption pattern of antimicrobial drugs. This data gave an overview of antimicrobial consumption pattern in medical intensive care unit which would spread awareness among prescribers and help in reducing unnecessary utilization of antimicrobial drugs.

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SS- Manuscript preparation, reviewed the literature, data collection, statistically analysed and interpreted; **PR-** Concept and design of study, helped in preparing the first draft of manuscript, critical revision of the manuscript; **PJ-** Manuscript preparation, organizing educational session; **SK-** Organizing and conducting educational session in MICU; **RSR-** Organizing and conducting educational session in MRD; **DS-** Data collection.

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