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RESEARCH ARTICLE

UTILIZATION OF ANTIMICROBIAL AGENTS IN MEDICAL INTENSIVE CARE UNIT OF A TEACHING HOSPITAL

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ABSTRACT

Objective: To study the prescribing pattern of antimicrobial agents in medical intensive care unit and to determine the outcome in these patients.
Materials and methods: Study was conducted by the Department of Pharmacology by obtaining the data of patients admitted to medical intensive care unit (MICU) of RLJH & RC attached to SDUMC, Kolar during January to June 2012. The demographic data, diagnosis, dosage schedule of the antimicrobials used, duration of stay and the outcome were recorded as per predesigned proforma.
Results: There were 408 patients of which 242 were males (59%). The mean age was 46.63 ± 18.28 years. Indications for admission were respiratory tract infections (20.83%) followed by fever for evaluation (16.91%) and poisoning (15.44%). Commonest being pneumonia, COPD, dengue fever and OP poisoning. 353 patients (86.51%) received antimicrobial therapy. Prophylactic and therapeutic use was 55.52% and 44.48% respectively. In 111 patients (27.20%) two antimicrobials were used, 94 (23.03%) and 87 (21.32%) patients received one and three antimicrobials respectively. Commonly used agents were third generation cephalosporins – ceftriaxone (71.67%) followed by metronidazole (33.71%), doxycycline (24.64%) and penicillins – piperacillin and tazobactum (23.79%). Only in 10 patients (2.45%) antimicrobial therapy was changed after culture and sensitivity report. The mean duration of stay in MICU was 3.01 ± 2.27 days. 307 (75.24%) patients recovered.
Conclusion: Majority of the patients in MICU received antimicrobials, commonest being cephalosporins. Most of our patients received 2 antimicrobials and only 15% received more than three. Change in the drug following culture and sensitivity was observed in few patients

INTRODUCTION

The discovery of antimicrobial therapy stands as a major breakthrough in modern medicine in the last century (**Rubin, 2007**). Antimicrobial agents are the most frequently prescribed drugs among hospitalized patients especially in intensive care unit. Protocols designed to encourage appropriate antimicrobial prescriptions are an important element in quality care, infection control and cost of therapy (**Goldman *et al.*, 1996; Lesar and Briceland, 1996**). With the availability of numerous antimicrobials and no governing laws towards their rational use, there is a wide variation in the use of these agents (Ian Phillips, 2001). Several studies have reported concern about the continuous, indiscriminate and excessive use of antimicrobial agents that has resulted in the emergence of resistant organisms (**Niederman, 2003; Pulcine *et al.*, 2006**). Knowledge of prescription pattern and monitoring of antimicrobial use are some of the strategies recommended to reduce resistance. Hence this study was undertaken to evaluate the prescribing pattern of antimicrobial agents in medical intensive care unit and to determine the outcome in these patients.

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MATERIALS AND METHODS

Study was conducted by the Dept. of Pharmacology between January to June 2012 at R.L Jalappa Hospital and Research Centre attached to Sri Devaraj Urs Medical College, Kolar after approval of the protocol by institutional ethics committee. Data of patients admitted to medical intensive care unit was collected. The demographic data, diagnosis, the dosage schedule of the antimicrobial used, duration of stay and outcome was recorded. Demographic data are expressed as mean ± SD. Quantitative data are expressed as percentages.

RESULTS

Total of 408 patients were admitted to medical intensive care unit during this period. Out of which 242 patients (59%) were males and 166 (41%) females. The mean age of the patients was 46.63 ± 18.28yrs. Mean pulse rate was 87.87 ± 15.77 beats per minute. Mean systolic and diastolic blood pressure was

124.89 ± 26.47 and 80.63 ±16.33 mm of Hg. 353 (86.5%) patients received antimicrobial agents. Table 1 represents the indication for admission to medical intensive care unit. Infections of the respiratory system were the commonest, followed by fever for evaluation, poisoning and snake bite. Antimicrobial agents were used prophylactically and therapeutically in 196 (55.5%) and 157 (44.5%) patients respectively. Prophylactically these agents were commonly prescribed for patients suffering from febrile illness and in cases of poisoning. Antimicrobials were used therapeutically for treatment of respiratory and gastrointestinal tract infections. Table 2 shows the various indications for the use of these agents.

Table 1. Indication for admission

Indications	Total patients (n=408)
Pneumonia, COPD, Tuberculosis	85 (20.83%)
Dengue, Malaria, leptospirosis	69 (16.91%)
Poisoning and snake bite	63 (15.44%)
Acute gastroenteritis	62 (15.19%)
Endocarditis	38 (9.31%)
Complications of diabetes mellitus	31 (7.59%)
Meningitis	31 (7.59%)
Others	29 (7.10%)

Table 2. Indication for use of Antimicrobials

Indications	Prophylactic (n=196)	Therapeutic (n=157)
Pneumonia, COPD, Tuberculosis	10 (5.10%)	75 (47.70%)
Dengue, malaria, leptospirosis	52 (26.53%)	17 (10.82%)
Poisoning and snake bite	48 (24.48%)	0 (0.00%)
Acute gastroenteritis	17 (8.67%)	45 (28.66%)
Endocarditis	20 (10.20%)	1 (0.63%)
Complications of diabetes mellitus	12 (6.12%)	3 (1.91%)
Meningitis	16 (8.16%)	8 (5.09%)
Anaemia, Leukemia	11 (5.61%)	5 (3.18%)
Nephrotic and nephritic syndrome	10 (5.10%)	3 (1.91%)

Figure 1 represents the antimicrobial agents used and amongst them cephalosporins were frequently administered. Majority of the patients (111) received two antimicrobials. Only 15% of patients received four or more drugs shown in the Figure 2. Mean duration of stay in MICU was 3.01 ± 2.27 days and there was change of antimicrobial treatment after culture and sensitivity report in 10 patients (2.45%). 307 patients recovered and were discharged, only 12 patients had to be referred to a higher centre.

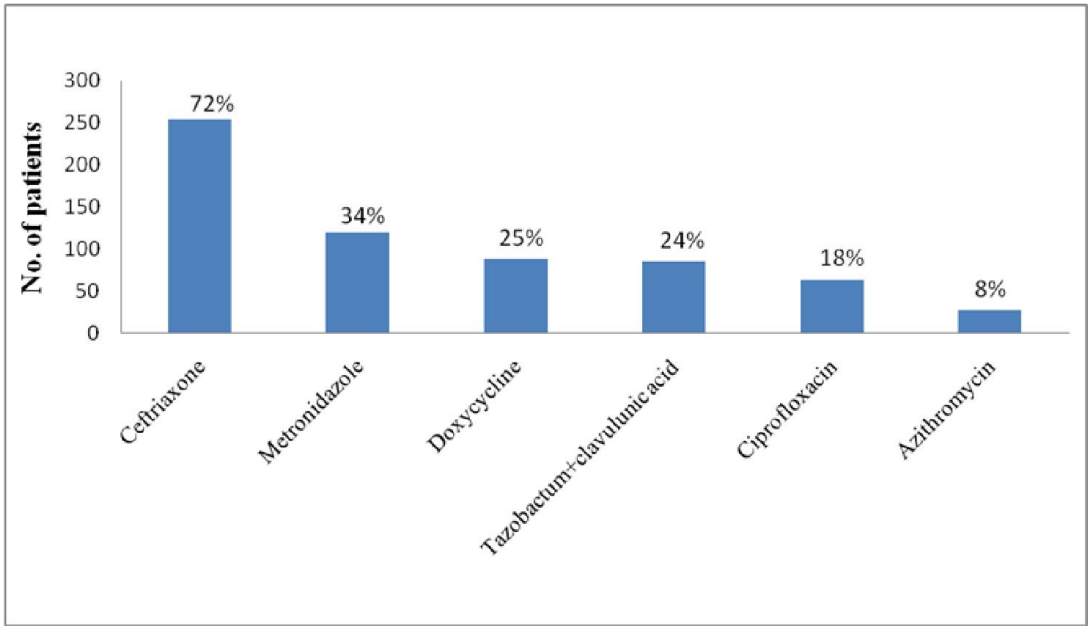

Fig. 1. Antimicrobial agents used

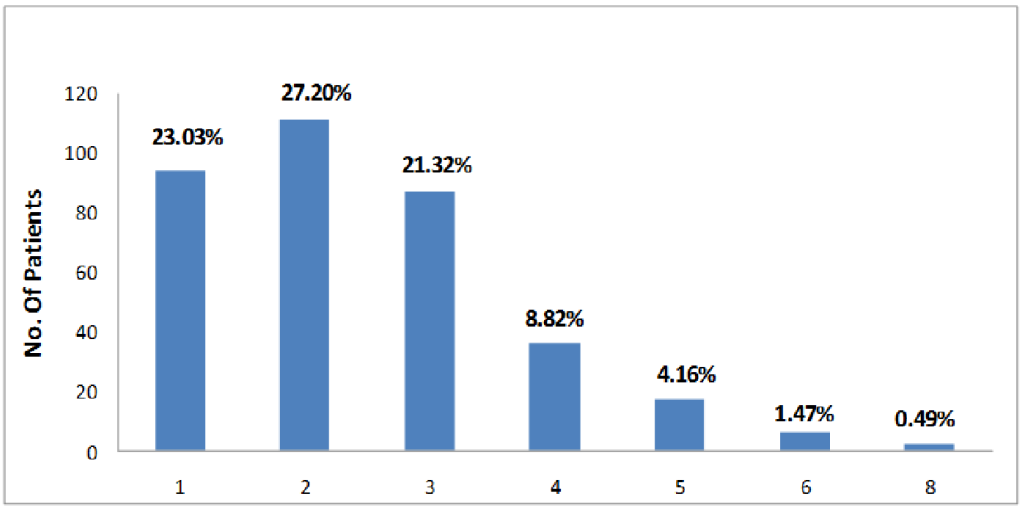

Fig. 2. Number of antimicrobials used

DISCUSSION

In our study, respiratory tract infections were the commonest cause for admission. Antimicrobials agents were used therapeutically in 44% of the patients contrary to an Indian study where 62% of the patients received these drugs for therapeutic use (**Fonseca and Conterno, 2004**). Ceftriaxone was the most commonest drug used in our study which is in accordance with other studies (**Shankar *et al.*, 2003**). 86.5% of patients received at least one antimicrobial which was similar to other studies which ranged from 41 to 98% (**Bosu and Ofori-Adjei, 1997; Gendel *et al.*, 2004**). Average number of drugs per person is an important index of prescription audit. It is preferable to keep the mean number of drugs per prescription as low as possible, since multiple drugs may lead to increased risk of drug interaction, development of bacterial resistance and increases the cost incurred by the patients.

The mean duration of stay was less than one week which was as per the recent intensive care unit guidelines (**Meyer *et al.*, 2007**). Studies have reported that incomplete therapy with antimicrobials can result in bacterial resistance and relapse (Cuthbertson *et al.,* 2004). Only ten patients required change in antimicrobial agent following culture and sensitivity report. Another study showed 57.5% of the patients had change in the treatment (**Shrikala *et al.*, 2010**). Several studies have shown that the administration of antimicrobials was inappropriate in 22% to 65% of the patients (**Giammarino *et al.*, 2005**). This needs to be avoided and also monitoring of antimicrobial use can minimize it. In the present study, 76% of the patients recovered and were discharged. Only 12 patients were referred to higher centre for further evaluation and treatment.

Prescribing drugs is an important skill which needs to be continuously updated and refined accordingly based on the local sensitivity pattern of the organisms. Appropriate diagnosis and selection of antimicrobial drugs will reduce emergence of drug resistance, hospital stay and economic burden on the patients (**Benet, 2011; Singh and Yu, 2000**).

Conclusion

Majority of the patients in MICU received antimicrobials, commonest being cephalosporins. Most of our patients received two antimicrobials and only 15% received more than three. Change in the drug following culture and sensitivity was observed in few patients. Majority of the patients admitted to MICU recovered and were discharged.

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