

Original Research Article

## **Pattern of Antimicrobial Agents used in Medicine Intensive Care Unit of a Teaching Hospital in Pokhara, Nepal**

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Received: 23/12/2015

Revised: 15/01/2016

Accepted: 27/01/2016

### **ABSTRACT**

**Objectives:** Antimicrobial agents (AMA) are among the most frequently prescribed drugs in Hospital sector. While Intensive care unit (ICU) in hospitals is a setting where large numbers of drugs are administered to patients and the cost of hospitalization and drug treatment are high and increasing rapidly. The present study was conducted to evaluate the current use of antimicrobial agents in the Medical ICU (MICU) of teaching hospital in Pokhara, Nepal.

**Methods:** The study was a prospective interventional study carried out in the Intensive Care Unit (ICU) of the Gandaki Medical College and Teaching Hospital (GMCTH) for a period of 6 months (October 2014-March 2015+1 month for analysis). Rationality of drug usage was also evaluated by analyzing the drug prescriptions.

**Results:** In intensive care unit ceftriaxone was the most commonly used AMA by 32.6 % patients, followed by metronidazole 20.3% patients and imipenem by 13.5% patients. 19 % patients were given 1- 2 AMAs, 27 % patients were given 3-4 AMAs, 46% patients were given 5-6 AMAs, 9 % patients were given more than 6 AMAs. Most common indication for the antimicrobial therapy was infection. Average numbers of drugs per patients were 6.2 drugs.

**Conclusion:** The rational use of antimicrobials agents and judicious prescribing is the major criteria for the interventional program focusing on the control of worldwide emergence of antibacterial resistance, side effects and reduced cost of treatment. The implementation of antibiotic policy and treatment guidelines with periodic assessment of the clinical pharmacist in the study area is very important in order to monitor the clinical use of these medications.

**Keywords:** Antimicrobial agents, Intensive care unit.

### **INTRODUCTION**

Antimicrobial drugs have saved countless lives over the past century, and studies show that timely administration of appropriate antimicrobial therapy to severely ill, infected patients is essential to avoid infection-related morbidity and mortality. [1-3] Antibiotics are the most frequently prescribed drugs among hospitalized patients especially in intensive care and surgical department. Programs designed to encourage

appropriate antibiotic prescriptions in health institutions are an important element in quality of care, infection control and cost containment. [4,5] The relationship between antimicrobials and resistant organisms is complex, encompassing selection and dissemination of resistance determinants between humans and bacterial hosts. Despite difficulties in proving a cause-effect relationship, there is good evidence that overuse and inappropriate use of

antimicrobials lead to emergence and dissemination of resistant organisms, with studies showing that resistance rises with increased antimicrobial use and falls after reduced use. [6-8]

The ICARE (intensive care) study established the high incidence of antibiotic resistance in an intensive care unit in comparison to the community. [9] It was demonstrated in the ICARE study that an infectious disease specialist intervention brought about a 45% decrease in antibiotic expenses. Prescribing drugs is an important skill which needs to be continuously assessed and refined accordingly. It not only reflects the physician's knowledge of pharmacology and pathophysiology but also his/her skill in diagnosis and attitude towards selecting the most appropriate cost-effective treatment. [10] Prudent use of antimicrobials is considered central to the control of resistance, and active surveillance of antimicrobial usage is paramount. The pattern of studying prescription seeks to monitor, evaluate and suggest modifications in practitioners prescribing habits so as to make medical care rational and cost effective. Information about antibiotic use patterns is necessary for a constructive approach to problems that arise from the multiple antibiotics available. [11] For this purpose of antimicrobial, plan to study the antimicrobial agents prescribed and administered to the patients admitted in medical ICU of Gandaki Medical college and teaching hospital, Pokhara which 547 bedded hospitals.

## MATERIALS AND METHODS

A prospective study was undertaken in MICU of Gandaki Medical College and Teaching hospital, Pokhara over a period of six months (October 2014-March 2015+1 month for analysis). The demographic and clinical treatment data of 480 patients was collected in the following format:

- Age and sex of patient.

- Diagnosis of patients.
- Percentage of AMAs prescribed in the order of preference.
- Average no. of drugs per patients.
- No of AMAs per patient.

Drug therapies were categorized according to indication for the antimicrobial use. Three usage groups were essentially defined by the physician according to the way they treated the patients. [9]

- 1) Infection was considered as the indication if clinical and/or laboratory data gave evidence of infection.
- 2) The therapy is considered as prophylactic if there was no evidence of infection and the agent was employed to prevent infection (e.g. catheterization).
- 3) Indication considered as symptomatic if no evidence of prophylaxis could be found and records shows the same symptoms being treated e.g. treatment of fever in absence of specifically suspected infection.

## RESULTS

During study period total 480 patients were evaluated, consisting 275 (57.29%) male patient and 205 (42.7%) females. The mean age of patients was 50 years. 316 (66%) patients were aged more than 40 years of age. The most common diagnosis which warranted admission to ICU was chronic obstructive pulmonary disease (38 %) followed by ischemic heart disease (20 %), congestive heart disease (7 %).

Figure 1 shows that in ICU ceftriaxone was the most commonly used AMA by 32.6 % patients, followed by metronidazole 20.3% patients, and imipenem by 13.5% patients.

Other antibiotics used were injection amoxicillin + clavulanic acid levofloxacin, amikacin, ciprofloxacin, ampicillin, Azithromycin, vancomycin, linezolid and gentamicin while figure 2 represents AMAs used for patients in MICU of which 19% patients were given

1- 2 AMAs, 27 % patients were given 3-4 AMAs, 46% patients were given 5-6 AMAs and 9 % patients were given more than 6 AMAs. Lastly Table 1 states information regarding antimicrobial used, where 65% were for infection, remaining 24% and 11% for symptomatic and prophylactic respectively.

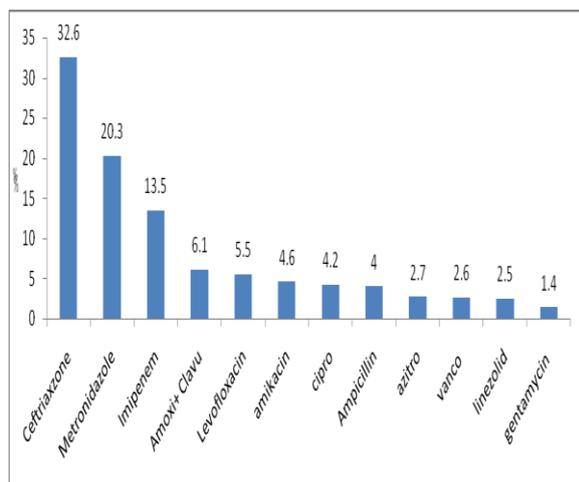


Figure 1 - the percentage of individual antimicrobial agents in MICU

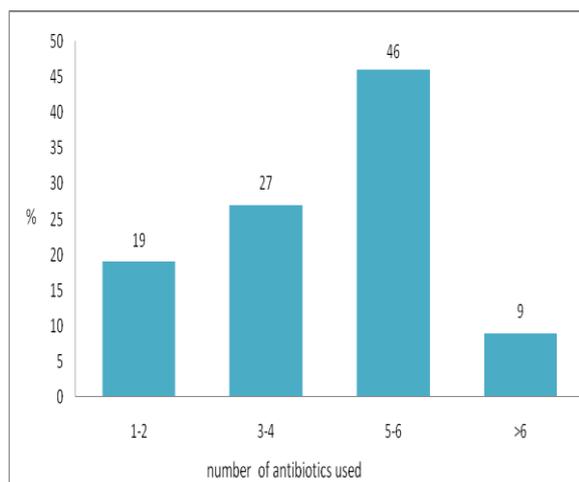


Figure 2: AMAs used for patients in MICU (Medicine ICU)

Table 2 shows indication for antimicrobial use for various purposes.

Sr.	Indication	% of patient
1	Infection	65 %
2	Prophylactic	11%
3	Symptomatic	24 %

## DISCUSSION

Antibiotics are among the most commonly prescribed drugs in hospitals and in developed countries around 30% of the hospitalized patients are treated with these drugs [12] with the numbers much

higher in developing countries. [13] A prospective survey on utilization of antibiotic carried out in two medical departments showed that 35.3% and 39% of the acute admitted patients had at least one antimicrobial exposure. [14]

The clinical setting in the medical ICU 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 medical ICU of a tertiary care of hospital.

Nina *et al* reported that ICU contributes 20-30% of the nosocomial infections in the hospital. [15] This could be expected since sepsis, multi organ function, acute respiratory distress and pneumonia and lower respiratory tract infections was prevalent among the patient 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. [16] A multidisciplinary can be adopted in ICU set up involving intensive care specialist; infectious disease control specialist, pharmacists and microbiologist can work together for more rational antimicrobial pharmacotherapy.

The average number of drugs per prescription is an important index of a prescription audit. It is recommended that the number of drugs per prescription should be kept as low as possible to minimize the risk of drug interactions, development of bacterial resistance, and hospital costs. [17] In our study, a mean of 6.2 drugs were prescribed per patient, which is comparable to the other data reported in literature, ranging from 5.1 to 12 which is according to the type of patient population and the geographical location studied. [18,19]

This study revealed that patient received multiple AMA on number of occasion. Due to multiple infections they were prescribed AMA for gram +ve, gram -ve and for the anaerobic infection. Number of times alternate AMA was prescribed due to ineffectiveness of the earlier and such was done without testing for any sensitivity.

Although our study has been conducted using a reasonably good sample size making various parameters quite trustworthy. The robustness of our findings could have been increased by an even larger sample size had the duration of study been longer, on the other hand its limitation is that it is a single centre study, hence the validity of findings would increase if it is a multi-centre study.

Rational prescribing habits should be encouraged in the doctors, which can be achieved by conducting awareness programs and time to time drug utilization studies in the hospital, which will provide a proper feedback to the prescribers. There should be awareness programs for the patients also, that will educate the consumers about the drugs which are prescribed to them. This is necessary because the overuse, underuse or the misuse of medicines harms people and wastes resources.

## CONCLUSION

Resistance developed towards antibiotics is climbing uphill unnoticeable manner which will ultimately lead to high morbidity, mortality and treatment. The major reason for this is polypharmacy. 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. Thus the responsible personal are doctors, patients, government, drug companies. Doctors either over prescribe /

under prescribe and patients are not satisfied unless some medicines are prescribed to them. Remedy of this situation requires regulation, education, and voluntary agency taking care of the society. The sensitivity test should be done where ever it is feasible before the prescription of AMA which will ensure its rational use.

Thus, requisite tools and insight necessary to predict or suppress microbial virulence are at hand.

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How to cite this article: Yadav RK, Sigdel M, Singh A et al. Pattern of antimicrobial agents used in medicine intensive care unit of a teaching hospital in Pokhara, Nepal. *Int J Health Sci Res.* 2016; 6(2):195-199.

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