

EVALUATION OF ANTIMICROBIAL UTILIZATION PATTERN IN A MEDICAL INTENSIVE CARE UNIT OF A TERTIARY CARE TEACHING HOSPITAL

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ABSTRACT

BACKGROUND

Antimicrobials are one of most commonly used drugs in the admitted patients especially in critical care unit. Seriously ill patients require critical care and multiple antibiotics for various infections as these patients are more susceptible for infections. Liberal use of antibiotics leads to antibiotic resistance and organisms causing infections will not be susceptible to antibiotics. Hence this study is done to evaluate the antimicrobial utilization pattern in a MICU of a tertiary care teaching hospital.

MATERIALS AND METHODS

A prospective observational study was done on 480 patients getting admitted to MICU of a tertiary-care teaching hospital, Basaweshwara Medical College, Chitradurga. Relevant history, clinical data, investigations including blood routine, urine routine, blood culture and sensitivity, urine culture and sensitivity were noted down and also antimicrobials prescription with respect to type of antibiotic, duration and dose of antibiotics were noted down from the date of admission till the date of discharge from medical ICU. Patients were classified into four categories on the basis of criteria to start antibiotics, that is if antibiotic was started prophylactically or symptoms suggesting infections or evidence of infection present but not bacteriologically proved or bacteriologically proved infection. Data were presented in proportions and expressed in percentages and analysed.

RESULTS

Out of 480 patients 412 (86%) of patients were prescribed with antibiotics. Majority of patients were prescribed with I V antibiotics. Among 412 patients, symptomatic treatment without any proven infection was seen in 75 (18.2%) patients, prophylactic treatment was seen in 117 (28.39%) patients. 183 (44.4%) patients had increased leukocytes but no evidence of bacterial infection. 37 (8.9%) patients showed culture positive and treated on culture and sensitivity report. Most common infection was pulmonary infections followed by urinary tract infection. Most common drug prescribed was injection ceftriaxone followed by piperacillin + tazobactam. Among 37(8.9%) patients who were positive on culture, 22 (5.3%) had infection with multiple organisms and rest with single organism. Average number of antibiotics used were 6.3.

CONCLUSION

In our study, only Small portion constituted definitive treatment with antibiotic based on culture sensitive report. In our study, treatment with antimicrobials were rational with respect to dosage, duration, selection of antibiotics and route of administration. Since proven bacterial infection constituted very small proportion, treating with antibiotic demands strict guidelines under vigilance of infectious disease control committee. And also, further studies in which samples sent for culture and sensitivity before starting even single dose of antibiotics may provide clear picture of bacterial infection spectrum and sensitivity to antibiotics there by helping to control drug resistance and making treatment more cost effective.

KEYWORDS

Antimicrobials, Culture and Sensitivity, Ceftriaxone.

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BACKGROUND

Discovery of antibiotics in 20 the century is a very rewarding gift by our scientists to field of medicine. It helped in curing many infections thereby decreasing morbidity and mortality due to infections.¹ Infectious diseases makes a major public

health problem specially in developing countries like India. Seriously ill patients admitted in critical care unit are more susceptible to various infections including life-threatening infections with multiple organisms. Hence, antimicrobials are most commonly prescribed drugs in the intensive care units.²⁻⁵ But antimicrobials when used irrationally leads to resistance and micro organisms will no more be susceptible to antibiotics. In the recent years, emergence of antibiotic resistance has increased drastically. This will narrow down antibiotic usage options and eventually leading to no antibiotics in near future.

Use of antimicrobials for the conditions or infections that are not caused by bacteria is one of the major reasons of development of resistance, improper selection of antibiotics,

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unscientific combination of drugs prescription, under dosage, incompleteness of course lead to antimicrobial resistance and substantial rise of the health care costs and increases patient morbidity and mortality.⁶

So, monitoring of antimicrobial use is required to control resistance to antimicrobials in hospitalized patients. Hence this study seeks to observe and evaluate the prescribing pattern of antimicrobials in ICU setting so as to make medical care rational and cost effective.⁷

- Erbay and colleagues evaluated the appropriateness of antimicrobial use in the adult ICUs of a tertiary care hospital and found that 223 (60.6%) of 368 patients admitted to the ICUs received antimicrobial agents and 47.3% of all antimicrobial prescriptions were inappropriate.⁷
- A cohort study conducted at a teaching hospital in the US found that 42% of the patients were treated for suspected infection, suspected sepsis, severe sepsis or septic shock. Only 41% of these patients subsequently had infections documented by positive cultures.⁸
- Suhen R Patel and colleagues evaluated the prescription pattern of antimicrobial use in the MICU of a tertiary care teaching hospital and found that majority of patients (94%) were treated prophylactically.⁹
- Vandana A Badar and colleagues evaluated the utilization of antibiotics in a MICU of a tertiary care teaching hospital and reported that rational use of antibiotics was found only in 30% of ICU admitted patients.¹⁰

MATERIALS AND METHODS

It was a prospective observational study including all patients of both genders getting admitted to Basaweshwara Medical College, Chitradurga from February 1, 2016 to January 30, 2017 were taken up for study considering the inclusion and exclusion criteria. Blood routine, urine routine, blood culture and sensitivity, urine culture and sensitivity, liver function tests and renal functions were done. Demographics data were collected, type of antibiotic, dosage, duration, route of administration were noted down. Basis for starting antibiotics were noted down after classifying it into four category that is symptomatically treated with antibiotic, prophylactic treatment, infection present but no proven bacterial infection, proven bacterial infection with culture sensitivity. All data were entered in preformed proforma and data were expressed in percentages and analysed.

Inclusion Criteria-

- All Patients >18 years of age getting admitted to MICU during the study period.
- Patients who give consent to enter the study.

Exclusion Criteria-

- Patients age <18 years.
- Patients who does not give consent to enter the study.
- Those patients who got shifted to other hospital or got discharged against medical advice or on request.

RESULTS

During our study period total 480 patients were evaluated, consisting 275 (57.29%) male patients and 205 (42.7%) females. The mean age of patients was 51.6 years. 316 (65.83%) patients were aged more than 40 years of age. The most common diagnosis which warranted admission to ICU was chronic obstructive pulmonary disease (COPD) 182 (38 %) followed by ischemic heart disease (IHD) 96 (20%), congestive heart disease (CHF) 34 (7%), upper gastrointestinal bleed (UGI Bleed) 19 (3.9) %, cerebrovascular accident (CVA) 64 (13.5%), sepsis 10.5% and generalized tonic clonic seizure (GTCS) 34 (7%) as shown in chart 1.

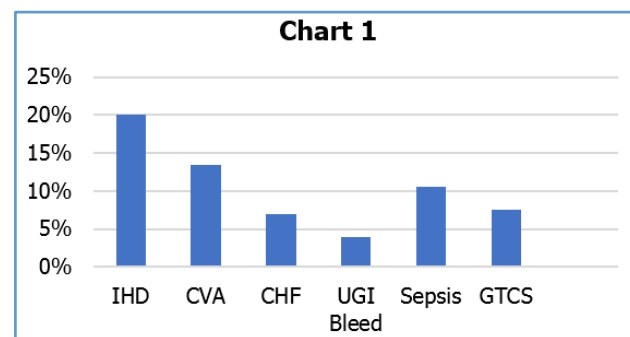


Chart 1. Showing Mortality Pattern in Critical Care Unit

Out of 480 patients 412 (86%) of patients were prescribed with antibiotics. Majority of patients prescribed I V antibiotics. Among 412 patients, symptomatic treatment without any proven infection was seen in 75 (18.2%) of patients, prophylactic treatment was seen in 117 (28.39%) of patients. 183 (44.4%) patients had increased leukocytes but no evidence of bacterial infection. 37 (8.9%) patients showed culture positive and treated on culture sensitivity report as shown in table 1. Among 37 (8.9%) patients who were positive on culture, 22 (5.3%) had infection with multiple organisms and rest with single organism. Average number of antibiotics used were 6.3.

Category	Percentage
Symptomatic	75 (18.2%)
Prophylaxis	117 (28.39%)
Non-bacterial proven infection	183 (44.4%)
Bacteriologically proven infection	37 (8.9%)

Table 1. Basis on which Antibiotics were Prescribed

Most common infection found was pulmonary infections followed by urinary tract infection. Most common drug prescribed was injection ceftriaxone followed by piperacillin + tazobactam, metronidazole and amikacin. Other antimicrobials drugs were also prescribed as shown in table 2., few cases which had resistance to ceftriaxone were sensitive to piperacillin + tazobactam and also imipenem.

Sl. No.	Group of Antimicrobial	No. of Prescriptions
1	Cephalosporin	48.2%
2	Penicillins	28.5%
3	Fluoroquinolones	12%
4	Metronidazole	18.2%
5	Aminoglycosides	12%
6	Macrolides	18.3%
7	Others	11.2%

Table 2. Group of Antimicrobials Prescribed

DISCUSSION

Infectious diseases make majority of cases in developing countries specially in critically ill patients since critically ill patients are more susceptible for infections. In recent years treating infections has become a challenge as antibiotic resistance has increased drastically. This is due to liberal and irrational use of antibiotics.

In our study, 480 patients were evaluated, out of which 275 patients were males and 205 patients were females. Mean age of patient was 51.6 and 316 patients were more than 40 years old. Common infection found was pulmonary infection followed by urinary tract infection.

In our study 86% patients were prescribed with antibiotics. In a study done by Erbay et al. 66.6% patients were prescribed with antibiotics and in a study done by Suhen R Patel et al. 91.87% were prescribed with antibiotics.

In our study, antibiotics were used for infections mostly indicating viral infections where there was no evidence of proven bacterial infection (44.4%) and for bacterial infections evidenced by blood routine or urine routine, and culture report (8.9) and as prophylaxis (28.39%) and symptomatic treatment (18.2%) was given. In a study done by Pandiamunian et al.¹¹ 57 out of 100 patients were treated with antibiotics. They also categorised patients on reason for treating with antibiotics and found that 23.9% patients were treated prophylactically, 12.7% patients were treated symptomatically on basis of clinical features, 52.3% though showed evidence of infection but without proven bacterial infection and 11.1% patients were had proven bacterial infection and treated with antibiotics.

Most common antibiotic used in our study was ceftriaxone followed by piperacillin and tazobactam. Similar observation was seen in a study done by Nikilesh et al.¹² In a study done by Pandiamunian et al. similar observation was found, they also found that organisms which were isolated from culture and sensitivity tests were found to be sensitive to imipenem and piperacillin + tazobactam. In our study organisms were sensitive to ceftriaxone or piperacillin + tazobactam combination drugs.

CONCLUSION

Antibiotic prescription was high in cases with infection but without proven bacterial infection either cultures were negative, or it was not sent before treating with antibiotic. In these cases, there were leukocytosis, some with neutrophilia. Small portion constituted definitive treatment with antibiotic based on culture sensitive report. In our

study, treatment with antimicrobials were rational with respect to dosage, duration, selection of antibiotics and route of administration.

Since proven bacterial infection constituted very small proportion, treating with antibiotic demands for strict guidelines under vigilance of infectious disease control committee. And also, further studies in which samples sent for culture and sensitivity before starting even single dose of antibiotics may provide clear picture of bacterial infection and sensitivity to antibiotics there by helping to control drug resistance and making treatment more cost effective.

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