

RESEARCH ARTICLE

A prospective observational study of use of antibiotics at emergency department in tertiary care hospital

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Received: July 23, 2016; Accepted: August 07, 2016

ABSTRACT

Background: Antibiotics are most extensively used drugs in hospitals. It is documented that antibiotics in developing countries have been consumed in relatively high levels, and consequently, led to higher occurrence of improper use and greater levels of resistance when compared to developed countries. **Aims and Objective:** The aim of this study was to analyze the antibiotic prescription patterns in emergency department (ED) prescribed for various illnesses. **Materials and Methods:** The prospective observational study was done by analyzing prescriptions in ED for 48 h of admission in tertiary care hospital, Mysore. The number of drugs and antibiotics prescribed were recorded. Based on this data, the WHO prescribing indicators were analyzed. **Results:** In our study, we found a total of 1009 drugs, and 186 antibiotics were prescribed in the 150 patients studied, that is, an average of 6.73 drugs/prescription and 1.24 antibiotics/prescription. The common diagnoses were organophosphate poisoning (19.3%), multi-organ failure/septic shock (13.3%), and cerebrovascular accidents (12%). 88% of antibiotics were prescribed from the essential drugs formulary list and 47% of the prescriptions included the drug's generic name. Cephalosporins (54.3%) were the most commonly prescribed antibiotic. **Conclusion:** The study reveals that practice toward polypharmacy and antibiotic prescribing was frequent in ED. Hence, there is a strong need for guidelines and protocol for the use of antibiotics in ED.

KEY WORDS: Antibiotics; Prescribing Pattern; Antibiotic Resistance


INTRODUCTION

Antibiotics are the most extensively used drugs in hospitals. It is documented that antibiotics in developing countries have been consumed in relatively high levels, and consequently, led to higher occurrence of improper use and greater levels of resistance when compared to developed countries.^[1] The previous studies in developing countries show that 35-60% of clinical encounters were prescribed antibiotics while appropriate prescribing were reported in <20%.^[2]

The impact of antimicrobial resistance is arguably greatest on low-income countries, which face the double burden of fewer antibiotic choices and higher rates of infectious diseases.^[3]

The WHO has developed prescribing indicators to detect barriers to good antimicrobial stewardship.^[4] These indicators measure the performance of health-care providers in prescribing drugs appropriately in primary health-care facilities and are a commonly used standard in drug utilization studies.^[4]

To date, the most efforts have focused on inpatient care units and outpatient clinics. Little attention has been paid to the emergency department (ED). The ED differs from inpatient care units primarily in the need for a rapid patient turnaround. ED physicians may be less concerned about adverse effects of antibiotics because follow-up with treated patients is limited.

Access this article online	
Website: www.njppp.com	Quick Response code
DOI: 10.5455/njppp.2017.7.0821607082016	

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Thus, antibiotics are often used liberally in the ED. There are very few studies on antibiotic usage in ED. Hence, we proposed to study the antibiotic prescription patterns using WHO indicators and group of antibiotics that are prescribed for various illnesses in the ED.

MATERIALS AND METHODS

A prospective observational study was conducted in ED of tertiary care hospital at Mysore after obtaining Institutional Ethical Committee clearance. Confidentiality of study subjects was maintained.

The case records of patients who visited ED of tertiary care hospital at Mysore, India, from August 2015 to September 2015 and fulfilled the inclusion criteria were analyzed. Case records of subjects aged more than 18 years, who were admitted as inpatients and stayed for a minimum of 48 h in emergency medicine ward were included. Case records of subjects who died within 48 h of admission were excluded from the study. Estimated sample size was 144 case records. Hence, we studied 150 case records for 48 h of admission. Based on this records, the WHO prescribing indicators such as an average number of drugs prescribed per patient encounter, percentage of encounters with an antibiotic prescribed, percentage of antibiotics prescribed by generic name, and percentage of antibiotics prescribed from essential drugs list or formulary were calculated. The distribution of antibiotic prescriptions was studied based on the class of antibiotic and primary diagnosis.

Data were entered into Microsoft Excel and analyses were done using the Statistical Package for Social Sciences (SPSS) for Windows software (version 23.0; SPSS Inc., Chicago). Descriptive statistics such as mean for continuous variables and frequency and percentage for categorical variables were determined.

RESULTS

The prescriptions of 150 patients admitted to the ED were recorded for 48 h. This included 98 male and 52 female patients. The majority patients belonged to 18-35 years which accounts for 36%. The most common diagnosis was organophosphate poisoning (19.3%) followed by multi-organ failure/septic shock (13.3%), cerebrovascular accidents (12%), and lower respiratory tract infections (7.33%). A total of 1009 drugs and 186 antibiotics were prescribed in the 150 patients studied, that is, an average of 6.73 drugs/prescription and 1.24 antibiotics/prescription. Antibiotics were prescribed for 116 patients (77.3%) during 48 h of admission out of which 46% prescribed by generic name and 88% of antibiotics were from essential drug list. The most frequently used antibiotics were cephalosporins (52.6%) and metronidazole (18.75%), alone or in combination with other antibiotics (Tables 1-3 and Figures 1-3).

DISCUSSION

The growing incidence of antibiotic-resistant bacteria and clostridium difficile colitis is a problem in hospitals across the world, which leads to increased morbidity, mortality, and health-care costs. Rational prescribing practices serve to combat this global public health challenge by preventing antibiotic overuse and misuse. Unfortunately, uptake of this concept has been slow, with fewer than half of all

Table 1: Baseline demographics of study sample (n=150)

Demographic parameters	Frequency	
	Number	Percentage
Age		
18-35	48	32
36-55	54	36
>55	48	32
Sex		
Male	98	65.33
Female	52	34.67
Diagnosis		
CNS		
Seizure	2	1.33
CVA	18	12
Meningitis	6	4
CVS		
LVF	7	1.67
MODS/sepsis	20	13.33
RS		
COPD	7	4.67
LRTI	11	7.33
Renal		
CKD	4	0.17
GIT		
Age	7	4.67
Hepatic encephalopathy	1	0.67
Hepatitis	6	4
Poisoning		
OP poisoning	29	19.33
Non-OP poisoning	19	12.67
Others		
Snake bite	7	4.67
PUO	3	2
DKA	1	0.67
Sickle cell anemia	1	0.67
Bee sting	1	0.67

CNS: Central nervous system, CVA: Cerebrovascular accident, OP: Organophosphate, DKA: Diabetic ketoacidosis, GIT: Gastrointestinal tract, CVS: Cardiovascular system, PUO: Pyrexia of unknown origin, LVF: Left ventricular failure, LRTI: Lower respiratory tract infection, COPD: Chronic obstructive pulmonary disease, MODS: Multiple organ dysfunction syndrome

countries having any policies promoting good antimicrobial stewardship.^[5] Even after searching extensively we could not find any studies on the antibiotic usage pattern in ED. Rather there were more studies conducted in the Intensive Care Unit (ICU).

Our study showed that the average number of drugs per encounter was 6.73, which was comparable to Williams et al.^[6] study that showed 6.2 but both were higher than the limit of 2.0 recommended by the WHO.

A total of 186 antibiotics were prescribed for the 150 patients that are an average of 1.24 antibiotics/prescription, so this study revealed that a large number of patients were prescribed an antibiotic during the first 48 h of admission in ED (77.3%), which was more than WHO standard (30%). Biswal et al.^[7] reported that nearly 62% patients in a tertiary care ICU in northern India received antibiotics, while Shrikala

et al.^[8] reported that 64% of ICU patients received empiric antibiotics.

About 88% of antibiotics were prescribed from the essential drugs formulary list. A formulary list can help aid rational prescribing by encouraging selection of medicines that are cost-effective and appropriate to local drug resistance and disease prevalence patterns. Adherence to an essential drugs list was high in our study likely because physicians had easy access to updated formularies in the ED.

In this study, 49% of patients received one antibiotic, while 41% received two and 10% received three antibiotics. Studies in North India showed that 70% patients received 2 or less antibiotics and Western countries reported still lower antibiotic prescription in ICU.^[9]

In our study, broad spectrum antibiotics accounted for approximately 73.12% of the total prescribed antibiotics and the most frequently prescribed antibiotics were the 3rd generation cephalosporins (cefotaxime and ceftriaxone) which were also reported by Williams et al.^[6] in ICU followed by Metronidazole. Biswal et al. reported that the most frequently prescribed antibiotic at ICU admission was metronidazole followed by cefotaxime, amoxicillin/clavulanic acid, cefipime, and ciprofloxacin.^[7] In another Indian study, the most commonly prescribed antibiotics at admission were cefoperazone/sulbactam or piperacillin/tazobactam.^[8]

Our finding reflects the practice toward polypharmacy in ED was more which could be because of the severity of presentation and inadequate history from the patient. This might increase the risk of drug interactions and adverse drug reactions.

The high percentage rate of prescribing antibiotics in our ED could be because it is a tertiary hospital, with most of

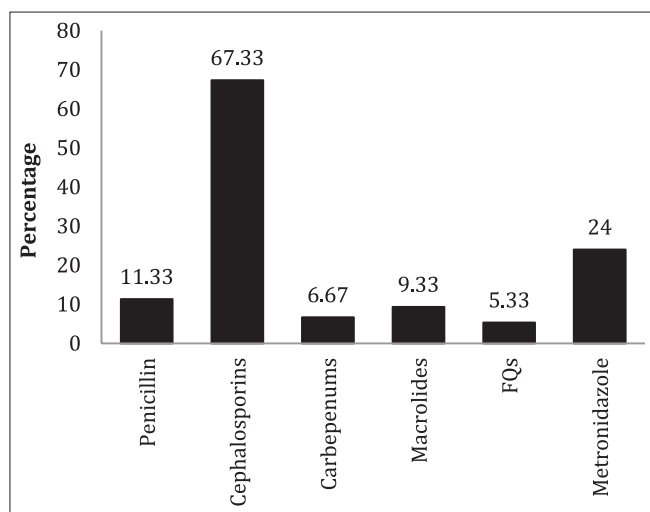


Figure 1: Percentage of different antibiotic prescribed (n = 186)

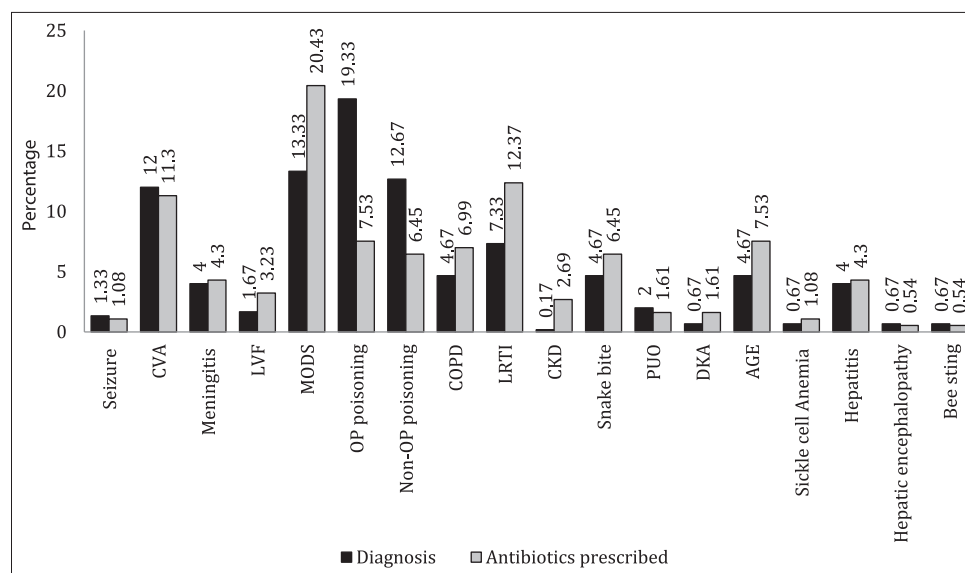


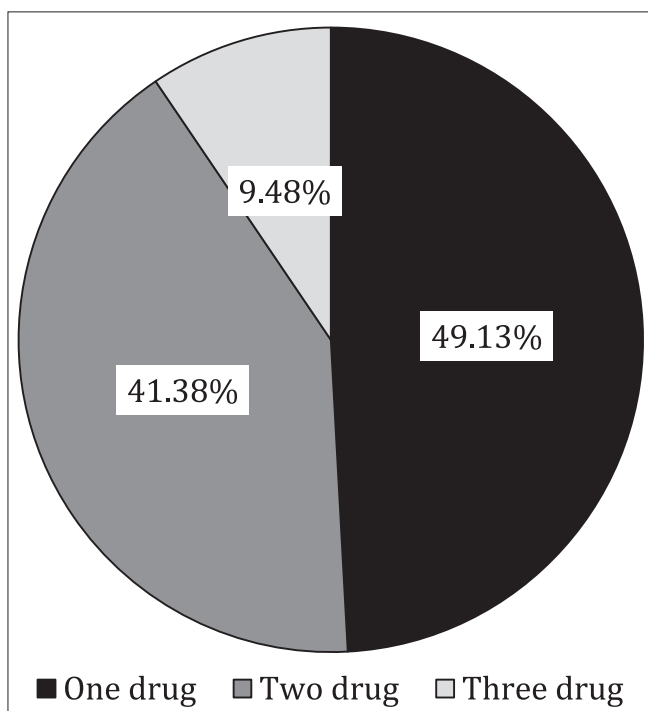
Figure 2: Distribution of all diagnoses seen in the emergency department with antibiotics prescribed

Table 2: Application of the WHO prescribing indicators in emergency department

WHO prescribing indicator	Results
Average number of drugs per encounter (<i>n</i> =150)	6.73
Average number of antibiotics per encounter (<i>n</i> =150)	1.24
Percentage of encounters with one or more antibiotic prescribed (<i>n</i> =150)	77.3% (<i>n</i> =16)
Percentage of antibiotics prescribed by generic name (<i>n</i> =150)	46% (<i>n</i> =69)
Percentage of antibiotics from essential drug list (<i>n</i> =150)	88% (<i>n</i> =32)

Table 3: Distribution of all antibiotics prescribed in the emergency department (*n*=186)

Antibiotic category ^[9]	Frequency	
	Number	Percentage
Broad spectrum agents		
Beta lactam antibiotics	128	68.82
Fluoroquinolone	8	4.3
Total	136	73.12
Narrow spectrum agents		
Metronidazole	36	19.35
Macrolide	14	7.53
Total	50	26.88

**Figure 3:** Distribution of patients according to the number of antibiotics prescribed (*n* = 116)

the critical patients referred from peripheral centers and in addition, incomplete medical history might influence the

physicians' decisions in prescribing antibiotics. And also there is a chance of prescribing antibiotics along with other medicines as prophylactic agents in various diseases.

In the study, broad spectrum antibiotics were prescribed more than narrow spectrum, maybe due to the ease of compliance with the treatment regimen or uncertainty about the diagnosis. However, it is better to avoid broad spectrum antibiotics for empirical or prophylactic therapy. Single centric and small sample size were the limitation of this study.

With greater awareness of the current treatment guidelines for selected conditions and with the use of procalcitonin test to help rule out bacterial infection, antibiotic use in the ED can be curtailed with a salutary effect on patient outcomes.^[10]

CONCLUSION

The study reveals that practice toward polypharmacy and antibiotic prescribing was frequent in ED, and the empirical treatment with antibiotics was common. The third generation cephalosporins were prescribed most commonly. It is advisable to prescribe antibiotics rationally to prevent the emergence of resistance and to minimize the adverse reactions in the patient. Hence, there is a strong need for protocol and guidelines for the use of antibiotics in ED.

Finally, this study needs to be extended and repeated over time to maintain good quality health care and to address factors influencing overprescribing of antibiotics.

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How to cite this article: Mamatha V, Nagesh HN, Parashivamurthy BM. A prospective observational study of use of antibiotics at emergency department in tertiary care hospital. *Natl J Physiol Pharm Pharmacol* 2017;7(1):103-107.

Source of Support: Nil, **Conflict of Interest:** None declared.