

## **Evaluation Of Antibiotic Drug Utilization In Emergency Department At A Tertiary Care Medical College Hospital – A Retrospective Study**

**SIMHADRI V. S. D. N. A. NAGESH<sup>1\*</sup>, CHAKRAPANI CHEEKAVOLU<sup>2</sup>, SLDV RAMANA MURTY KADALI<sup>3</sup>  
GARIKIPATI KRANTHI KUMAR<sup>4</sup>**

<sup>1</sup>Associate Professor, Department of Pharmacology, Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, Uttar Pradesh, India. Pin: 243202

<sup>2</sup>Associate Professor, Department of Pharmacology, Karpagam faculty of Medical sciences and research, Coimbatore, Tamil Nadu, India. Pin: 641032

<sup>3</sup> Associate Professor, Department of Pharmacology, Jaipur National University Institute of Medical Sciences and Research Center, Jaipur, Rajasthan, India. Pin: 302017

<sup>4</sup>Assistant Professor, Department of Physiology, Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, Uttar Pradesh, India. Pin: 243202

### Address For correspondence

Simhadri V. S. D. N. A. Nagesh Associate Professor, Department of Pharmacology, Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, Uttar Pradesh, India. Pin: 243202

---

### **Abstract**

Emergency department is a very busy department with many patients of in difficult situation. The drugs used in this cases are prime important. Antibiotics are the one of the major drugs commonly prescribed to save many lives. The main purpose of this research is to facilitate the rational use of drugs. To estimate the type of drug used and the prevalence of the drug, it is studied to see whether prescription guidelines are followed or not which was prescribed by WHO. The study was conducted in tertiary care hospital retrospectively from the records maintained by MRD. The antibiotic which is commonly prescribed in this research is amikacin which is an aminoglycoside antibiotic.

---

### **Introduction**

Emergency medicine is a specialty in medicine that cares for caregivers at uncertain times in their lives. The emergency department (ED) is frequently cited as the ideal setting for identifying patients with high-risk health behaviours, such as substance use, and connecting them to evidence-based treatment services(1). As per the WHO, drug utilisation can be defined as "the marketing, distribution, prescription, and use of drugs in a society, with special emphasis on the resulting medical, social, and economic consequences(1)". Drug use is a complicated process because optimal advantages of drug therapy in clinical outcomes may not be realised due to underuse, overuse, or misuse of these drugs. Inappropriate drug use can also lead to higher medical costs, antimicrobial resistance, side effects, and patient death(2). The analysis of medication utilisation and expenditure can provide healthcare decision makers with

information about overall medication utilisation by gender, comorbidities, and age group(3). It faces the challenge of reviewing the early stages of biological disease behaviour. The urgency, the unpredictability, and the need to control the entire spectrum of age, gender, and pathology are characteristics of the specialty. Evaluation of the need for better organised emergency care led to the development of emergency treatment as a specialty in the Western world in the 1970s. In the twenty-first century, emergency treatment was recognised as a specialty in almost eight countries around the world, including India. Emergency related issues, challenges, and practises are the same around the world. Medication review is one proposed intervention to maximise the advantages of medications while minimising their potential for harm(4). The WHO ATC/DDD(5) (Anatomical Therapeutic Chemical/Defined daily dose) methodology is the gold standard for drug use. The WHO Collaborating Centre for Drug Statistics and Methodology defines defined daily dose (DDD) for each drug and route of administration as the assumed average maintenance adult dose per day for its main indication. As a result, the DDD is an international unit used for international or regional comparisons. However, DDD does not always correspond to the recommended or prescribed daily dose (PDD). In fact, several studies have found differences between DDD and PDD for various drug classes(6). Knowledge of rational and irrational prescription writing is essential for safe, error-free, and to of untoward events(7). Polypharmacy is one of the causes of the irrational prescribing habit(8). This study will mainly focus on drug utilisation in the emergency department of a tertiary care medical college hospital.

### **Aim**

The aim of the research is to subject a comparative analysis of drug utilization in emergency department of tertiary care medical college hospital with government college hospital.

### **Objectives**

- To compare the number of drugs used
- To understand the type of drugs used
- To investigate which type of drugs are more utilized

### **Materials and Methods**

This study was a retrospective study conducted in a tertiary care hospital after getting permission from the Institutional Ethics Committee. The data was collected from the MRD department, where those who got admitted to the emergency department from January 2018 to December 2018 were tracked. In this data, we collected information about the antibiotics used in the emergency department. The data is entered in the excel file, and from there we obtained various charts for the depiction of the data. The sample size is 100, and the inclusion criteria for these samples are those who took antibiotics as admitted patients.

### **Results**

Figure 1 depicts age- and gender-wise distribution. The table shows the number of patients and their percentage. The number of male patients was 21 and female patients were 15, which were 58% and 42%,

respectively. In this case, it can be said that the number of male patients is higher than the number of female patients.

In the same figure, the age group of the patients was divided into four categories: below 20 years, 20–40 years, 40–60 years, 60–80 years, and above 80 years. The number of patients below 20 years is 3, the number of patients in the context of 20–40 years is 16, the number of patients in the context of 40–60 years is 13, the number of patients in the context of 60–80 years is 2, and the number of patients above 80 years is 2. The percentage of patients below 20 years is 8%, the number of patients 20–40 years is 44%, the percentage of patients 40–60 years is 36%, the percentage of patients 60–80 years is 6%, and the percentage of patients above 80 years is 6%. The highest percentage of patients here is 44% in the context of 20- to 40-year-olds.

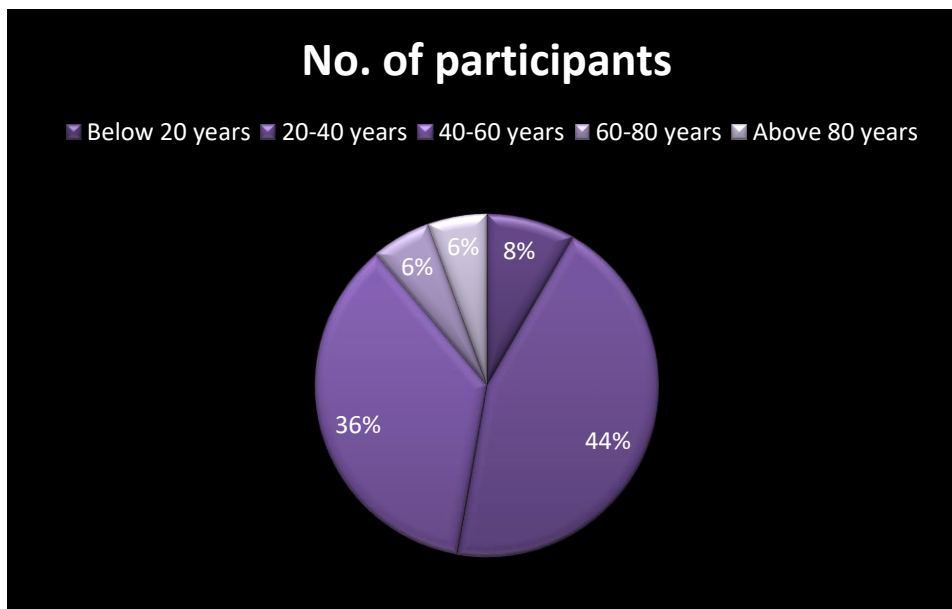
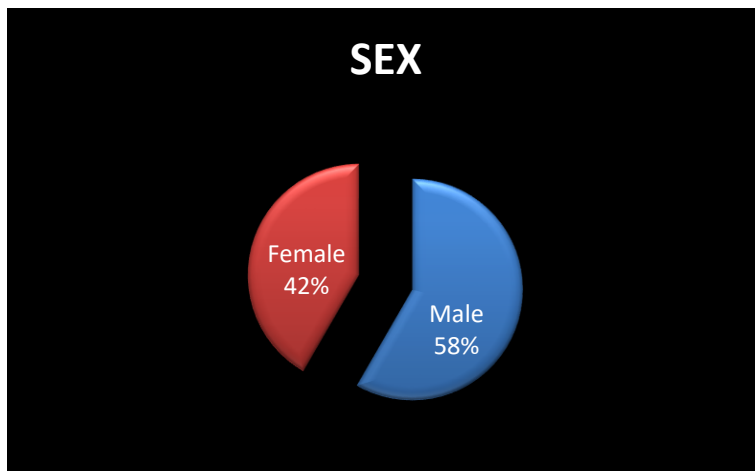


Fig 1: the figure 1 indicates the sex and age of the patients who attended in the emergency department.

In Figure 2, commonly prescribed drug groups and classes were studied. The drugs prescribed were: Ceftriaxone, Amikacin, Piperacillin with Tazobactam, levofloxacin, Cefixime, Cefuroxime + Clavulanic Acid, Cefotaxime + Sulbactam, Metronidazole, Amoxicillin + Clavulanic Acid, Cefoperazone + Sulbactam, Doxycycline, Co-trimoxazole DS, Chloramphenicol, and Linezolid. The number of prescriptions in context is as follows : Ceftriaxone is 20%; Amikacin is 29%; Metrogyl is 10%; Levofloxacin is 6%; Cefixime is 6%; Cefuroxime + Clavulanic Acid is 6%; Piperacillin + Tazobactam is 5%; Amoxicillin + Clavulanic Acid is 5%; Cefoperazone + Sulbactam is 2%; Doxycycline is 3%; Cefloxaci The drug with the highest percentage of prescriptions in this context is Amikacin, at 29%.

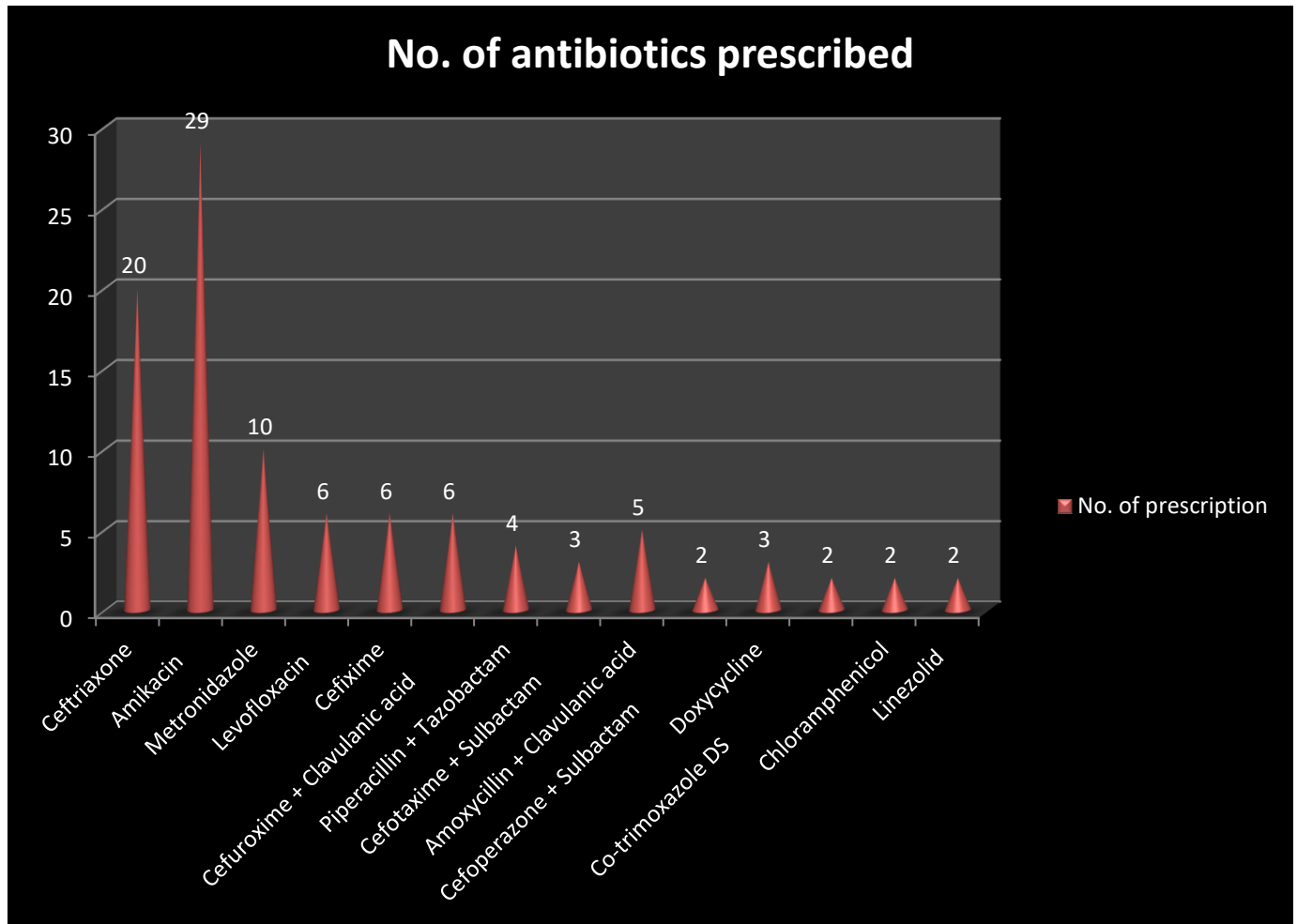


Fig 2: the figure 2 shows the various drugs prescribed to the patients admitted in emergency department.

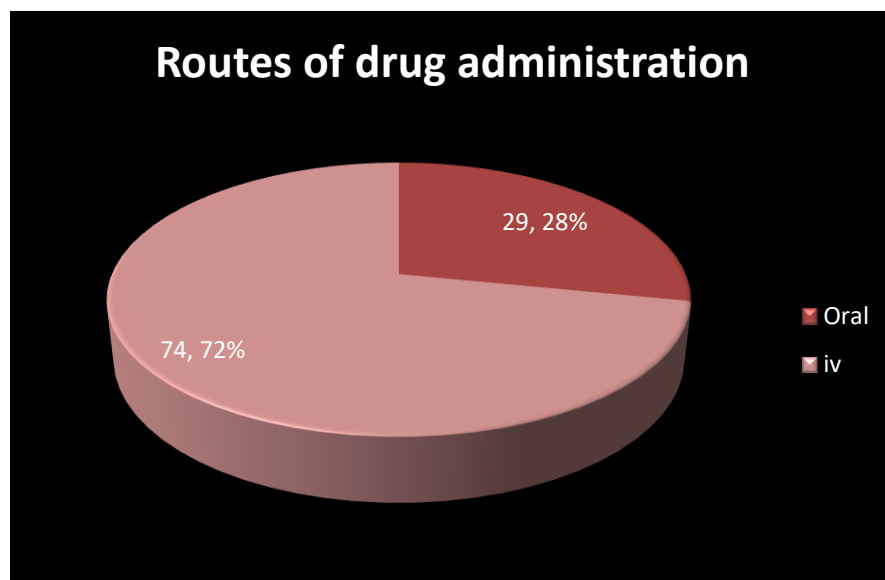


Fig 3: the figure 3 depicts the various routes of drugs administered to the patients while in emergency department

In Figure 3, the common routes for administration of drugs that were prescribed are described. The routes of administration commonly used were both oral and IV. The number of drugs prescribed for oral administration is 29, and the number of drugs prescribed for IV administration is 74. Therefore, it can be said that the percentage of drugs prescribed for oral is 28% and the number of drugs prescribed for IV is 72%. It can be seen from the above table that the percentage is higher in the context of IV.

#### Discussion:

This study was conducted in a tertiary care hospital's MRD on the patients' record files who got admitted to the emergency department of a tertiary care hospital.

In this study, the most common antibiotic used was amikacin, an aminoglycoside. The FDC, Co-trimoxazole double strength, cefoperazone with sulbactam, Linezolid, and Chloramphenicol are the least commonly used here in emergency departments the WHO(5) prescribing indicators prescribed as Percentage of prescription with antibiotic is 23%, Percentage of prescription with injection is 33%.

In a study by Preksha A. Barot(9), ceftriaxone (32.69%) was the most commonly prescribed drug along with the other drugs, but in our study, amikacin (29%) was the most commonly used drug. In another study by Rucha Mahesh Shinde(10), ceftriaxone was prescribed to more than 30% of the patients, with an average of 1.12 antibiotics prescribed per patient. In another study by Mamatha(7), 76.66% of antibiotics were utilised in their research with 100 % injectables and the most commonly used was 3<sup>rd</sup> generation cephalosporin. According to A. K. Yadav(11), 49% of the 504 patients were treated with antibiotics, and cefixime (76.6%) is the most commonly used antibiotic, which is an oral formulation, but in our study, amikacin was commonly used, which is an injectable. In a study by Kopparthi(12), 34.5 % of penicillins were commonly used and in our study 31% were cephalosporins both of these are betalactam antibiotics. In one more study by Neha Joshi(13), 18.70% (271) of the drugs were antibiotics among the 260

prescriptions, whereas in our study, our inclusion criteria were on the utilisation of antibiotics. In a research study by Mohammed Sulaiman Sait(14), 138 prescriptions were analyzed, of which 42.2% were injectables and 20 % were oral routes, whereas in our study 72% were injectables and 28 % were oral. In one study by Ritika Suresh(15), 59.62% were parenteral routes and 26.02 % were oral routes and 51 % were antibiotics especially cephalosporins but in our study, 72% injectables and 28 % were oral route. In research conducted by Sharonjeet Kaur(1), 17.8% of the drugs were beta-lactam antibiotics, and 75.17% of the drugs were given as injectables as compared to 72% in our study. According to Mishore Kirubel M(16), antibiotics were prescribed in 27.62% of cases and injections in 44.77%, which is less than our study (72%). In a research study by (16), antibiotics were 28.0% of the total and injections were 87.7% of the total, whereas in this study injections were 72% and, according to WHO prescribing indicators, 37.13% of the total were prescribed. According to Saad Ahmed Alkahtani(17), 23% were Augmentin, which is a fixed-dose combination of Amoxicillin and Clavulanic Acid; the least-used antibiotic was Cefixime, which is a Cephalosporin and 23% were injectables, while 68% were taken orally.

### **Conclusion:**

This research was carried out in a tertiary care hospital retrospectively. For the patients who were attended from January 2018 to December 2018, we studied the antibiotics used in these patients. The aminoglycoside amikacin was the most commonly prescribed antibiotic in these patients, and the co-trimoxazole-DS, cefoperazone with sulbactam, chloramphenicol, and linezolid were the least commonly prescribed., the WHO prescribing indicators indicated the average number of drug per prescription is  $2.39 \pm 0.55$ , Percentage of prescription with antibiotic is 23%, Percentage of prescription with injection is 33%, while Percentage of drug prescribed from essential drug list is 65%, our study results also nearly to the WHO prescribing indicators.

**Conflict of interest-** no conflict of interest among authors.

### **References**

1. Kaur S, Rajagopalan S, Kaur N, Shafiq N, Bhalla A, Pandhi P, et al. Drug Utilization Study in Medical Emergency Unit of a Tertiary Care Hospital in North India. *Emerg Med Int.* 2014;2014:1–5.
2. Kumar BS, Maria S, Shejila CH, Udaykumar P. Drug Utilization Review and Cost Analysis of Anticancer Drugs Used in a Tertiary Care Teaching Hospital. *Indian J Pharm Sci [Internet].* 2018 [cited 2022 Nov 5];80(4). Available from: <http://www.ijpsonline.com/articles/drug-utilization-review-and-cost-analysis-of-anticancer-drugs-used-in-a-tertiary-care-teaching-hospital-3516.html>
3. Balkhi B, Alqahtani S, Altayyar W, Ghawaa Y, Alqahtani Z, Alsaleh K, et al. Drug utilization and expenditure of anticancer drugs for breast cancer. *Saudi Pharm J.* 2020 Jun;28(6):669–74.
4. Kitchen SA, McGrail K, Wickham ME, Law MR, Hohl CM. Emergency department-based medication review on outpatient health services utilization: interrupted time series. *BMC Health Serv Res.* 2020 Dec;20(1):254.
5. WHO. How to investigate drug use in health facilities : selected drug use indicators. World Health Organization; 1993.

6. Mittal N, Mittal R, Singh I, Shafiq N, Malhotra S. Drug Utilisation Study in a Tertiary Care Center: Recommendations for Improving Hospital Drug Dispensing Policies. *Indian J Pharm Sci.* 2014;76(4):308–14.
7. V. M, B. M. P, D. K. S. Study of drug utilization pattern in emergency medicine ward at a tertiary care teaching hospital. *Int J Basic Clin Pharmacol.* 2017 Mar 25;6(4):868–73.
8. Cheekavolu C, Pathapati RM, Babasaheb Laxmansingh K, Saginela SK, Makineedi VP, Siddalingappa, et al. Evaluation of Drug Utilization Patterns during Initial Treatment in the Emergency Room: A Retrospective Pharmacoepidemiological Study. *ISRN Pharmacol.* 2011 Dec 25;2011:1–3.
9. Malhotra S, Rana D, Patel V, Patel K, Barot P. Drug utilization in emergency medicine department at a tertiary care teaching hospital: A prospective study. *J Basic Clin Pharm.* 2013;4(4):78–81.
10. Shinde R, Kale A, Chube S, Sawant M. Drug utilization study in medical intensive care unit in a rural tertiary care teaching hospital in Maharashtra. *Int J Med Sci Public Health.* 2017;6(4):733–7.
11. Yadav AK, Bhandari R, Rai B, Giri S, Baral DD, Mandal M. Presentation, Prescription Pattern and Time Taken To Discharge From An Emergency Department Of Eastern Nepal. *Health Renaiss.* 2016 Jul 25;12(3):209–14.
12. Koppaarthi AS, Kaniganti S, Chodavarapu R. Drug utilization study in the paediatric department of a tertiary care teaching hospital. *Int J Basic Clin Pharmacol.* 2019;8(7):1518–22.
13. Joshi N, Sharma A, Baldi A, Sharma DK. Drug utilization study in patients attending emergency department at a tertiary care hospital in Punjab: A prospective observational study. 2018;10(2):95–7.
14. SULAIMAN SAIT J M, S S, J A, V R. STUDY OF DRUG UTILIZATION PATTERN IN A TERTIARY CARE HOSPITAL DURING THE INPATIENT ADMITTANCE IN THE EMERGENCY CARE DEPARTMENT. *Asian J Pharm Clin Res.* 2014 Jan;7(1):146–8.
15. Suresh R, Selva P. Prescription pattern study of the drugs used in the emergency department of a tertiary care hospital. 2020:85–92.
16. Mishore KM, Girma Y, Tola A, Mekuria AN, Ayele Y. Evaluation of Medication Use Pattern Among Patients Presenting to the Emergency Department of Hiwot Fana Specialized University Hospital, Using WHO Prescribing Indicators. *Front Pharmacol.* 2020 Apr 28;11:509.
17. Alkahtani SA. Drug Utilization Patterns in the Emergency Department of Najran University Hospital, Najran. *J Pharm Pract Community Med.* 2018 Feb 10;4(1):12–5.