UPI Journal of Pharmaceutical Medical, and Health Sciences
Content Available at www.uniquepubinternational.com ISSN: **2581-4532**

Open Access **Research Article**

Study of the utilization of antimicrobial agents in surgical devices at a tertiary care hospital, Nellore

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Article History

Received: 29-04-2021
Revised: 16-05-2021
Accepted: 27-06-2022

Keywords

Antimicrobial agents, surgical units, monotherapy, Sensitivity pattern.

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DOI: https://doi.org/10.37022/jpmhs.v5i2.77

Abstract

The demographic data & patient characteristics in surgical unit-I and surgical unit-II in the hospital were enrolled in the study. In the study, a total number of 240 prescriptions were analyzed during the study period which includes 92 male and 148 female patients. Drug utilization can be defined as the marketing, distribution, prescription and use of drugs in a society, considering its consequences, either medical, social, and economic. The present study was performed to evaluate utilization of antimicrobial agents in surgical units at a tertiary care teaching hospital. During the 6 months period, we collected 240 prescriptions with antimicrobial agents from both surgical I and surgical II units. The data collected were analysed and summarised accordingly. A study of utilization of antimicrobial agents in surgical units at a Jaybharath hospital, Nellore was conducted. The most frequently used antimicrobial monotherapy agents were ceftriaxone and ciprofloxacin. The most frequently used antimicrobial combinations were amoxicillin + clavulanic acid and cefoperazone+salbactum. Sensitivity pattern of antimicrobial agents in surgical departments will help the physician to select the proper drug of choice

Introduction

The World Health Organization (WHO) addressed drug utilization as the marketing, distribution, prescription and use of drugs in a society, considering its consequences, either medical, social, and economic [1]. Studies on the process of drug utilization focus on the factors related to the prescribing, dispensing, administering, and taking of medication, and its associated events, covering the medical and non-medical determinants of drug utilization, the effects of drug utilization, as well as studies of how drug utilization relates to the effects of drug use, beneficial or adverse [2,3,4]. The therapeutic practice is expected to be primarily based on evidence provided by pre marketing clinical trials, but complementary data from post marketing period are needed to provide an adequate basis for improving drug therapy [5].

Scope of Drug Utilization Studies

Drug utilization studies (DUS) may include descriptive epidemiological approaches to the study of drug utilization, but also the assessment of how drug utilization relates to the effects of drug use, beneficial or adverse. The research in this field aims to analyze the present state and the developmental trends, of drug usage at various levels of the health care system, whether national, regional, local or institutional. Drug utilization

studies may evaluate drug use at a population level, according to age, sex, social class, morbidity, among other characteristics. These studies are useful to provide denominators to calculate rates of reported adverse drug reactions, to monitor the utilization of drugs from therapeutic categories where particular problems can be anticipated (e.g., narcotic analgesics, hypnotics and sedatives, and other psychotropic drugs), to monitor the effects of informational and regulatory activities (e.g., adverse events alerts, monitoring urgent safety restrictions). Drug utilization data may be used to produce crude estimates of disease prevalence (e.g., cardiovascular disease, anti-diabetic drugs, to plan drug importation, production, and distribution, and to estimate drug expenditures. The characterization of drug utilization may be extended linking prescription data to the reasons for the drug prescribing. They include the concept of appropriateness that must be assessed relative to indication for treatment, concomitant diseases (that might contraindicate or interfere with chosen therapy) and the use of other drugs (interactions). Therefore they can document the extent of inappropriate prescribing of drugs (e.g. antibiotics, NSAIDs) and even the associated adverse clinical, ecological, and economic consequences. Moreover, they can also explore the percentage of drugs that adhere to the evidence-based recommendations in place for its indications [6, 7, 8].

Types of drug use studies

DU studies are either Qualitative or Quantitative 9.

Qualitative DU studies are multidisciplinary operations which collect, organize, analyze and report information on actual drug use. They usually examine use of specific drugs or specific conditions. Qualitative DU studies include the concept of criteria. Criteria are predetermined elements against which aspect of the quality, medical necessity and appropriateness of medical care may be compared. Drug use criteria may be based upon indications for use, dose, dosing frequency and duration of therapy. Qualitative studies assess the appropriateness of drug utilization and generally link prescribing data toreasons (indications) for prescribing. Such studies are referred to as DU review (DUR) or DU Evaluation (DUE). The process is a "therapeutic audit" based on defined criteria and has the purpose of improving the quality of therapeutic care.

Quantitative DU studies involve the collection, organization and display of estimates or measurements of drug use. This information is generally used for making purchase decisions or preparing drug budgets. But data from quantitative drug use studies are generally considered suggestive, not conclusive with respect to quality of drug use. It is possible to combine both quantitative and qualitative DU studies, which will yield information about pattern and amount of drug use as well as the quality of drug use.

Methodology

Study site: Surgical Unit-1 & Surgical Unit-2 in jayabharath hospital, Nellore.

Study design

- This is a prospective, observational study to evaluate utilization of drug use & writings patterns of the prescription.
- The total number of antimicrobials in prescription, dose and route of administration were collected from in-patient records.

Study period

The study is planned over a 6months period.

Study criteria

Inclusion Criteria

Patients above 15 years and who are admitted in Surgical units are involved in it.

Exclusion criteria

- Treatment charts without AMAs (anti microbial agents) are excluded from the study. Pregnant women are excluded from this study.
- Age below 15years children are not allowed

Study procedure

The data source needed for the study will be collected from case reports, treatment charts and lab reports in a specially designed patient data entry form. The outcomes will be measured using the below data

- Age and sex of the patient.
- Diagnosis of patients.
- Percentage of AMAs (Antimicrobial Agents) prescribed in the order of preference.
- Average no. of drugs patientents.
- Dose and route of administration of AMAs.
- Rationality.

Results

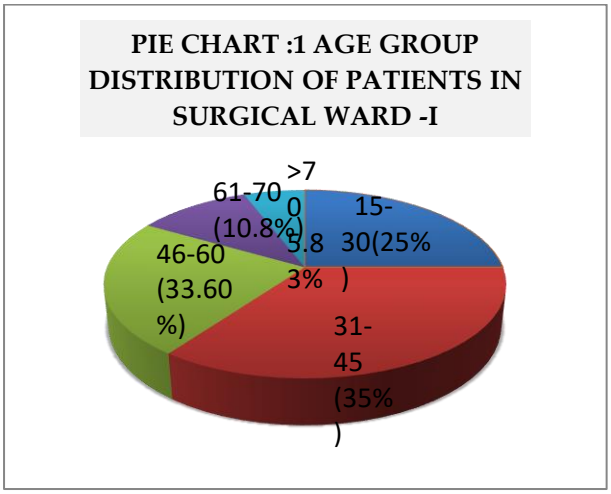
Demographic Profile and Patient Characteristics

The demographic data & patient characteristics in surgical unit-I and surgical unit-II in the hospital were

enrolled in the study. In the study, a total number of 240 prescriptions were analyzed during the study period which includes 92 male and 148 female patients. Table: 1 Shows prescriptions received from patients in surgical unit I classified as per age from 15-30 30 (25%), 31-45 42 (35%), 46-60 28 (33.60%), 61-70 13 (10.08%),>70 07 (5.83%).

Table 01: Demographic data and patient characteristics in Surgical-I Department			
Parameters	**Age group**	**Number of prescriptions**	**Percentage (%)**
Age	15-30	30	25.00%
	31-45	42	35.00%
	46-60	28	33.60%
	61-70	13	10.08%
	>70	07	5.83%
	Mean ± SD	24 ± 14.017	

Pie chart: 1 Shows prescriptions received from patients in surgical unit I classified as per age from 15-30 30 (25%), 31-45 42 (35%), 46-60 28 (33.60%), 61-70 13 (10.08%),>70 07 (5.83%).Maximum number of prescriptions are 42 from the age group 31-45 years. Minimum of the age group are 07 Prescriptions from more than 70 years.



Pie Chart: 1 Demographic data and patient characteristics in Surgical-I Department

Table: 2 Shows prescriptions received from patients in surgical unit II classified as per age from 15-30 26 (21.66%), 31-45 28 (23.3%), 46-60 45 (37.5%), 61-70 14(11.06%), >70 07 (5.83%).

Table:2 Demographic data and patient characteristics in Surgical-II Department			
Parameters	**Age group**	**Number of prescriptions**	**Percentage (%)**
Age	15-30	26	21.66%
	31-45	28	23.3%
	46-60	45	37.5%
	61-70	14	11.6%
	>70	07	5.8%
	Mean ± SD	24 ± 14.017	

Pie chart: 2 Shows prescriptions received from patients in surgical unit II classified as per age from 15-30 26 (21.66%), 31-45 28 (23.3%), 46-60 45 (37.5%), 61-70 14(11.06%), >70 07 (5.83%).

Maximum prescriptions were 45 from the age group 46-60 years. Minimum of the age group are 07 Prescriptions from more than 70 years.

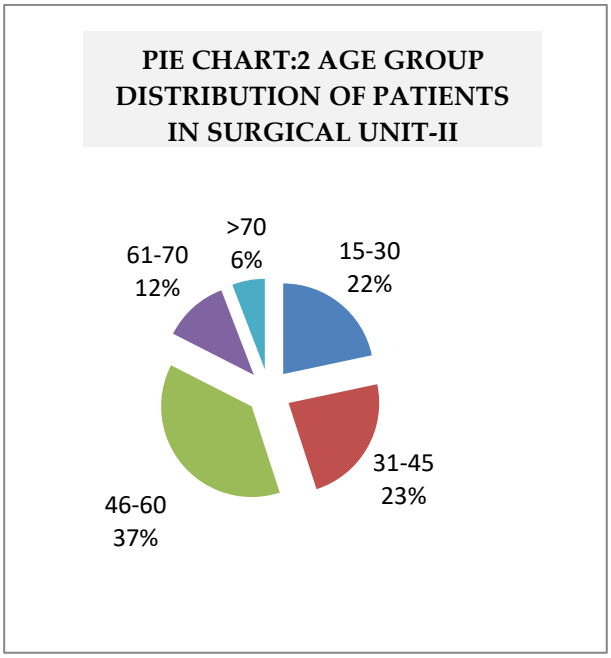


Table: 3 Shows prescriptions received from patients classified as per gender variation from both the departments of surgical wards-I & II. Males 46 (38.3%), females 74(61.6%) in Surgical ward-I and *Mean ± SD* 60 ± 19.79. In Surgical ward-II calculation are males 58(48.3%), females 62(51.6%) and *Mean ± SD* 60 ± 2.82.

Table:3 Gender variation in both surgical departments			
Parameters	**Surgical 1 Units**	**Number of prescriptions**	**Percentage (%)**
Gender	Male	46	38.3%
	Female	74	61.6%
	Surgical 2 Units		60 ± 19.79
	Male	58	48.3%
	Female	62	51.6%
	Mean ± SD	60 ± 2.82	

Histogram: 3 Shows prescriptions received from patients classified as per gender variation from both the departments of surgical wards-I & II. Calculated according to males 46 (38.3%), females 74(61.6%) in Surgical wards-I and *Mean* ± *SD* 60 ± 19.79. In Surgical wards-II calculation are males 58(48.3%), females 62(51.6%) and *Mean* ± *SD* 60 ± 2.82.

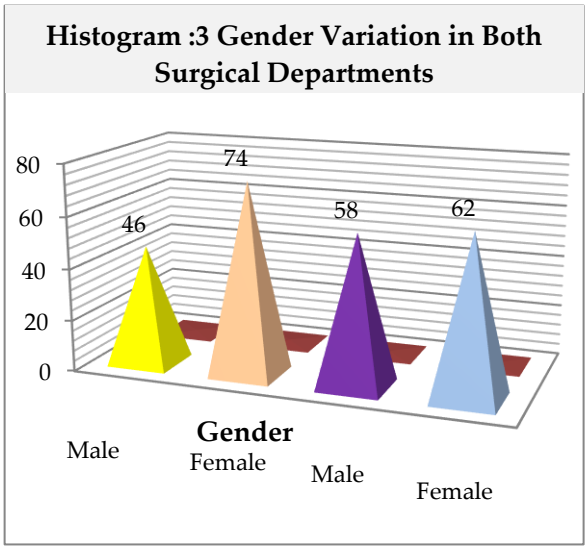
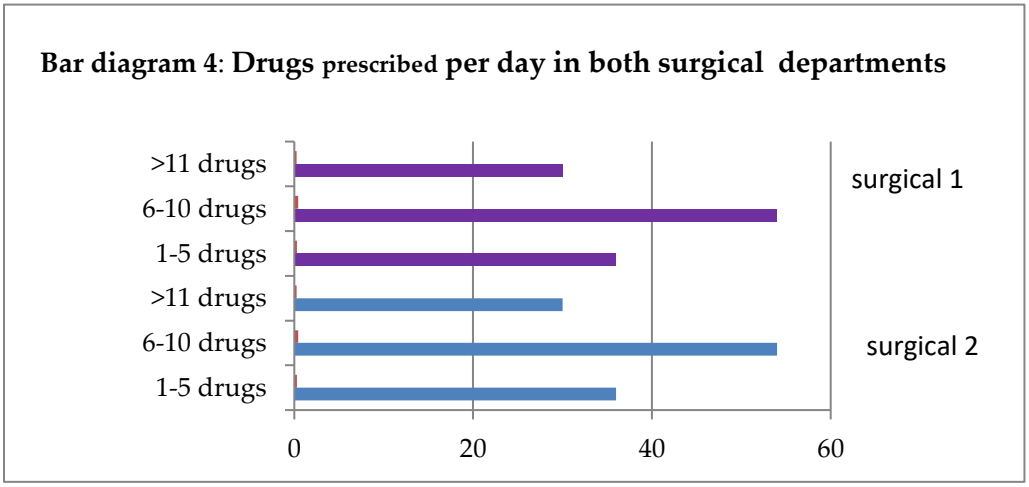


Table: 4 Shows prescriptions are received from patients classified as per drugs prescribed per day from both the departments of surgical wards-I & II. Calculated according to 1-5 days 36 (30.0%), 6-10 days 54 (45.0%), > 11 30 (25.0%) in Surgical wards-I and *Mean* ± *SD* 40 ± 12.49. In Surgical wards-II calculation 1-5 days 43 (35.8%), 6-10 days 47(39.1%), 30 (25.0%) and *Mean* ± *SD* 40 ± 8.8.

Table:4 Drugs prescribed per day in both surgical departments			
Parameters	**Drugs Surgical ward-I**	**Number of prescriptions**	**Percentage (%)**
Drug prescribed	1-5 drugs	36	30.0%
	6-10 drugs	54	45.0%
	>11 drugs	30	25.0%
	Mean ± *SD*	40 ± 12.49	
Drug prescribed	**Surgical ward-II**		
	1-5 drugs	43	35.8%
	6-10 drugs	47	39.1%
	>11 drugs	30	25.0%
	Mean ± *SD*	40 ± 8.8	

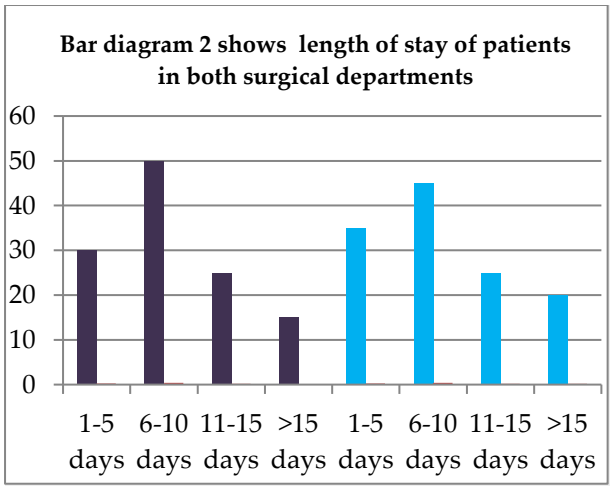


Bar diagram: 1 Shows prescriptions are received from patients classified as per drug prescribed in both the departments of surgical wards-I & II. Calculated according to 1-5 days 36 (30.0%), 6-10 days 54 (45.0%), > 11 30 (25.0%) in Surgical wards-I and *Mean ± SD* 40 ± 12.49. In Surgical wards-II calculation 1-5 days 43 (35.8%), 6-10 days 47(39.1%), 30 (25.0%) and *Mean ± SD* 40 ± 8.8.

Table: 5 Length of the stay of patients in both surgical departments

Parameters	Days Surgical ward-I	Number	Percentage (%)
Length of the stay	1-5 days	30	25%
	6-10 days	50	41.6%
	11-15 days	25	20.0%
	>15 days	15	12.5%
	Mean ± SD	30 ± 14.71	
Length of the stay	**Surgical ward-II**		
	1-5 days	35	29.1%
	6-10 days	45	39.1%
	11-15 days	25	20.8%
	>15 days	20	16.6%
	Mean ± SD	31 ± 11.08	

Table: 5 Show length of stay of patient calculated according to 1-5 days 36 (25%), 6-10 days 54 (41.6%), 11-15 (20.0%),>15(12.5) in Surgical wards-I and *Mean ± SD* 30 ± 11.08. In Surgical wards-II calculation 1-5 days 35 (29.1%), 6-10 days 45(39.1%), 11-15 days 25(20.8%),>15 days 20(16.6%) and *Mean ± SD* 31 ± 11.08.



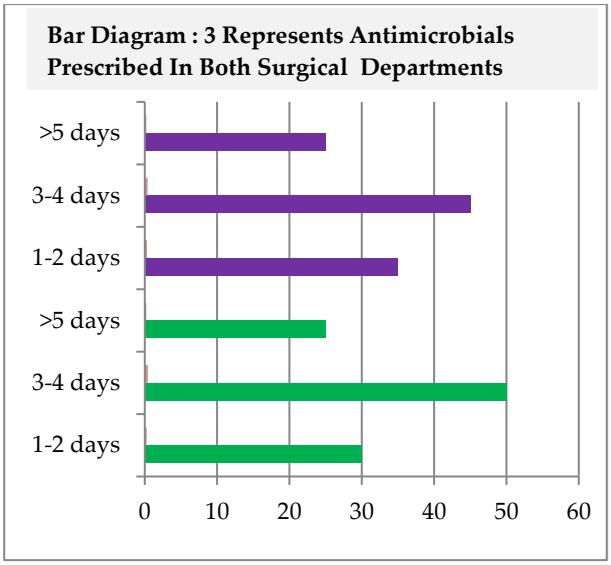
Bar Diagram: 2 Show length of stay of patient calculated according to 1-5 days 36 (25%), 6-10 days 54 (41.6%), 11-15 (20.0%), >15(12.5) in Surgical wards-I and *Mean ± SD* 30 ±14.7. In Surgical wards-II calculation 1-5 days 35 (29.1%), 6-10 days 45(39.1%), 11-15 days 25(20.8%), >15 days 20(16.6%) and ± *SD* 31 ± 11.08.

Table 6: Show antimicrobials prescribed in both surgical departments calculated according to 1-2 drugs 70 (58.3%), 3-4 drugs 40 (33.3%), >5 drugs 10 (8.3%), in Surgical

Table: 6 Antimicrobials prescribed in both surgical departments

Parameters	Antimicrobials Surgical ward-I	Number	Percentage (%)
Antimicrobial drugs	1-2	70	58.3%
	3-4	40	33.3%
	>5	10	8.3%
	Mean ± SD	40± 30	
Antimicrobial drugs	**Surgical ward-II**		
	1-2	69	57.5%
	3-4	41	34.1%
	>5	10	8.3%
	Mean ± SD	40 ± 29.5	

wards-I and *Mean ± SD* 40 ± 30. In Surgical wards-II calculation 1-2 drugs 69 (57.5%), 3-4 drugs 41(34.1%), >5 drugs 10(8.3%) and *Mean ± SD* 40 ± 29.5.



Bar Diagram: 3: Show antimicrobials prescribed in both surgical departments calculated according to 1-2 drugs 70 (58.3%), 3-4 drugs 40 (33.3%), >5 drugs 10 (8.3%), in Surgical wards-I and *Mean ± SD* 40 ± 30. In Surgical wards-II calculation 1-2 drugs 69 (57.5%), 3-4 drugs 41(34.1%), >5 drugs 10 (8.3%) and *Mean ± SD* 40 ± 29.5.

Table:7 Department of origin in both surgical departments

Parameters	Ward	Number of prescriptions	Percentage (%)
Department of origin	Surgical ward-I	120	100%
	Surgical ward-II	120	100%

Table 11: Show Department of origin in both surgical departments calculated according to surgical I 120(100%), and surgical II 120(100%).

Table:12 Antimicrobial agents in both surgical departments		
Antimicrobial agents	**Number of Prescriptions**	**Percentage (%)**
Amoxicillin	20	5%
Metronidazole	35	8.75%
Clindamycin	30	7.5%
Ceftriaxone	50	12.5%
Levofloxacin	25	6.25%
Cefaparazone	28	7%
Ornidazole	12	3%
Cefotaxim	35	8.75%
Amikacin	25	6.25%
Ciprofloxacin	40	10%
Doxycycline	37	9.25%
Streptomycin	20	5%
Linezolid	20	5%
Colistin	03	0.75%
Azithromycin	05	1.25%

Table 7: shows that most frequently used antimicrobial agents are Ceftriaxone 50 (12.5%) and Ciprofloxacin 40 (10%) and less frequently used antimicrobial agents are Colistin 03(0.75%) and Azithromycin 05(1.25%)

Table:8 Antimicrobial combination in both surgical departments			
Parameters	**Combination of Antimicrobial agents**	**Number of prescriptions**	**Percentage (%)**
Antimicrobial agents	Piperacillin + tazobactum	6	12%
	cefoperazone+ salbactum	10	20%
	cefoperazone+ tazobactum	5	10%
	Cefixime+clavulanic acid	4	8%
	Amoxicillin +clavulanic acid	15	30%
	Cortrimaxozole+trimethoprime	7	14%
	Imipenum +cilastatin	3	6%

Table 8: shows that most frequently used Antimicrobial combination are Amoxicillin+ clavulanic acid 15 (30%) and cefoperazone+ salbactum 10 (20%) and less frequently used antimicrobial combination are Imipenum +cilastatin 03(6%).

Table : 9 Culture pattern in both surgical departments			
Parameters	**Characteristics Specimen**	**Number**	**Percentage (%)**
Specimen	Blood	30	42.8%
	Pus	20	28.5%
	Urine	12	17.1%
	Sputum	08	11.4%

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