

## A Study on Drug Utilization Pattern in Surgery Departemnt at a Teritary Care Teaching Hospital

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### Abstract

**BACKGROUND:** Drug utilization study was conducted to identify drug related problem and to prevent the antimicrobial resistance. It also encouraged the rational use of drug and at possible modest cost. **AIM:** To study the drug utilization pattern on surgery ward at a tertiary care teaching hospital. **METHODOLOGY:** Prospective observational study was conducted for a period of 6 months at Rajah Muthiah Medical College, Chidambaram by enrolling patients based on inclusion and exclusion criteria. **RESULTS:** A total of 150 patients were enrolled, in which males (58.71%) were highly enrolled than females (41.29%). Appendicitis (16.77%) was commonly observed disease followed by hernia (16.12%). Antibiotics (97.42%) were commonly prescribed in which cephalosporin (41.28%) type of antibiotics was commonly utilized. Cefotaxime (48.28%) and ceftriaxone (21.84%) were used as a single dose therapy and cefotaxime + metronidazole (10.35%) was used as a combination therapy as a prophylactic antibody in surgery department. **CONCLUSION:** Most of the drugs were prescribed in generic name as well from National List of Essential Medicine (NLEM) for improving the rational usage of antibiotics. Patient counselling was done to improve the Quality of Life (QOL) of patient.

**Keywords:** Antibiotics, Utilization Pattern, Prophylaxis, Patient Counselling.

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### I. Introduction

Irrational drug use was the major cause of serious public health problems. The over usage of medicines in inappropriate manner leads to reduced access of patient confidence also by increased cost, it affects the range of patient adherence to medication on view of nominal cost of drugs.

The global increase of antimicrobial resistance is emerged as the most challenging public health hazard to Infection and AMR control community, which often caused by inadequate dosage, insufficient duration, overuse of drugs.

Identifying Rational Use By Drug Utilization Research: Promotion of rational use and appropriate usage of drugs at lowest possible dose and cost are the ultimate aim of drug utilization study. This is accepted worldwide for comparison, analysis and presentation of statistical data of drug utilization research and also recommended by WHO and it defined as, “the marketing, distribution, prescription and the use of drugs in a society, with special emphasis on the resulting medical, social and economic consequences”.

Appendectomy, cholecystectomy, hernioplasty, wound debridement, amputation, prostatectomy, tendon repair, parotidectomy, bursectomy and sphincterotomy are common surgical procedures being performed in tertiary care hospital.

Surgical Site Infections: The surgical site infections occurs within 30 days after surgery which is classified as superficial incisional surgical site infection, deep incisional surgical site infection and organ or space surgical site infection as per CDC. Staphylococcus, pseudomonas and streptococcus causes the infection at surgical wound through various forms of contact.

The administration of appropriate antibiotics preoperatively is the ultimate way to prevent surgical site infection. The prophylactic antibiotics aimed not to eradicate pathogens but to achieve an immunity level in order to eliminate the possible infections caused by potential micro-organism without affecting microbial flora.

When the surgical site infection occurs during post-surgery, 60% of the admitted patients are prescribed with various antibiotics which leads to nosocomial infections and emerging of multidrug resistance organisms. It is the responsibility of Hospital Infection Committee to monitor hospital antibiotic status and

susceptibility profiles regularly to observe any changes in trends in development of multidrug resistance organisms.

As the prophylactic antibiotics reduces the incidence of infection, side effects, duration of hospital stay, cost of treatment, early recovery of patients and mortality. The prophylactic antibiotics usage is considered essential to prevent post-operative infections. National authority's guidelines such as ASHP, SHEA and Infectious disease society of America recommends that the antimicrobial agents should be administered 1hour (60 minutes) before the incision.

## II. Methods

**study design :**Prospective observational study.

**study site:** The study was conducted in the Department of Surgery in Rajah Muthiah Medical College and Hospital, Annamalai University, Chidambaram, Tamil Nadu, a 1250 bed Multi-speciality, tertiary care teaching hospital.

**Study period:** 6 months (From November 2019 to April 2020) **Study size:** 155 patients

**Inclusion criteria:**

- ❖ Patients of both gender.
- ❖ Patients who were above 20 years of age.
- ❖ Patient admitted in the Inpatient department of surgery.

**Exclusion criteria:**

- ❖ Patients for whom follow-up could not be done.
- ❖ pregnant and breast-feeding women.
- ❖ Patients unable to communicate i.e., Patients on ventilators or critically ill and who were unwilling to participate were excluded.
- ❖ Patient who were below 20 years of age.

**study subject recruitment procedure:**

The recruitment of subjects was carried out with help of physician who has knowledge of patient's medical history. The patient information form includes the details of the patient age, gender, Patient IP number, Patient past medical and medication history, drug chart details, prescribed dosage, frequency, route of administration and clinical diagnosis. The study procedure was completely explained to the Patient / Patient's caretaker and a Patient Consent form will be collected from them. Subjects will be selected based on inclusion and exclusion criteria.

## III. Results

The total of 155 patients were included in this study in which male patients (58.71%) were predominant than female patient (41.29%). Most of the patients (45.80%) belongs to age group 41-60. However, 63.22% patients belong to age group from 41 to 70, followed by 20.65% in age group of 20 to 30. Lower % of patients (10.96%) in age group 31 to 40. Patients with condition of Appendicitis were majorly encountered of 16.77 % followed by Hernia of 16.12 % and Diabetic foot ulcer of 11.61 % and together they comprises of 44.5%.

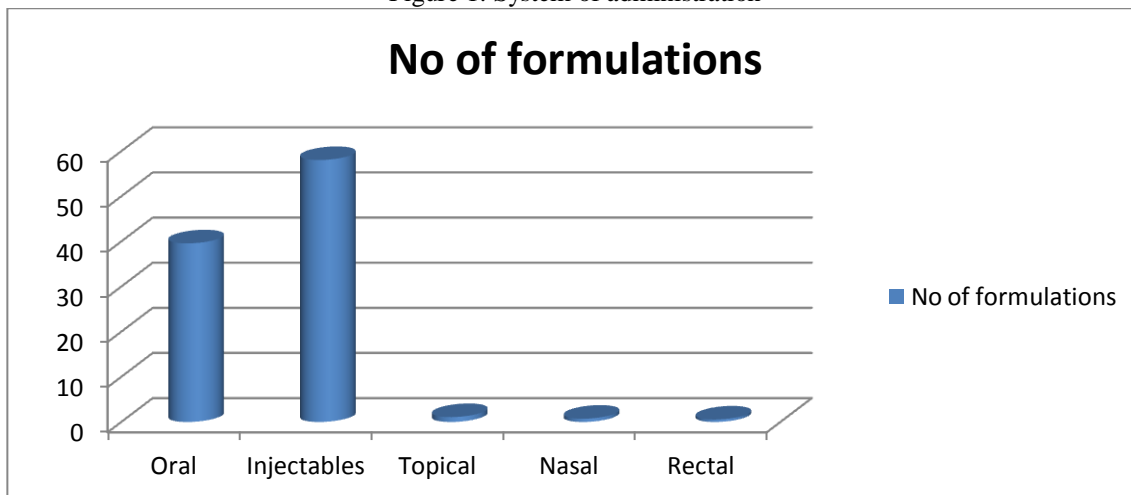
**Table 1 : Patients with different diagnostic condition**

S.no	Diagnosis	No. of encounters	Percentage	Mean stay (days)
1.	Appendicitis	26	16.77	7.5
2.	Hernia	25	16.12	8.3
3.	Diabetic foot ulcer	18	11.61	10.5
4.	Hemorrhoids	12	7.74	6.5
5.	Alcoholic gastritis	9	5.80	6.8
6.	Varicose veins	8	5.16	5.6
7.	Liver abscess	7	4.51	8.1
8.	Renal calculi	7	4.51	7.9
9.	Anal fissure	7	4.51	8.6
10.	Hydrocele	6	3.87	7.3
11.	Prostatomegaly	6	3.87	6.6

12.	Pancreatitis	5	3.23	7.5
13.	Parotid swelling	4	2.58	5.2
14.	Bursitis	4	2.58	5.4
	Total	155	100	7.51

We found that majority of drug formulations were prescribed in injectable form of 58.05 % followed by oral form 39.58%.

Figure 1: System of administration



Antibiotics are prescribed to greater extent (27.11%) followed by anti ulcerants (18.83%) , Vitamin and iron supplements (11.83%) and Analgesics (11.37%)

Fig 2: Prescribed drug class

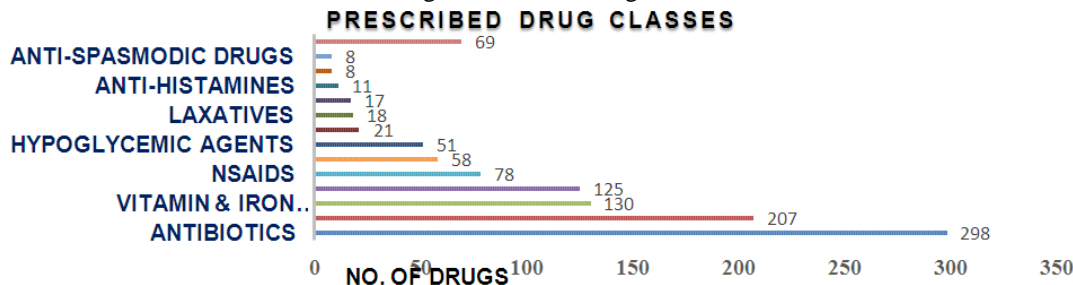


Table 2: Frequently prescribed drug on each class

Among 355 interaction, 192 (54.08%) were significant interaction , followed by 161 (45.35%) minor interaction and 2(0.56%) serious interaction.

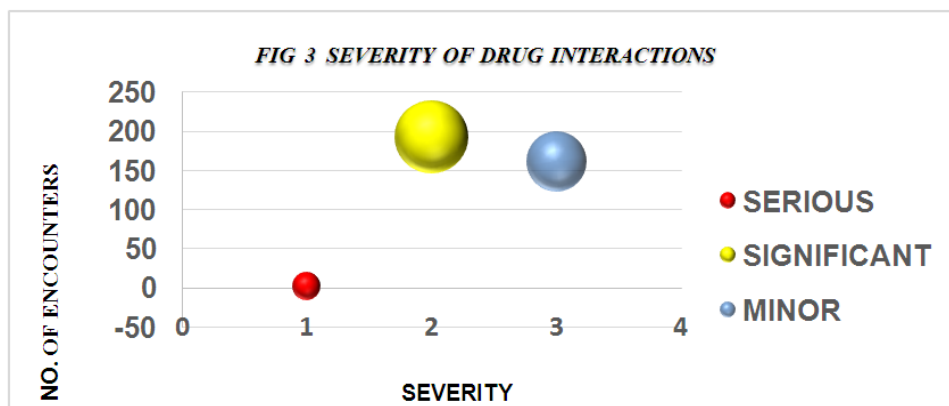


Table 3 : Based on WHO – Prescribing indicators

Prescribing indicators	Nos	Percentage	WHO-STD
Total no of prescriptions encountered	155	-	-
Total no of Drugs prescribed	1099	-	-
Average no of Drugs per encounter	7.09	-	1.6 – 4.8
Percentage of drug prescribed by Generic name	795	72.52 %	100 %
Number of drugs prescribed from (NLEM-2015)	992	80 %	100 %
Number of drugs prescribed from (EDL-2019)	684	62.23 %	100 %
Percentage of encounters with an Antibiotics prescribed	151	97.42 %	20 to 26.8 %
Percentage of prescription with Injectables	128	82.58 %	13.4 to 24.1

	Antibiotics	Encounters	Dosage	Duration (Before Incision)	Dose interval
1.	Cefotaxime	42 (48.28%)	1g - IV	30 mins-1 Hour	Every 12 hours (B.D)
2.	Ceftriaxone	19 (21.84%)	1g- IV	30 mins-1 hour	Every 12 hours (B.D)
3.	Metronidazole	17 (19.54%)	500mg - IV	1 hour	Every 6-8 hours (T.D)
4.	Ceftriaxone + Metronidazole	9 (10.35%)	1000 + 500mg - IV	1 hour	Every 12 hours (B.D)
	Total	87			

Table 4 : Prescribing pattern of surgical antibiotics

Cefotaxime (48.28%) was more frequently prescribed. Ceftriaxone with metronidazole were commonly used as combination therapy.

Table 5 : Compliance statement of prescribed antimicrobial prophylaxis

This compliance statement based on ICMR-SAP guidelines on the selection of appropriate antibiotic , dosage, dose interval, duration, omission.

S.NO	KEY ASSESSMENT	PROCEDURAL PROPHYAXIS (N=87)	ICMR-SAP GUIDELINES
1	Overall appropriateness of prescribed antimicrobials	55.17% (48/87)	100
2	Prescribed antimicrobials compliant with SAP guidelines	63.21% (55/87)	100
3	Surgical episodes where antimicrobial based on indication	26.43% (23/87)	100

#### IV. Discussion

This prospective study was carried out to determine the prescribing pattern of drugs in surgical ward which was conducted for the duration of 6 months. The total number of 155 patients were observed in this study on the basis of inclusion criteria.

Among these 155 patients, male patient was more predominant (58.71%) than female patients (41.29%). The age group of 41 - 60 years (45.80%) were hugely admitted in the surgical ward our study was consistent with the study by Min et al. where maximum number of patients belongs to the category of 40- 70 years. This category of people was easy to get infection its leads to got admission at surgical ward.

The major diagnostic condition was observed in the surgical ward was Appendicitis (16.77%) followed by Hernia (16.2%) and Diabetic foot ulcer (11.61%), which was weighed against kaut et al. which showed that Hernia (20.62%) followed by cellulitis (18.12%) and Diabetic foot ulcer (16.87%).

Most of the prescription were prescribed with large portion of injectables (58%) which was match up to the study done by Aduragbenro.D Adedapo that 72% were injectables. Parenteral forms will give immediate effective action as of analgesic and antibiotics in both Pre-operative and Post operative patient.

A total of 1099 drug formulations were identified in the study. Among these formulations, 7.55 percent (83/1099) were FDCs. Here the highest count of drug group was antibiotics (27.11%). followed by antiulcerants (18.83%), vitamins and iron supplement (11.37%) which was compared to the study done by Patel KM et al. report suggest that the most common drug group was antibiotics (32%) followed by Analgesic (17.11%) and antacid (16.09%). Antibiotics were predominantly prescribed at surgical ward to prevent surgical site infection.

Of all encountered prescriptions, 111 have potentially possible drug interactions. In which the total of 355 numbers of drug interactions were found, as seen large figure of 353 numbers were identified as significant interaction these were accordance with others. Amidst the drug interaction 75.5% belongs to the pharmacokinetic interaction and remaining 24.5 % belong to pharmacodynamic interaction which was compared to Solanki and patel that showed 61.3 pharmacokinetics and 47 phramacodynamic interaction.

The average number of drugs prescribed per prescription was 7.09. This is slightly higher than that 5.15 study showed by Nilay Solanki et al. This is a deviation from the reference value of 1.6 to 4.8 recommended by WHO.

The majority of drugs prescribed by Generic form (795/1099) 72.52%. (304/1099) 27.48% were prescribed in the brand name which is comparable to the study done by Devarsi Choudhury et. al. (41.60%) This shows the majority of free medicines offered in the government hospital located in rural areas are generic drugs, which is highly appreciable. It also reduces confusion while prescribing drugs to patient.

The percentage of drug prescribed from the National List Of Essential Medicine (NLEM) and Essential Drug List was 80% and 62.23% respectively. which is responsible for appreciable and good positive outcome among treatment in patients during the treatment period. This also reflects a rational prescribing pattern to a greater extent.

Parenteral Injections were commonly prescribed with the percentage of 82.58% which does not adhere to WHO recommended value of 13.4%- 24.1%. Injection form enhance the drug adherence and have quick onset of action, immediate therapeutic effect when compared to any other dosage form it was common in surgical patients.

Cephalosporin (41.28%) was most commonly utilized antibiotic amidst antibiotic class followed by Nitroimidazole (23.82%) contrary to our study penicillin (40.2%) group of antibiotics was commonly used antibiotics demonstrated by Devarsi Choudhury et al.

On broad spectrum cephalosporins group, Cefotaxime (28.19%) was frequently prescribed in both pre and post operative ward, followed by 23.82% of metronidazole, which was compliance with the study done by Barot et al. showed ceftriaxone (32.69%) was frequently observed antibiotic.

Cefotaxime (48.28%) and ceftriaxone (21.84%) were used as single dose therapy for both clean and clean contaminated surgeries, where cefotaxime and metronidazole (10.35%) used as a combination therapy, which was compared to the study done by Janet Sultana et al. revealed that ceftriaxone and metronidazole (47.1%).

While assessing the procedural antibiotic usage the compliance of regime followed in hospital with ICMR-SAP guidelines followed result was found on contaminated and clean-contaminated wounds.

Overall appropriateness (on empirical therapy) of prescribed antimicrobials was found to be 55.17%. The prescribed antibiotics for prophylaxis complaint with SAP guidelines 63.21%. Surgical episode where antimicrobial based on indication 26.43%. Initial treatment followed in empirical manner for critically-ill patients, due to unavailability of culture and susceptibility results on initial stage of treatment, which usually takes 48 to 72 hours for receiving microbiological data. Major unbecomingness in the phase of selection with prescribing indications, and omission of drugs.

## **V. Conclusion**

On basis of common surgical procedures performed, the prescription of drugs from various drug classes, generic drugs and from the essential drug list was much appreciable in this tertiary care teaching hospital. There is a scope for improving rational use of drugs. Wherein the usage of procedural antibiotics, the class of third generation cephalosporins were encountered most diagnostic conditions this could develop resistance to the particular group. The use of narrow spectrum antibiotics appropriate to the site of surgery was insisted. Adopting Surgical Antibiotic Prophylactic (SAP) guidelines should highly recommended to enhance the selection and omission of prophylactic antibiotic administration to reduce the occurrence of multiple drug resistance of pathogens. To improve the appropriateness of prescription and reduce AMR, auditing the usage of antibiotics is the need of the hour.

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## **DECLARATION**

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