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DRUG UTILIZATION STUDY IN INDOOR ADULT POST-OPERATIVE PATIENTS OF GENERAL SURGERY UNIT OF A TERTIARY CARE TEACHING HOSPITAL OF CENTRAL INDIA – A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT: Background: Drug Utilization Study offers useful methods for teaching and training in drug therapy. In our setting, there is no such study that describes the use of drugs post-operatively. As a result, this study was conducted to investigate the post-operative drug utilization pattern in indoor post-operative patients. **Aim:** To study the prescribing trends of drugs used in indoor adult post operative patients in general surgery unit. **Methods:** Prospective observational study was conducted in post operative patients in General Surgery wards and ICU for 12 months at a tertiary care teaching hospital. **Results:** Total 600 cases were studied. Majority of the patients managed were males (64.5%). Most of the patients were in 18-40 years age group (49.66%) and from rural background 69.33% (416). The most common surgical procedure performed was Appendectomy (29%). A total of 4437 drug products were prescribed. Average number of drugs prescribed per encounter were 7.39 ± 2.56 . Only 41.08 % of the drugs were prescribed by Generic name. Antibiotics were prescribed to 99.66% of the encounters. Antibiotics per prescription were 2.12 ± 0.85 . Injections were prescribed to 96.5% of the encounters. About 84.69 % of the drugs were prescribed from the WHO Model List of Essential Medicines (EML). **Conclusion:** Results indicate that there is scope for improving prescribing habits among the surgical fraternity. This study will provide them with feedback on prescribing.

INTRODUCTION: Drug utilization studies are periodically performed in order to increase therapeutic efficacy, decrease adverse effects and provide feedback to prescribers to promote rational use of drugs. The World Health Organisation (WHO) defines drug utilization as, “the study of marketing, distribution, prescription and uses of drugs in a society with special emphasis on resulting medical, social and economic consequences¹.”

The WHO core indicators for drug utilization include: Average number of drugs per encounter, average number of drugs prescribed by generic name, percentage of encounters with an injection/antibiotic and percentage of drugs prescribed from the essential medicine list².

Drugs are prescribed post-operatively for the analgesia, prevention of infection, nausea and vomiting, intravenous fluids. In post-operative patients surgical site infection (SSI) can occur. Surgical site infection (SSI) is a typical hospital-acquired infection that leads to serious health issues, prolongs hospitalization, raises treatment costs, and increases patient mortality and morbidity³. To prevent and also to treat SSI various antibiotics are frequently prescribed in postoperative patients.

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The use of many medications during and after surgery is common in both preoperative and postoperative patients. Despite the widespread use of drugs including antibiotics, parenteral analgesics, and IV fluids, there is insufficient information on how these drugs could be used or misused. Additionally, there aren't much research that have examined the drug use patterns of surgical indoor preoperative and postoperative patients⁴. There are very few studies that have considered drug utilization pattern as a whole in surgical indoor wards⁵. In our setting, there is no such study that describes the use of drugs post-operatively. As a result, this study was conducted to investigate the post-operative drug utilization pattern in indoor post-operative patients.

Objectives: to find out the Drug Utilization pattern of the drugs prescribed in post operative patients in general surgery wards and Surgical Intensive Care Unit of a tertiary care teaching hospital in terms of WHO Prescribing Indicators:

- Average number of drugs per encounter.
- Percentage of drugs prescribed by generic name.
- Percentage of encounters with an antibiotic prescribed.
- Percentage of encounters with an injection prescribed.
- Percentage of drugs prescribed from Essential Drug List or Formulary.

MATERIALS AND METHODS:

Study Design: It was a prospective observational study.

Study Setting: The study was carried out at a tertiary care teaching hospital in Central India. In particular the study is performed on post operative general surgery patients admitted in General surgery wards and ICU.

There are around 130 beds in General Surgery Unit (Male surgery ward 60, Female surgery ward 60 and Surgery ICU 10 beds).

Study Population: Indoor adult post-operative patients in General Surgery wards and surgery ICU were enrolled for the study.

Inclusion Criteria:

1. Postoperative patients with age ≥ 18 years.
2. Post operative patients in surgery department of hospital till discharge.
3. Drugs used post operatively were only considered and not the drugs that were already going on.
4. Patients willing to participate in this study.

Exclusion Criteria:

1. Patients with age < 18 yrs.
2. Case papers with insufficient information as per pre-designed format.
3. Patient who absconded / discharged against medical advice.
4. Any patient who dies post operatively
5. Severely ill post operative patients.

Consent: Written informed consent was taken from the patient or his/her close relative included in study to generate information in pre-designed format before enrolment of the patient for study.

Sample size: 600 as per WHO recommendations on sample size for Drug Utilization Study⁶.

Sampling Technique: Convenient sampling technique was used till sample size was achieved.

Data Source: Data on pre-designed Case Report Form (CRF) was generated on regular visits of investigator from the indoor post operative patients till discharge in general surgery wards and SICU (surgery intensive care unit) of a tertiary care teaching hospital.

Study Duration: Data of post-operative patients matching inclusion criteria admitted in surgery wards and ICU over a period of 12 months from NOVEMBER 2018 to OCTOBER 2019 were recorded and analysed.

Ethical Consideration: Study was initiated after written approval from the Institutional Ethics Committee of the parent institute vide letter (IEC Reference no. 209, dated -17.10.2018).

Data Analysis Plan: Data collected as per pre designed case record form was entered in Microsoft excel and analysed by descriptive statistics by using statistical software under the guidance of statistician. The results were represented as numbers and percentages. Drugs are verified by WHO Model list of Essential Medicines.

RESULTS:

Demographic Details of Study Population: During the study period 600 cases were studied in surgical inpatient wards and ICU of which majority 387(64.5%) of the patients managed were males **Fig. 1.**

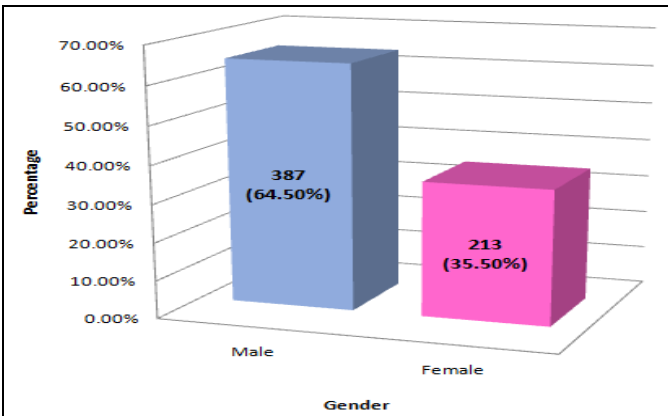


FIG. 1: GENDER DISTRIBUTION OF STUDY PARTICIPANTS (N= 600)

Out of 600 study participants most of the patients were in 18-40 years age group (49.66%) followed by 41-60 years (26.16%) and >60 years (24.16%) **Fig. 2.**

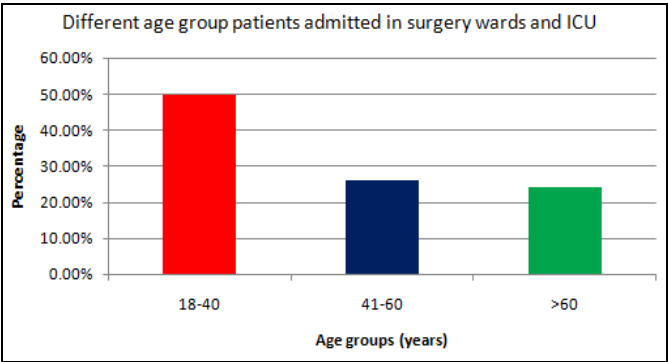


FIG. 2: AGE WISE DISTRIBUTION OF STUDY PARTICIPANTS (N=600)

Most of the inpatient admissions 416 (69.33%) in General surgery wards and ICU of the hospital were from rural background **Fig. 3.**

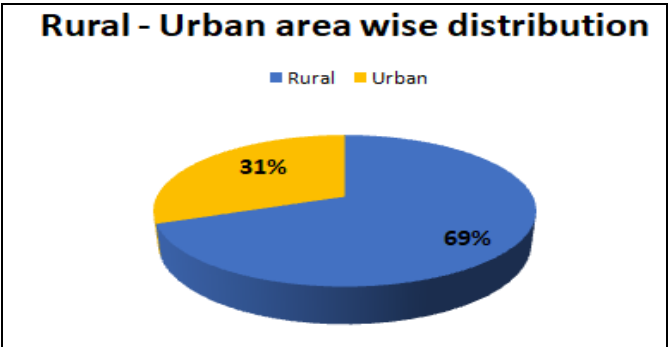


FIG. 3: PLACE OF RESIDENCE OF THE STUDY PARTICIPANTS (N=600)

The most common surgical procedure performed was Appendicectomy (29%) followed by Hernia repair surgeries (17.83%), Debridement surgery (11.83%) **Table 1.**

TABLE 1: DIFFERENT TYPES OF SURGERIES DONE IN OUR GENERAL SURGERY UNIT

Sr. no.	Type of Surgery	Number of Surgeries done	Percentage (%)
1	Appendicectomy	174	29%
2	Hernia repair surgeries (Hernioplasty, Herniorrhaphy, Herniotomy)	107	17.83%
3	Debridement	71	11.83%
4	Incision and drainage	57	9.5%
5	Swelling/ cysts excisions	44	7.33%
6	Laparotomy	28	4.66%
7	Cholecystectomy	20	3.33%
8	Eversion of sac (Hydrocoele)	13	2.16%
9	Mastectomy	7	1.16%
10	Circumcision	6	1%
11	Orchidectomy	6	1%
12	Thyroidectomy / Hemithyroidectomy	5	0.8%
13	Amputation	4	0.66%
14	Fistulectomy	3	0.5%
15	Haemorrhoidectomy	2	0.33%
16	Other minor surgeries	53	8.83%
	Total	600	100%

In the post-operative patients of General Surgery Unit, a total of 4437 drug products were prescribed to 600 encounters. The average number of drugs prescribed per encounter were 7.39 ± 2.56 . The total number of drugs per encounter range from a minimum of 2 drugs to maximum of 18 drugs. Only 41.08 % of the drugs were prescribed by generic name. Antibiotics were prescribed to 99.66% of the encounters. Of a total of 4437 drugs prescribed, 28.71% (1274) were antibiotics.

Antibiotics per prescription were 2.12 ± 0.85 . Injections were prescribed to 96.5% of the encounters. About 579 encounters contain an injection prescribed either an injectable antibiotic, or an injectable analgesic or injectable antacid or antiemetic and intravenous fluids. About 84.69 % of the drugs were prescribed from the WHO Model List of Essential Medicines (EML). All WHO core prescribing indicators are as follows **Table 2**.

TABLE 2: THE WHO CORE PRESCRIBING INDICATORS

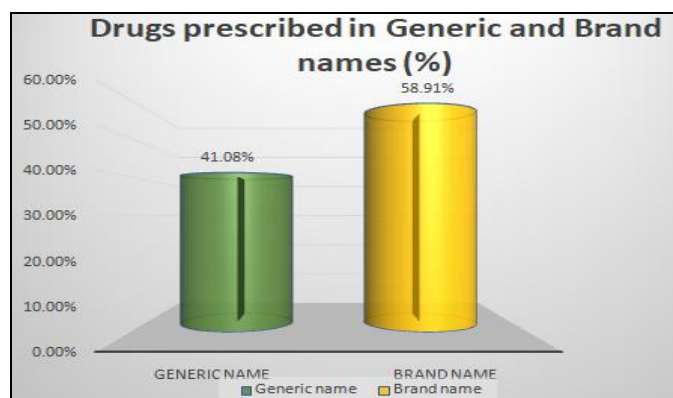
Sr. no.	WHO Prescribing Indicators	Number / percentage (%)	Number
1	Total number of encounters	—	600
2	Total number of drugs prescribed	—	4437
3	Average number of drugs per encounter	4437/600	7.39 ± 2.56
4	Percentage of drugs prescribed by generic name	41.08% (1823/4437)	1823
5	Percentage of encounters with an antibiotic prescribed	99.66% (598/600)	598
6	Percentage of encounters with an injection prescribed	96.5% (579/600)	579
7	Percentage of drugs prescribed from WHO Essential Drug List 2021	84.69% (3758/4437)	3758

Among total 4437 drugs prescribed 86.07 % (3819) were injections while 13.92 % (618) were oral drugs **Table 3**.

TABLE 3: ROUTES OF DRUG ADMINISTRATION IN THE STUDY PATIENTS

Route of drug administration	Number	Percentage
Injectable (IV/IM/SC)	3819	86.07%
Oral	618	13.92%
Total	4437	

Amongst the total 4437 drugs prescribed during the study period, only 41.08 % drugs were prescribed by their Generic names, while 58.91 % drugs were prescribed by their Brand names **Fig. 4**.

**FIG. 4: DRUGS PRESCRIBED BY GENERIC NAMES AND BRAND NAMES**

Among the 600 studied prescriptions, the most common class of drugs prescribed by surgeons were Antimicrobials (28.71%), followed by Intravenous fluids (24.70%), Analgesics (16.58%),

Antacids (14.91%) and Antiemetics (10.59%) **Table 4**.

TABLE 4: MAJOR CLASSES OF DRUGS PRESCRIBED

Class of drugs	%	Total
Antimicrobials	28.71%	1274
IV fluids	24.70%	1096
Analgesics	16.58%	736
Antacids	14.91%	662
Antiemetics	10.59%	470
Other drugs *	2.68%	119
Multivitamins and minerals	1.80%	80

*(laxatives, cough syrups, antihypertensives, antihistaminic, urimax D, Chymoral forte, nephrozone, sodamint, steroids, insulin, diuretics, bronchodilators, drugs affecting coagulation fibrinolysis and platelet function).

Most of patients 47.5% (285) were prescribed 2 different antibiotics, 24.83% (149) patients were prescribed single antibiotic, 21.33% (128) patients were prescribed 3 antibiotics, 5.33% (32) patients were prescribed 4 antibiotics, 0.33% (2) patients were prescribed 5 antibiotics and no antibiotic was prescribed to 0.66% (4) patients **Table 5**.

TABLE 5: NUMBER OF ANTIBIOTICS PRESCRIBED IN AN ENCOUNTER

Number of antibiotics prescribed	Number of encounters	Percentage
0	4	0.66%
1	149	24.83%
2	285	47.5%
3	128	21.33%
4	32	5.33%
5	2	0.33%
Total number of encounters	600	

DISCUSSION: Data of 600 patients was collected matching inclusion criteria that underwent surgery and were in their post-operative period till they were discharged in the surgery ward of our tertiary care teaching hospital.

Largest proportion of the patients were Males 387(64.5%) followed by Females 213(35.50%), which was in accordance with the studies done by Vibha Karande *et al.* (51.8%)⁷ and Sane *et al.*⁸ which showed male preponderance and opposite to the study by Joshi *et al.*⁹ which showed female predominance.

In this study, a total of 298 (49.66%) patients were in the age group of 18–40 years followed by 41–60 years (26.16%). In contradiction to this Vibha Karande *et al.*⁷ reported that 50.00% of patients and Bhansali *et al.*¹⁰ reported that 57.08% of patients were from 40 to 60 years age groups.

In the post-operative patients of General Surgery Unit, total 4437 drug products were prescribed to 600 encounters.

In this study, the average number of drugs per prescription were 7.39 ± 2.56 with a range of 2–18. This is similar with the findings of Vibha Karande *et al.* (7.0)⁷ and lower in comparison to the findings of Palikhey *et al.* (9.17)¹² Thus, in the studied population, polypharmacy was observed as drugs per prescription were high (7.39).

In this study, about 598 patients received antimicrobial agents making it 99.66%. This is similar to studies by Bhansali *et al.* (100%)¹⁰, and Sneha *et al.* (100%)¹¹. The purpose of antibiotic usage in post-operative patients is prophylactic to prevent post-operative infection at the surgical site.

In this study the percentage of encounters with an injection prescribed was 96.5% as 579 patients out of 600 were prescribed one or more injections. This is higher as compared to the study conducted by Vibha Karande *et al.*⁷ (66.88%) and comparable to the study conducted by Palikhey *et al.*¹² (87.31%). Among total 4437 drugs prescribed 86.07 % (3819) were injections while 13.92 % (618) were oral drugs. This shows that in post operative patients' parenteral route of drug administration is mostly preferred as compared to oral route which makes the treatment costly.

The overall percentage of drugs prescribed from WHO Essential Medicine List in the present study was 84.69%. This is higher when compared to other studies done across India such as Vibha Karande *et al.* (77.27%)⁷, Sneha *et al.* (78.99%)¹¹, Siddhartha *et al.* (54.89 %)¹³, Choudhury *et al.* (57.4%)¹⁴, and Sharma *et al.* (52.96%)¹⁵. The reason for this high could be an effective and successful implementation of EML in our tertiary care teaching government hospital. Increase in the use of essential medicines makes the medicine therapy more rational.

Among total 4437 drugs prescribed 86.07 % (3819) were injections while 13.92 % (618) were oral drugs.

The overall percentage of drugs prescribed by their generic name in the present study was 41.08 % which is comparable with study done by Choudhury *et al.* (41.6%)¹⁴ and higher as compared to study done by Vibha Karande *et al.* (11.6%)⁷ and Palikhey *et al.* (19.64%)¹²; but less than other studies such as Sneha *et al.* (98.51%)¹¹ and Siddhartha *et al.* (68.51%)¹³. This indicates that more than half of the drugs were prescribed by brand names which add to the increased cost of therapy so has to be improved. Increasing generic prescribing would rationalize the use and reduce the cost of drugs¹⁴.

Among the studied prescriptions, the most common class of drugs prescribed by surgeons were Antimicrobials (28.71%), followed by Intravenous fluids (24.70%), Analgesics (16.58%), Antacids (14.91%) and Antiemetics (10.59 %). The most extensively prescribed drugs from each of the above groups were Inj. Metronidazole, RL (Ringer's lactate), Inj. Tramadol, Inj. Ranitidine and Inj. Ondansetron, respectively.

The average number of antibiotics used in the present study came out to be 2.12, which is lower than reported by Bhansali *et al.* (2.95)¹⁰. The higher number of antibiotics per patient indicates that more and more antibiotics were used for prophylaxis purpose rather than definitive treatment purpose. It is used more as a blanket therapy to prevent any or all types of infection. This not only leads to the increased cost of therapy but also to increased incidence of adverse drug

reactions and to the development of drug-resistant bacterial strains.

Limitations: The present Drug Utilization Study has some limitations as given below:

1. Other WHO drug use indicators such as Patient care indicators, Facility indicators and Complimentary drug use indicators were not studied.
2. Pre-operatively prescribed drugs were not considered.

Hence, further study on large number of participants and including all pre-operative as well as postoperative patients' needs to be carried out to fulfil the above limitations.

CONCLUSION: This study gives an in general pattern about the use of drugs in post-operative patients in the general surgery wards and ICU of a tertiary care teaching hospital. From this study, we came to know about the common surgeries which are performed in our hospital. In this study the proportion of drugs prescribed from EML was high that is a good sign. Less than 50% drugs are prescribed by generic name. On an average more than 2 broad spectrum antibiotics were given along with extensive use of other drugs. Polypharmacy was seen. Routine polypharmacy leads to poor patient compliance, higher incidence of adverse events, drug-drug interaction and economic burden on patients and society and makes healthcare unaffordable to the common Indian masses. It is, thus, necessary to make surgeons aware about the importance of prescribing drugs with generic names, prescribe minimum possible antibiotics, avoid polypharmacy and, from patients' point of view, the vital factor of cost benefit.

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Declaration:

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CONFLICT OF INTEREST: None.

Ethical Approval: Institutional Ethics Committee approval received (IEC Letter. No. 209 Dated - 17.10.2018).

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