

## DRUG UTILIZATION STUDY IN POST-OPERATIVE PATIENTS IN THE SURGERY WARD OF A TERTIARY CARE TEACHING HOSPITAL IN SOUTH INDIA

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### ABSTRACT

**Objectives:** Pharmacotherapy with multiple agents before, during, and after surgery is marked in the present day indoor hospital setting. The main objective of our research is to evaluate the prescribing and drug utilization patterns using the World Health Organization (WHO) indicators in post-operative patients in the surgery ward of Raichur Institute of Medical Sciences (RIMS) teaching hospital - Raichur, which will help us to use the medicines rationally and decrease the adverse effects in surgical patients.

**Methods:** A retrospective study was done on post-operative patients of surgery ward in RIMS teaching hospital - Raichur. A total of 574 patients prescriptions/case record forms were collected over a period of 15 months from January 2015 to March 2016 from the medical record section of the hospital for analysis and rationalization. We analyzed the data using the various drug use indicators given by the WHO.

**Results:** The average number of drugs per encounter was 7.04. Ranitidine, analgesics, antibiotics, and intravenous fluids accounted for majority of the drugs prescribed. Appendectomy (34.84%) was most commonly performed surgical procedure. Percentage of encounters in which an antibiotic prescribed was 99.8%. Percentage of encounters with an injection prescribed was 100%. Percentage of drugs prescribed by generic name was 43.93%. Percentage of drugs prescribed from National List of Essential Medicines 2015 was 99.3%.

**Conclusion:** Our study gave us an in general pattern about the use of drugs in post-operative patients in the surgical ward of a tertiary care hospital. Widespread polypharmacy, particularly in case of the antibiotics, lack of generic prescribing are some concerns that need to be addressed to conform to rational drug therapy. However, prescribing according to the national essential list of medicines is good in our study.

**Keywords:** Drug utilization study, Post-operative patients, Surgical ward, WHO drug use indicators.

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### INTRODUCTION

Drug utilization is defined by the World Health Organization (WHO) as "study of marketing, distribution, prescription, and uses of drugs in a society stressing on the resulting medical, social, and economic consequences" [1]. Drug therapy is a main component of patient care management in health-care settings. There are many pharmaceutical products with many brand names available to prescribers and consumers at an unreasonable cost. Irrational and inappropriate use of drugs in health-care system noticed globally is a major concern. Hence, the foremost aim of drug utilization research is to facilitate rational use of drugs in the population [2].

Rational drug use is also defined as "getting the right drug to the right patient at the right time in the right dose at the right price." Identifying the pattern of prescription of drugs and irrational prescribing of drugs is necessary to create awareness among prescribers. Hence, drug utilization study should be done regularly to enhance the therapeutic efficacy, lessen the adverse effects, and provide feedback to the prescriber to make sure rational usage of medicines [3]. There is a need to create awareness among doctors about the concept of essential drugs, benefits of generic drugs prescription, and usage of rational medicines [4].

Multidrug therapy before, during, and after surgery is marked in indoor post-operative patients. While medicines such as parenteral analgesics, IV fluids, and antibiotics are commonly used, there are inadequate data on monitoring of possible use or misuse of such medicines. Furthermore, there are not many studies that have taken drug utilization pattern as a whole in surgical indoor post-operative patients [5]. Hence, the current study was conducted to assess the drug utilization patterns on post-operative patients in the inpatient ward of the Department of Surgery - Raichur Institute of Medical Sciences (RIMS) teaching hospital - Raichur.

### METHODS

#### Study design

Our study is a retrospective cross-sectional drug utilization study on the post-operative patients of the Surgery Department of RIMS-teaching hospital, Raichur, India. Prior permission of the Institutional Ethics Committee was obtained for conducting the study.

#### Source of data

Data such as name, age, sex, diagnosis, and ongoing treatment were recorded from post-operative patient's case file admitted in the indoor wards of the surgery department of RIMS-teaching hospital, Raichur, India. The case files were obtained from medical record section of the hospital.

#### Study period

Data of patients matching inclusion criteria admitted in surgery ward over a period of 15 months from January 2015 to March 2016 were recorded and analyzed.

#### Sample size

As per the WHO recommendations, it has been suggested that at least 600 encounters should be included in a cross-sectional survey. In our study, we collected data from 574 post-operative patients over a period of 15 months and were recorded over the WHO prescribing indicator form.

#### Method of collection of data

Data were recorded in previously prepared case record form. Data of patients matching inclusion criteria were only recorded.

For studying the drug utilization pattern, following data were collected - (i) age, (ii) gender, (iii) diagnosis of the patient, and (iv)

ongoing treatment. Detailed information on drugs used including name of the drug, dosage schedule (form, route, and frequency), and duration of treatment was recorded from the patient medical records.

Data were then analyzed for age- and sex-wise distribution, different types of surgeries done with their mean duration of hospital stay. The rationality of prescriptions was also evaluated using the WHO core drug prescribing indicators [6], that is, (a) average number of drugs per encounter, (b) percentage of encounters with an antibiotic prescribed, (c) percentage of encounters with an injection prescribed, (d) percentage of drugs prescribed from National list of Essential Medicines (NLEM) 2015, and (e) percentage of drugs prescribed by generic names (NLEM 2015 is used to determine medicines prescribed either in generic or in brand name). The percentage of the fixed-dose combinations (FDCs) was also determined. Such WHO prescribing indicators assess the degree of polypharmacy, prescription of drugs by generic name, and the use of antibiotics and injections [7].

#### Inclusion criteria

The following criteria are included in the study:

1. All post-operative patients in surgery ward of hospital until discharged; only adults - both males and females including pregnant/lactating mothers were taken
2. Only drugs which are prescribed after operations were considered and not the drugs that are already going on.

#### Exclusion criteria

The following criteria are excluded from the study:

1. Any patient who dies postoperatively before being discharged
2. Patient who absconded/discharged against medical advice
3. Patient referred to higher center
4. All pediatric patients.

#### Data analysis

Data were entered and analyzed using Microsoft Excel 2007. Drugs are verified by NLEM 2015. Different parameters were given as percentage.

**Table 1: Age- and sex-wise distribution**

Age group (years)	n		Percentage	Total
	Male	Female		
18-40	234	137	64.63	371
41-60	106	53	27.70	159
>60	33	11	7.67	44
Total (%)	373 (65)	201 (35)	100	574

**Table 2: Different types of surgeries with their mean duration of hospital stay**

Type of surgery	Number of surgeries done (%)	Mean stay (days)
Appendicectomy	200 (34.84)	09.92
Inguinal hernia	61 (10.63)	12.34
Other hernias (incisional, epigastric, umbilical, and ventral hernia)	20 (3.48)	15.70
Total hernias	81 (14.11)	-
Laparotomy	52 (9.06)	19.47
Hydrocele	43 (7.49)	10.42
Swelling/cysts excisions	33 (5.75)	06.24
Breast surgeries	31 (5.40)	12.13
Anorectal surgeries	26 (4.53)	11.81
Cellulites	23 (4.01)	28.09
Gangrene	15 (2.61)	20.73
Gallbladder surgeries	10 (1.74)	17.80
Incision and drainage	08 (1.39)	10.63
Amputation	06 (1.05)	32.83
Circumcision	05 (0.87)	05.20
Thyroid surgeries	03 (0.52)	08.00
Renal surgeries	02 (0.35)	13.00
Miscellaneous (prostate, head injury, varicose, lymphadenopathy, pancreatic cyst, hemothorax, etc.)	36 (6.27)	20.92
Total	574 (100)	Mean=15

## RESULTS

Majority of the patients managed were male (65%) and most of the patients were in 18-40 years of age group, i.e. 64.63% (Table 1).

The most common surgical procedure performed was appendicectomy (34.84%) followed by repair of inguinal hernia (10.63%) and mean duration of hospital stay is 15 days (Table 2).

The total number of drugs per encounter ranges from a minimum of two drugs to 12 drugs. Majority of patients were prescribed 7-8 different drugs. The average number of drugs per encounter is 7 in our study (Table 3).

Most commonly prescribed drugs were antiulcer drugs, antibiotics, analgesics, and intravenous fluids (Table 4). The most common prescribed antibiotics were metronidazole (492), ceftriaxone (379), amikacin (323), cefixime (95), ciprofloxacin (72), piperacillin+tazobactam (36), penicillin's (8), and levofloxacin (5) and other antibiotics (9) such as cefotaxime, cefoperazone, meropenem, etc. (Table 4).

Majority of patients were prescribed 2-3 different antibiotics (Table 5).

#### FDC

Of the total 4042 formulations prescribed, 44 are FDCs (1.08%). FDCs were most commonly prescribed in the age group of 18-40 years (25) followed by 41-60 years (16) and >60 years (3). Most common prescribed FDC was piperacillin+tazobactam (81.82%) (Table 6).

A total of 4042 drug products were prescribed to 574 encounters. Of a total of 4042 drugs prescribed, 35.10% (1419) were antibiotics. About 574 encounters contain an injection prescribed either an injectable antibiotic, or an injectable analgesic or intravenous fluid. All WHO core prescribing indicators are as follows (Table 7).

## DISCUSSION

We had collected data of 574 patients matching inclusion criteria that underwent surgery and were in their post-operative period till they were discharged in the surgery ward of our hospital. Largest proportion of patients were male 373(65%) which was in accordance with the studies done by Alam *et al.* (63.2%) [8] and Kumar *et al.* (61.77%) [9].

In our study, a total of 371 (64.63%) patients were in the age group of 18-40 years. The results reported by Alam *et al.* (63%) [8] and Patil *et al.* (62.96%) [10] also showed the same trend as the majority of patients were in the age group of <40 years. In contradiction to this

**Table 3: Total number of drugs per encounter**

Number of drugs	Number of encounters (%)
2	01 (0.17)
3	13 (02.26)
4	33 (05.75)
5	66 (11.50)
6	67 (11.67)
7	143 (24.91)
8	156 (27.18)
9	69 (12.02)
10	20 (03.48)
11	05 (0.87)
12	01 (0.17)

**Table 4: Most frequently prescribed drugs with percentage**

S. No	Name of drug	Number of encounters (%)
1	Ranitidine	559 (97.39)
2	Metronidazole	492 (85.71)
3	Diclofenac sodium	486 (84.67)
4	Ringer's lactate	448 (78.05)
5	Inj. ceftriaxone	379 (66.03)
6	Dextrose normal saline	352 (61.32)
7	Inj. amikacin	323 (56.27)
8	Normal saline	213 (37.11)
9	5% dextrose	184 (32.06)
10	Tramadol	162 (28.22)
11	Ondansetron	122 (21.25)
12	Cefixime	95 (16.55)
13	Ciprofloxacin	72 (12.54)
14	Blood	37 (06.45)
15	Piperacillin+tazobactam	36 (06.27)
16	Paracetamol	27 (04.70)
17	Vitamins	14 (02.44)
18	Penicillin's	08 (01.39)
19	Miscellaneous drugs (enzymes, laxative, pantoprazole, botropase, levofloxacin, etc.)	33 (05.75)

**Table 5: Number of antibiotics prescribed in an encounter**

Number of antibiotics prescribed	Number of encounters
0	1
1	54
2	206
3	306
4	7

**Table 6: Fixed-dose combinations**

Drugs	n (%)
Piperacillin+tazobactam	36 (81.82)
Amoxicillin+clavulanic acid	3 (06.82)
Diclofenac+paracetamol	2 (04.55)
Tramadol+paracetamol	1 (02.27)
Cefoperazone+sulbactam	1 (02.27)
Ceftriaxone+sulbactam	1 (02.27)

Bhansali *et al.* [11] reported that 57.08% of patients were from 40 to 60 years age groups.

The mean duration of post-operative stay in our study is 15 days with a range of 5–32 days. This is more when compared to other studies such as Alam *et al.* (9.19 days) [8], Bhansali *et al.* (8.77 days) [11], and Ali *et al.* (2–21 days) [12] in emergency procedures. Highest duration of stay in our study was seen in patients of amputation (32.83 days),

cellulites (28.09 days), gangrene (20.73 days), and laparotomy (19.47 days) patients. Extended length of stay after surgery represents complications, patient illness, or inefficient practice style which has to be improved.

In our study, surgery for appendicectomy was the most common procedure done and accounted for a total of 200 (34.84%) patients, which was consistent with the finding of Qureshi and Durrani [13] who reported that appendicectomy was most common surgery in their audit. Ali *et al.* [12] and Alam *et al.* [8] also reported that appendicectomy was the commonly done procedure on 27.44% and 11.9% of their patients, respectively. However, in other studies like by Sadaf *et al.* [14], appendicectomy was the 2<sup>nd</sup> most commonly performed procedure.

The second most common procedure done in our study was inguinal hernia repair surgery accounting for 61 (10.63%) of total patients which is less when compared to other studies such as Bhansali *et al.* (28.33%) [11] and Alam *et al.* (15.5%) [8]. Total hernia surgeries including inguinal hernias in our study are 14.11%. Various other studies such as Shaikh *et al.* [15] reported overall hernia incidence of 15.9%, Manzar *et al.* (9%) [16], Sneha *et al.* (24.13%) [3], and Ali *et al.* (33.47%) [12], respectively.

In our study, the average number of drugs per encounter was 7.04 with a range of 2–12. This is higher in comparison to the findings of Salman *et al.* (4.8) [4], Kumar *et al.* (4.26) [9], and Siddhartha *et al.* (6.27) [5] and lower in comparison to the findings of Sneha *et al.* (8.93) [3] and Bhansali *et al.* (9.03) [11]. Intravenous fluids are included in our study so high result shown. Polypharmacy is frequent in post-operative patients.

Most commonly prescribed drugs were ranitidine (97.39%), metronidazole (85.71%), diclofenac sodium (84.67%), Ringer's lactate (78.05%), ceftriaxone (66.03%), dextrose with normal saline (61.32%), amikacin (56.27%), normal saline (37.11%), 5% dextrose (32.06%), tramadol (28.22%), ondansetron (21.25%), cefixime (16.55%), and ciprofloxacin (12.54%).

Intravenous fluids were also commonly used drugs. The different type of fluids used includes injection Ringer's lactate (78.05%), injection dextrose plus normal saline (61.32%), injection normal saline (37.11%), and 5% dextrose (32.06%). High average number of drugs per patient is also due to so many IV fluids administration.

One of the most common complains after surgery is post-operative pain. Hence, the use of an analgesic has almost become compulsory following surgery. The most commonly used analgesic was diclofenac in our study which is consistent with the findings with that of Salman *et al.* [4], Bhansali *et al.* [11], and Kumar *et al.* (80.0%) [9], wherein it was the most commonly prescribed analgesic. However, the use of nonsteroidal anti-inflammatory drugs (NSAIDs), particularly diclofenac for the management of post-operative pain, is controversial [17].

In our study, about 573 patients received antimicrobial agents making it 99.8%. This is similar to studies by Bhansali *et al.* (100%) [11], Kumar *et al.* (100%) [9], and Sneha *et al.* (100%) [3]. The purpose of antibiotic usage in post-operative patients is prophylactic to prevent post-operative infection at the surgical site.

The average number of antibiotics used in our study came out to be 2, which is higher than reported by Kumar *et al.* (1.55) [9] but lower than reported by Bhansali *et al.* (2.95) [11]. 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 selection of drug-resistant bacterial strains.

Table 7: The WHO core prescribing indicators

WHO prescribing indicators	Number/percentage (%)	Number
Total number of encounters	-	574
Total number of drugs prescribed	-	4042
Average number of drugs prescribed per encounter	-	7.04 (4042/574)
Percentage of drugs prescribed by generic name	43.93 (1776/4042)	1776
Percentage of encounters in which an antibiotic was prescribed	99.8 (573/574)	573
Percentage of encounters with an injection prescribed	100 (574/574)	574
Percentage of drugs prescribed from NLEM 2015	99.3 (4014/4042)	4014

WHO: World Health Organization, NLEM: National List of Essential Medicines

About 35.10% of patients were prescribed antibiotics in our study which is similar to studies done by Mandal *et al.* (30%) [18] and Kumar *et al.* (37.89%) [9]. Metronidazole (85.71%), ceftriaxone (66.03%), and amikacin (56.27%) were the most commonly used antibiotics in our study. This is consistent with the findings of the study conducted by Sneha *et al.* [3], Patil *et al.* [10], and Sharma *et al.* [19], wherein these antibiotics are also commonly prescribed in their studies.

In our study, 1.08% of drugs were in the form of FDCs which is very less than other studies such as Sneha *et al.* (18.47%) [3] and Kumar *et al.* (12.42%) [9].

The overall percentage of drugs prescribed from essential drug list in the present study was 99.3%. This is high when compared to other studies done across India such as Sneha *et al.* (78.99%) [3], Kumar *et al.* (69.25 %) [9], Choudhury *et al.* (57.4%) [20], Siddhartha *et al.* (54.89 %) [5], and Sharma *et al.* (52.96%) [19]. The reason for this high could be an effective and successful implementation of EML in government hospitals of Karnataka. Increase in the use of essential medicines makes the medicine therapy more rational.

The overall percentages of drugs prescribed from generic name in the present study were 43.93% which is comparable with study done by Choudhury *et al.* (41.6%) [20] but less than other studies such as Sneha *et al.* (98.51%) [3] and Siddhartha *et al.* (68.51%) [5]. 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 drugs [20].

## CONCLUSION

Our study gave us an in general pattern about the use of drugs in post-operative patients in the surgical ward of a tertiary care hospital. From this study, we came to know about the common disorders for which surgeries are performed in our hospital. Furthermore, we found that polypharmacy was very common, particularly in case of the antibiotics. Generic drug prescribing was low and needs improvement. Furthermore, prescribing by essential drug list is good in our hospital. This study is a step forward in the broader assessment of safety and efficacy of prescription of drugs on post-operative patients in surgical wards of a teaching hospital.

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## AUTHORS' CONTRIBUTIONS

All authors have contributed equally in developing the concept of the study, data collection, data analysis, and drafting the manuscript.

## CONFLICTS OF INTEREST

The present study was performed in the absence of any conflicts of interest.

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