

An in-depth study of drugs prescribing pattern in the Surgery Department of a Tertiary Care Teaching Institute in Northern India

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ABSTRACT

Background: In surgical patients, a number of drugs are prescribed to prevent post-operative infections and to relieve pain. Therefore, prescription audit should be periodically performed in Department of Surgery to analyze the present scenario of drugs prescribed for the surgical/post-operative patients. This will help us to use the medicines rationally and decrease the adverse effects in surgical patients. The main aim of the study was to evaluate the drugs prescribing pattern in the Surgery Department in Tertiary Care Teaching Institute.

Methods: Patients' prescriptions or case record forms were randomly collected over a period of 1 year from the Department of Surgery at GGS Medical College and Hospital, Faridkot, Punjab (India) for analysis and rationalization.

Results: A total of 900 prescriptions was collected and analyzed for drugs used in surgical patients. Average number of drugs prescribed is 4.26. The most commonly prescribed drugs were anti-microbial agents (AMAs), gastrointestinal tract (GIT) related, non-steroidal anti-inflammatory drugs (NSAIDs) and multivitamins and trace elements, and their percentages were 37.90%, 23.36%, 14.14 %, and 9.11% respectively. About 95% drugs were prescribed by non-generic (Trade) names. Drugs prescribed from National Essential Medicines List (EML) and World Health Organization EML were 69.25% and 45.31% respectively. Average cost per prescription per day was Rs. 610/- (INR) or \$10.34 USD in a surgical patient.

Conclusions: There is a high tendency and frequency to prescribe four and more than four drugs to post-operative patients. Most drugs prescribed were AMAs, GIT related, NSAIDs and Multivitamins and trace elements. There is an urgent need to develop proper prescription writing skills in budding doctors regarding the use of EML/drugs list and generic medicines to reduce the cost of treatment.

Keywords: Prescription audit, Prescribing indicators, Essential medicines list, Anti-microbial agents, Post-operative patient, Generic medicines

INTRODUCTION

A prescription is a written advice that mentions drugs and other instructions given to either pharmacist or chemist to dispense the drugs to the patients for proper treatment of the disease.¹⁻³ It provides information like an adequate dose of the drug to be given, its duration and the way it has to be taken.^{2,3} If a drug is prescribed in a rational way, it will help us in reducing the patient's expenditure, lower adverse drug reactions, drug interactions and extra burden on medical as well as paramedical staff.^{1,4,5} Therefore, prescription audit/monitoring or drug utilization study should be done periodically to increase the therapeutic efficacy, decrease the adverse effects and provide feedback to the prescriber to ensure rational use of medicines.^{6,7}

There is a specific format for prescription and World Health Organization (WHO) has given a list of prescribing indicators to analyze the drugs prescribing pattern.⁴

In the surgical department, a number of drugs (viz. anti-microbial agents [AMAs], non-steroidal anti-inflammatory drugs [NSAIDs], gastrointestinal tract [GIT] related drugs, etc.) are prescribed, but the AMAs are most frequently prescribed to prevent infections at the surgical sites.⁸⁻¹¹ As the micro-organism developed resistance to these AMA with the passage of time, therefore, a drug (or AMA) must be used in a rational way for the treatment of disease or to prevent infections because it is of utmost importance for the success of treatment and well-being of patients.^{4,5}

The current study was done to evaluate the drugs prescribing pattern in the Department of Surgery in a Tertiary care teaching Institute at Faridkot (Punjab).

METHODS

This was a cross-sectional hospital based descriptive study. Patients' prescription slips or physicians' order sheet of the hospital record (case record forms [CRFs]) were randomly collected from the patients visiting the outpatient departments (OPDs) or admitted in the ward of Surgery Department, Guru Gobind Singh Hospital attached to the GGS Medical College, Faridkot over a period of 1 year (April 2013 to April 2014) (Figure 1). The relevant information was entered into the pretested proforma (containing name, age, sex, diagnosis, ongoing treatment as recorded from patients' prescription slips or CRFs) and analyzed for prescribing indicators (as per WHO guidelines).⁴ These prescribing indicators are:⁴

1. Average number of drugs per prescription (encounter)
2. Percentage of drugs prescribed by generic name
3. Percentage of encounters for antibiotic prescriptions
4. Percentage of encounters for prescribing injections
5. Percentage of drugs prescribed from an essential medicines list (EML)/drugs list
6. Average drug cost per prescription or encounter.

Necessary permission was granted by the Institutional Ethical Committee and written informed consent was obtained from the patients prior to collecting their prescription slips/CRFs.

Inclusion criteria

Patients of either sex over 14 years of age, patients who had been through a surgery, patients with co-morbid condition, patients undergoing re-operation and patients visiting the OPD after surgery (day care surgery) were included in the study.

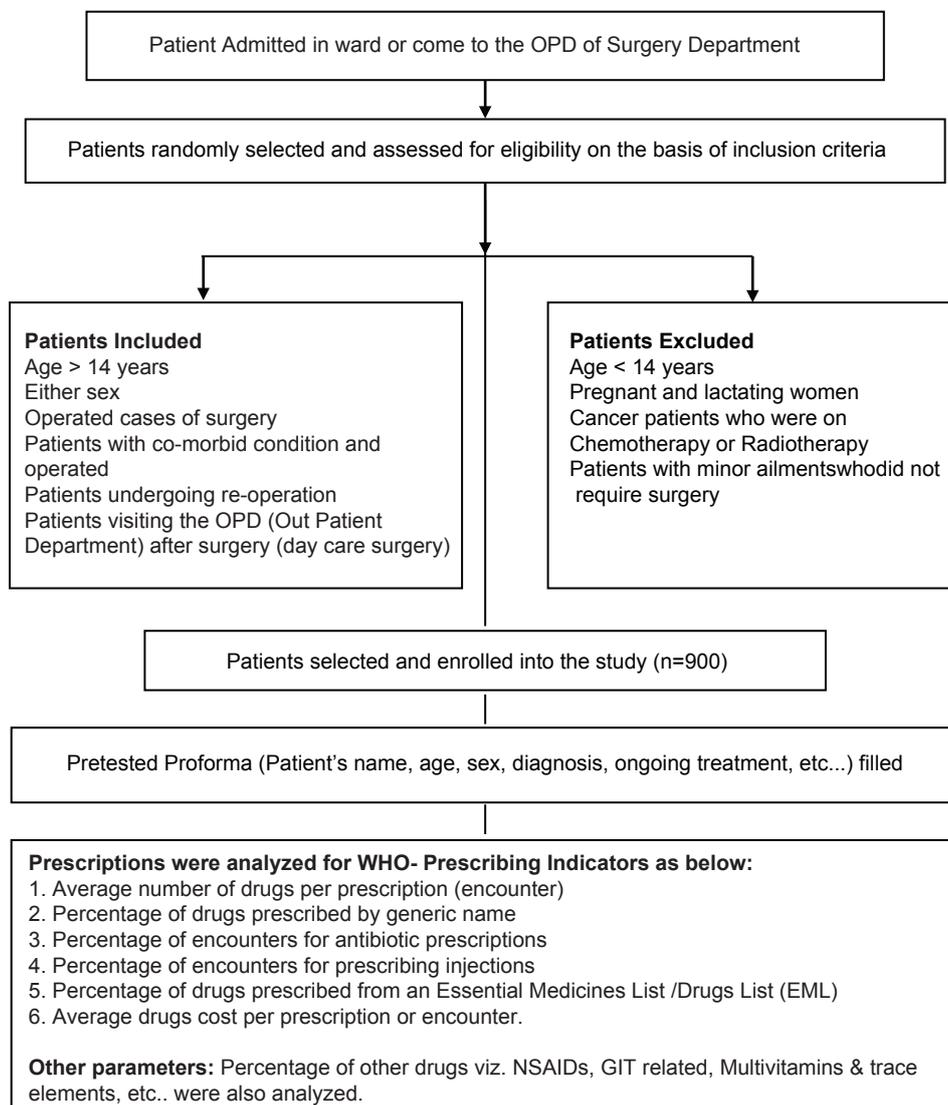


Figure 1: Study design.

Exclusion criteria

Patients who were below 14 years of age, pregnant and lactating women, cancer patients who were on chemotherapy and outpatients with minor ailments were excluded.

RESULTS

A total of 900 prescriptions/CRFs was collected that contained 3840 drugs. Males were 61.77% and females were 38.33%, respectively. There were patients who had undergone surgical procedures of different diseases like GIT (31.66%), kidney urinary bladder (13.67%), followed by cancer (11.44%), other miscellaneous disorders (11.44%), traumatic injuries (16.44) and undiagnosed contributed (4.1%), respectively (Table 1).

Average number of drugs prescribed was 4.26 and most commonly prescribed number of drugs was 4 (24.67%) and 5 (23.33%) as per prescription (Table 2).

The most commonly drugs prescribed were antimicrobials, GIT related, NSAIDs, vitamins/minerals and central nervous system related drugs and their percentage was 37.90%, 23.36%, 14.14%, 9.11% and 2.66%, respectively. About 11.14% drugs involved various intravenous (IV) fluids. About 94.75% drugs were prescribed by non-generic (Trade) name (Table 3).

Fixed-dose combinations (FDCs) were given by 14.19% (n=477). Commonly prescribed FDCs were multivitamins (50.31%, n=240), AMAs (antimicrobials agents) (33.96%, n=162) and NSAIDs (15.72%, n=75) among FDCs group.

DISCUSSION

Prescribing indicators

Average number of drugs prescribed (4.26) (Table 2) was less as disclosed by Bhansali et al. (5.70)⁸ and Sharma et al. (5.45).⁹ Number of drugs prescribed per encounter (4/prescription, 24.67%) less as revealed by Bhansali et al. (8/prescription, 19.58%).⁸

Total AMAs prescribed (37.89%) (Table 2) was more than as revealed by Bhansali et al. (16.16%)⁸ and Shankar et al. (21.1%).¹⁰ Commonest group of AMAs prescribed was cephalosporin (40.99%) (Table 4) that was less as revealed by Bhansali et al. (74.73%)⁸ and more than Sharma et al. (34%)⁹ but comparable to Parveen et al. (44.5%)¹¹ respectively. Among cephalosporin, cefuroxime (17.17%) (Table 4) was commonly prescribed in this study, while other studies^{8,9} disclosed use of ceftriaxone (64.66% and 23.77% respectively) in surgical patients.

Aminoglycosides (14.70%) (Table 4) prescribed was less as revealed by Bhansali et al. (25.26%)⁸ and Sharma et al.

(26%)⁹ but comparable to Parveen et al. (15%).¹¹ Among aminoglycosides amikacin (13.73%) was prescribed less than as observed by Bhansali et al. (25.16%)⁸ and Sharma et al. (26%)⁹ respectively.

Fluoroquinolones (5.58%) (Table 4) prescribed was less as observed by Sharma et al. (12%)⁹ but more than Parveen et al. (2%).¹¹ In this study, ofloxacin was most frequently prescribed while ciprofloxacin and levofloxacin were observed by Sharma et al.⁹

Table 1: Morbidity patterns in surgical patients.

Diagnosis	N	Percentage
Total	900	
GIT related diseases	285	31.67
Gall bladder	132	21.33
Cholelithiasis	112	12.33
Cholecystitis	30	9
Acute appendicitis	31	3.35
Acute pancreatitis	14	1.67
Intestinal obstruction	35	4
Intestinal perforation	10	1.11
Rectum/anal diseases	21	2.33
Hernia	42	4.67
Inguinal hernia	27	3
Umbilical hernia	15	1.67
Varicocele/hydrocele	14	1.55
KUB	123	13.67
Renal calculi	54	6
Renal cyst	12	1.33
BPH	21	4
Urethral stricture	33	3.67
UTI	3	0.33
Traumatic injuries	145	16.44
Road side accident with head injury	57	6.33
Other trauma	91	10.11
Diabetes mellitus with complications	32	3.67
Burn	27	3
Cancers	103	11.44
Cancer breast surgery	35	3.89
Cancer other organs (esophagus, stomach, prostate, anus, rectum, prostate, urinary bladder, gall bladder, liver, cervix)	33	3.67
Thyroid diseases, salivary glands, lipoma, splenic cyst, abscess, benign lump, neck swellings, intestinal tuberculosis, etc.	103	11.44
Undiagnosed	37	4.1

GIT: Gastrointestinal tract, KUB: Kidney urinary bladder, BPH: Benign prostatic hyperplasia, UTI: Urinary tract infection

Nitroimidazoles (5.36%) (Table 4) prescribe was less as revealed by Sharma et al. (12%)⁹ and Parveen et al.

(30.7%).¹¹ Commonly prescribed was metronidazole among nitroimidazoles (8.8%), which was less as revealed by Parveen et al. (30.7%).¹¹

Table 2: Number of drugs prescribed per encounter.

Number of drug prescribed in a prescription	Number of encounters	Percentage
1	12	1.33
2	45	5
3	162	18
4	222	24.67
5	210	23.33
6	147	16.33
7	54	6
8	21	2.33
>9	27	3

FDCs of fluoroquinolones with nitroimidazoles was frequently prescribed (5.36%) (Table 4) but other studies⁸⁻¹¹ did not mention about them.

Total FDCs of AMAs was prescribed by 11.45% (Table 4) that is less as disclosed by Parveen et al. (18.84%).¹¹ These combinations include beta-lactam with penicillinase inhibitors (20.17%, n=282), while rest was fluoroquinolones with nitroimidazoles (5.36%). FDCs of amoxicillin with clavulanic acid (37.81%) and tazobactam with piperacillin (16.80%) were more as revealed by Parveen et al. (23.4% and 11.11% respectively).¹¹ During FDCs of ceftriaxone with sulbactam (9.24%) was also prescribed in this study, while other study showed cefoperazone with sulbactam (37%)

Table 3: Drugs commonly used in surgical patients.

Parameters	Total N	Percentage within the group	Percentage out of total drugs
Prescription	900		
Total drugs	3840		
AMA	1398		37.9
GIT related	897		23.36
Pantoprazole	507	56.52	
Omperazole	15	1.67	
Rabeprazole	18	2.0	
Ranitidine	51	5.69	
Antispasmodic	39	4.35	
Antiemetics (domperidone, ondansetron, metoclopramide)	87	9.7	
Antacids	180	20.01	
NSAIDs	543		14.14
Diclofenac	429	80.0	
Paracetamol	30	5.61	
Diclofenac+Serratiopeptidase	66	12.36	
Ibuprofen+Paracetamol	09	1.68	
Tetanus toxoid (injection)	54		1.41
Vitamins and trace elements	350		9.11
Vitamin C	14	4	
B-complex	240	68.57	
Vitamin K	36	10.0	
Iron	60	17.14	
CNS related	102		2.66
Opioids/tramadol	33	32.35	
Phenytoin	15	14.71	
Piracetam	54	52.94	
Mannitol	30		0.82
Intravenous fluids (ringer lactate, dextrose, dextrose saline, etc.)	428		11.14
Drug prescribed by generic name	192		5.25

AMAs: Anti-microbial agents, GIT: Gastrointestinal tract, NSAIDs: Non-steroidal anti-inflammatory drugs, CNS: Central nervous system

Table 4: AMA commonly prescribed.

	N	Percentage	Percentage of out of total AMAs
AMAs	1398	36.41	
Beta lactam			55.01
Cefuroxime	240	17.17	
Cefotaxime	30	2.15	
Cefixime	24	1.72	
Ceftriaxone	30	2.14	
Ceftazidime	33	2.36	
Cefoperazone	69	4.93	
Tazobactam+Piperacillin	60	4.29	
Ceftriaxone+Sulbactam	33	2.36	
Ceftriaxone+Tazobactam	27	1.93	
Ampicillin+Sulbactam	27	1.93	
Amoxicillin+Clavulanic acid	135	9.65	
Aminoglycosides	204		14.59
Amikacin	192	13.73	
Genatmicin	12	0.86	
Kanamycin	9	0.64	
Vancomycin	12	0.85	
Nitroimidazoles-metronidazole	123		8.8
Ofloxacin+Ornidazole	75		5.36
Fluoroquinolones	78	5.5	
Ofloxacin	66	4.72	
Levofloxacin	12	0.85	
Others AMAs	111		7.94
Povidone iodine	116		8.30

AMAs: Anti-microbial agents

(Sharma et al.).⁹ Among other FDC's combination ofloxacin with the ornidazole (21%) was commonly prescribed while other studies⁸⁻¹¹ did not mention about such combination.

Average number of antibiotics (1.55) in the prescription was less as revealed by Bhansali et al.⁸ (2.95) and Parveen et al. (3.92).¹¹

GIT-related drugs prescribed (by 23.36%) (Table 3) were more than as disclosed by Bhansali et al. (13.2%)⁸ and Shankar et al. (9.5%)¹⁰ respectively. The most common anti-ulcer drugs prescribed were pantoprazole (52.98%) and antacids (18.80%). Anti-ulcer drugs more frequently prescribed were pantoprazole (a proton pump inhibitor) and ranitidine (antihistaminic - H2 blocker). In this study, ranitidine prescribed (5.69%) was less as observed by Bhansali et al. (68.47%)⁸ and Shankar et al. (6.4%)¹⁰ respectively in post-operative patients. Antiemetics viz. domperidone, metoclopramide and ondansetron were also prescribed in some cases.

NSAIDs (14.84%) (Table 3) prescribed was less as observed by Bhansali et al. (16.24%)⁸ and Shankar et al. (19.7%)¹⁰ respectively. Among NSAIDs commonest prescribed was diclofenac (both monotherapy and combination) (91.16%), which matched the findings as observed by Bhansali et al. (89.72%).⁸

Multivitamins and minerals (10%) prescribed were more as disclosed by Shankar et al. (2.6%)¹⁰ and commonest vitamin prescribed was vitamin B as FDCs (73.33%).

Serratiopeptidase (1.72%) prescribed was almost more or less near to the observation of Shankar et al. (1.5%).¹⁰

Total FDCs prescribed (12.42%) was less as observed by Sharma et al. (25.78%)⁹ and Parveen et al. (18.84%)⁸ (Table 5).

Drugs prescribed from WHO EML¹² (45.31%) was less while from National EML¹³ (69.25%) was more than as revealed by Sharma et al. (52.96% and 68.93% respectively).⁹ Injectable dosage forms (100%) were more as observed by Sharma et al. (86.08%).⁹

Drug consumption and cost analysis

Average costs of AMA, GIT related agents, NSAIDs, vitamin B and IV fluids are Rs. 352/-, 90/-, 20/-, 8/- and 130/-INR respectively per day per prescription. Average cost of drug per encounter was Rs. 610/- INR (\$10.34, USD) that is very less as disclosed by Sharma et al. (Rs. 1090.40 INR or \$18.30 US Dollar)⁹ in the post-operative patients.

It has been observed that cephalosporins (third generation) and their combinations (with penicillinase inhibitors) are frequently prescribed which is the cause of concern in the present scenario. Secondly, AMA and other medicines are prescribed by non-generic (Trade) name, thereby, increasing the total cost of treatment in post-operative patients.

Implications of the study

The study reflects the common disorders for which surgeries are performed in a tertiary care teaching institute/hospital. This study revealed that the poly-pharmacy is a very common practice. The prescribing of medicines, according to the National Essential Medicine/Drug List is adequate but needs a lot of improvement. The prescription of medicine by non-generic (Trade) name is very common, which increases the cost of the drug therapy in a developing country like India.

Limitations

This study had a small sample size and was done in the patients admitted in the Department of Surgery. We did not enroll patients from Orthopedic, ENT, Eye/Ophthalmology, Obstetrics and Gynae Departments. Therefore, it gave us a limited pattern of drug use in post-operative patients in the

Table 5: Prescribing indicators.

Parameters	N	Percentage
Average number of drugs per prescription	-	4.26
Number of encounters with an injectable preparation prescribed	900	100
Number of fixed dose combinations prescribed	477	12.42
Number of drugs prescribed from EML of India	2659	69.25
Number of drugs prescribed from EML of WHO	1740	45.31
Number of encounters with an antibiotics prescribed	900	100
Number of drugs prescribed by generic name	192	5

EML: Essential medicines list, WHO: World Health Organization

surgical ward only. A prospective study, with large sample size in all the operative cases need to be done to evaluate the prescribing pattern and cost analysis in a better way.

CONCLUSION

Most of the patients with surgical diseases require surgical intervention; therefore, they require more than one medication post-operatively to prevent wound infections and to relieve pain. There is a high tendency and frequency to prescribe more than four drugs, but less are prescribed from the National EML. Most of the drugs prescribed are generally AMAs, GIT related and NSAIDs. There is an urgent need to develop proper prescription writing skills in budding doctors for the use of EML and generic medicines to reduce the cost of treatment and better compliance of the patients.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethical Committee

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