

## **Drug prescribing pattern in surgical wards of a tertiary care hospital in Western part of India**

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### **ABSTRACT**

**Background:** In surgical wards, drugs are required to manage pain, nausea, vomiting, infections, etc. A growing number of pharmaceutical products are available in present era. Irrational prescribing of drugs is prevalent worldwide. Drug utilization study can be used to assess prescribing patterns. Authors undertook this study to determine current practice of prescribing in surgical wards of the hospital.

**Methods:** Authors conducted observational, noninterventional, descriptive study among patients admitted in surgical wards for one year. Authors have analysed collected data of 604 patients using descriptive statistics to determine utilization pattern of drugs and drug use indicators.

**Results:** Appendicitis (14.9%) followed by hernia (10.6%) were leading diseases for admission. Mean duration of stay was 7.44. Average number of drugs in a prescription was 8.94. Antibiotics (32.07 %), analgesics (17.11 %) and antacids (16.09 %) were leading drug groups prescribed. Amikacin (5.81 %) followed by metronidazole (5.30 %) and ciprofloxacin (5.19 %) were commonly prescribed antimicrobial drugs. Tramadol (5.31 %) and pantoprazole (7.17 %) were leading drugs prescribed from analgesics and antacids respectively. All prescriptions had at least one injectable drug. At least one antibiotic was present in 92.05 % prescriptions. Majority of drugs (87.27 %) were prescribed by generic names. Proportion of drugs prescribed from essential medicine list was 84.22 %.

**Conclusions:** Polypharmacy and injectable drug prescribing were common in practice. There is a scope for improving such prescribing practices among practitioners. Use of multiple antibiotics should be avoided whenever possible and usage should be evidence based.

**Keywords:** Drug utilization study, Drug use indicator, Surgical ward

### **INTRODUCTION**

Drug utilization study is “the marketing, distribution, prescription and use of a drug in society with special emphasis on resulting medical, social and economic consequences”.<sup>1</sup> Main aim of such study is to promote rational use of drugs in society. Irrational prescribing habits are present worldwide. More than 50% of all medicines are prescribed, dispensed or sold inappropriately, while 50% of patients fail to take them correctly in world. Moreover, about one-third of the

world’s population lacks access to essential medicines.<sup>2</sup> Antibacterial agents are prescribed even if not indicated, inappropriate in terms of drug selection or dosage or therapeutic basis. Such use of antimicrobial agents may cause number of problems including emergence of antimicrobial resistant bacteria.<sup>3</sup> Many times, injectable drugs are given even if alternative oral drug is available. A growing number of pharmaceutical products are available and there has been an increase in both the consumption of the drugs and in expenditure on them. In country like India, where resources are limited, rational prescribing is important. However, before suggesting any change, it is

necessary to evaluate the existing base line practice which can be done using data on prescriptions and prescribing practices with the help of a drug utilization study.<sup>4</sup> Feedback to doctors regarding their current prescribing practice compared to standard therapy or guideline improves prescribing practice among them.

In surgical wards, drugs are required to manage pain, nausea, vomiting, infections, etc. Salman MT et al, in his study of prescribing practices among patients of surgical wards found that proportion of drugs prescribed from essential medicine list was low with an average prevalence of more than 2 broad spectrum antibiotics given unnecessarily along with extensive use of other drugs.<sup>5</sup> Thus it is necessary to sensitize surgeons about prescribing needed drugs from essential medicine list with generic names and cost consideration. Also, there is a clear need for the development of prescribing guidelines and educational initiatives to encourage the rational and appropriate use of drugs in surgery. We decided to undertake this study to investigate the current situation in surgical wards of our hospital.

## METHODS

This prospective, observational, descriptive study was carried out after approval from institutional ethics committee of the institute. We used a sample consisting 604 patients. Duration of study was one year from April 2015 to March 2016. In this study, we included indoor patients of both sex including pregnant and lactating mother admitted in general surgery wards of the institute. Patients referred to higher centre, died before discharge, absconded or discharged against medical advice were excluded. The diagnosis and line of treatment to be given was decided by surgeon in charge of the ward. Written informed consent was taken from patients fulfilling study criteria. After interview of patient and review of case paper data regarding demographic details, clinical status, operative procedure, medication prescribed till discharge result of culture and sensitivity test, etc. were recorded in case record forms. The data collected was analysed with the help of MS excel using descriptive statistics to determine drug use indicators and utilization pattern of drugs. National essential medicine list 2015 was used for the reference to evaluate percentage of drugs prescribed from essential medicine list.<sup>6</sup>

## RESULTS

We have analysed data of 604 prescriptions. Majority of patients were from 20 to 50 years age group (52.65 %) with mean age was 39.22±19.62 years. Proportion of male to female was 1.54:1 in this study. Duration of admission for majority of patients (53.64 %) was 5-10 days. Mean duration of stay was 7.44±4.82 days (Table 1).

Table 2 shows morbidity pattern among patients. Appendicitis (14.9%) followed by hernia (10.6%) were leading diseases for admission in this study. Out of total

operative procedures; leading operative procedures were appendectomy (21%), cyst or lipoma excision (17%), hernia repair and meshplasty (16%), laprotomy (13%) and amputation (10%). Other operative procedures were debridement, circumcision, hydrocele, nephrolithotomy or pyelolithotomy and anorectal surgery.

**Table 1: Demographic characteristics of patients.**

Characteristics	No. of patients
<b>Age (years)</b>	
Less than 20 years	122 (20.2%)
20-50 years	318 (52.65%)
More than 50 years	164 (27.15%)
<b>Sex</b>	
Male	366 (60.60%)
Female	238 (39.40%)
<b>Duration of Stay</b>	
Less than 5	178 (29.47%)
5-10 days	324 (53.64%)
11-20 days	92 (15.23%)
21-30 days	6 (0.90%)
More than 30 days	4 (0.66%)

**Table 2: Distribution of patients as per disease.**

Disease	% of patients
Appendicitis	14.9%
Hernia	10.6%
Abdominal pain	6.3%
Abscess	6.6%
Cystitis	7.9%
Renal/bladder stone	5.6%
Brest lump/fibroadenoma	5.3%
Cellulitis	6.3%
Cyst	3.3%
Diabetic foot	3.6%
Lyphadenopathy inguinal	2.2%
Phimosis	2.6%
Renal colic	2.2%

In this study, total 5400 drugs were prescribed. Antibiotics (32.07%), analgesics (17.11%) and antacids (16.09%) were leading drug groups prescribed in this study.

Table 3 show prescribing patterns of drug groups. Among antimicrobial agents, amikacin (5.81%) was the most common prescribed drug followed by metronidazole (5.30%) and ciprofloxacin (5.19%). Tramadol (5.31%) followed by diclofenac (4.46%) and paracetamol (3.26%) were first three commonly prescribed analgesic drugs. Among antacid drugs, pantoprazole (7.17%) followed by famotidine (4.3%) and ranitidine (2.35%) were first three commonly prescribed drugs. Out of total drugs, 14.28% drugs were parenteral fluids. Dextrose normal saline (4.33%), ringer's lactate (3.44%) were most commonly used parenteral fluids. Table 3 shows prescribing patterns

of various drugs. Table 3 shows prescribing pattern of various drugs.

Of all drugs, 68.24% drugs were prescribed in injectable form. Average number of drugs prescribed was 8.94. In this study, a prescription contained minimum of four drugs

and maximum of thirteen drugs. All prescriptions had at least one injectable drug. At least one antibiotic was present in 92.05% prescriptions with range of 0 to 7. Nearly one third (32%) prescription have 3 antibiotics. Table 4 shows drug use indicators.

**Table 3: Prescribing patterns of various drugs.**

Drugs	No. of drugs prescribed	Percentage
<b>Antimicrobial agents</b>	<b>1732</b>	<b>32.07</b>
Amikacin	314	5.81
Metronidazole	286	5.30
Ciprofloxacin	280	5.19
Ceftriaxone	280	5.19
Amoxicillin + Clavulanic acid	138	2.56
Cefotaxime	85	1.57
Cefixime	73	1.35
Piperacillin + Tazobactam	67	1.24
Other antibiotics*	209	3.87
<b>Analgesic and antispasmodic drugs</b>	<b>924</b>	<b>17.11</b>
Tramadol	287	5.31
Diclofenac	241	4.46
Paracetamol	176	3.26
Hyoscine butyl bromide	106	1.96
Ibuprofen	102	1.89
Others**	12	0.22
<b>Antacid drugs</b>	<b>869</b>	<b>16.09</b>
Pantoprazole	387	7.17
Famotidine	232	4.30
Ranitidine	127	2.35
Omeprazole	107	1.98
Rabeprazole	16	0.30
<b>Parenteral fluids</b>	<b>771</b>	<b>14.28</b>
Dextrose normal saline solution	234	4.33
Ringer's Lactate solution	186	3.44
Dextrose 5% solution	133	2.46
Dextrose 25% solution	78	1.44
ISO-M solution	74	1.37
Others (Normal saline, ISO-P solution)	66	1.22
<b>Vitamins and minerals</b>	<b>422</b>	<b>7.81</b>
Multivitamin / B-Complex tablets	153	2.83
Vitamin C tablets	123	2.28
Tablet folic acid	76	1.41
Others vitamins and minerals***	70	1.30
<b>Antiemetic drugs</b>	<b>342</b>	<b>6.33</b>
Ondansetron	308	5.70
Domperidone	26	0.48
Metoclopramide	8	0.15
<b>Other drugs****</b>	<b>340</b>	<b>6.30</b>

\* Other antibiotics includes Cloxacillin, Crystalline penicillin, Amoxicillin, Nafcillin, Cefoperazone, Ceftriaxone + Sulbactam, Meropenem, Doxycycline, Gentamicin, Azithromycin, Linezolid, Albendazole, Diethylcarbamazine, Sulfamethoxazole with trimethoprim

\*\*Other analgesic and antispasmodic drugs are Diclofenac, paracetamol, serratiopeptidase (Diclo+sp tablets) combination and Drotaverine

\*\*\*Other vitamins and minerals - Multivitamin inj., Ferrous sulphate, Vitamin K inj, Calcium

\*\*\*\*Others includes less frequently prescribed drugs from various drug groups – Tetanus toxoid, Diazepam, Biscodyl, Carbimazole, Furosamide, Cetirizine, Deriphyllin, Drotaverine, Tamsulosin, Urodeoxycholic acid, Lignocaine, Bupivacaine, Atropine

**Table 4: Summary of drug use indicators.**

Average number of drugs prescribed	8.94
% of encounters with an antibiotic prescribed	92.05%
% of encounters with injections prescribed	100.00%
% of drugs prescribed by generic name	87.27%
% of drugs prescribed from essential medicine list	84.22%
Average no. of antibiotic per prescription	2.86
Average no. of injection per prescription	6.10
Availability of essential medicine list or formulary	Yes
Key drugs available	86.18%

## DISCUSSION

In this study, 60.60% were male and 39.40% were female. Similar male preponderance was reported by other studies.<sup>7-9</sup> Majority of patients (52.64%) were between age group of 20-50 years. The finding is in consonance with other studies.<sup>7,10,11</sup> One of the possible reason is that productive age group is actively involved in socioeconomic activities, making them vulnerable to diseases, which may need surgical interventions.<sup>7</sup> Disease patterns in this study were appendicitis (14.9%) followed by hernia (10.6%), cystitis (7.9%) and other conditions. Our findings are in consonance with other studies.<sup>9,12</sup> However in study by Sharma et al, renal stone was leading operative procedure.<sup>7</sup> A wide spectrum of clinical diagnoses was observed in this study. Region wise morbidity pattern may differ. Other possible reason may be difference in health care facility of the hospital. Thus, observed disease pattern may differ from other study. In this study, majority of patients had duration of stay less than 10 days. The mean duration of stay was 7.44 days. This finding are in consonance with other studies.<sup>8,10</sup>

In this study, most commonly prescribed groups of drugs were antibiotics (32%) followed by analgesic (17%) and antacids (16%). Prescribing pattern of drug groups is in consonance with other studies.<sup>5,13</sup> Antimicrobial agents are very important class of drugs essential in treating or preventing infections in patients. Patients in surgical wards may develop infections post-surgery; many of the infections may be due to highly virulent bacteria. The use of antibiotics in surgical patients for prophylaxis and treatment of infections is a justifiable practice. However, its use should be judicious which requires regular review of chosen regimen on the grounds of efficacy, toxicity, cost and other aspects to maximize the benefits to the patient.<sup>10</sup>

The most common drug group was antibiotics (32%) in this study. Commonly prescribed antibiotics were amikacin (5.81%) followed by metronidazole (5.30%), ciprofloxacin (5.19%) and ceftriaxone (5.19%). Amikacin was 2<sup>nd</sup> in more commonly prescribed drugs in this study. We found it in 314 (51.99%) encounters. Khade et al, observed that ciprofloxacin and metronidazole were most

commonly used antibiotics.<sup>11</sup> In study by Vadajiya et al, metronidazole and ciprofloxacin were two most commonly prescribed antibiotics.<sup>14</sup> Study by Salman et al, showed major use of amikacin.<sup>5</sup> Amikacin is potentially ototoxic and nephrotoxic. The risk of nephrotoxicity is greater in patients with impaired renal function and in those who receive high doses or prolonged therapy. Also, to reduce the development of drug-resistant bacteria and maintain the effectiveness, amikacin should only be used to treat or prevent infections that are proven or strongly suspected to be caused by susceptible bacteria.

In present study, one third of prescriptions (32%) were with three antibiotics. Average number of antibiotics per prescription was 2.86. Other studies showed similar results.<sup>5,8,14</sup> The higher number of antibiotics per patient indicates that more and more antibiotics were used for prophylaxis purpose rather than definitive treatment purpose, more as a blanket therapy to prevent any or all types of infections. 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.<sup>8</sup>

Analgesics and antispasmodic drugs (17.11%) were second most common group prescribed in this study. Tramadol (5.31%) was the most commonly used analgesic. Authors found it in 287 (47.52%) prescription. It was 4<sup>th</sup> in commonly prescribed drugs in this study. Analgesic drugs are required to manage pain due to disease or operative procedures. Patients in surgical wards may have inflammatory pain, postoperative pain or many times visceral pain. Opioid analgesics like tramadol can be useful to manage such pain. Tramadol has advantage over other opioids likeless chances of respiratory depression, low potential for development of tolerance, dependence and abuse.<sup>15</sup> Diclofenac (4.46 %) was the second most common analgesic. Our study findings are comparable to observation in other study.<sup>5</sup> However in study by Bhansali et al, diclofenac was the most commonly prescribed analgesic drug.<sup>8</sup>

The third most common drug group was antacid (16.09%) in this study. Pantoprazole (7.17%) followed by famotidine (4.30%) were two commonly prescribed antacids. Pantoprazole was the most common drug prescribed in this study. We found it in 387 (68.07%) prescriptions. Pantoprazole was the most extensively prescribed drug among antacids in similar study.<sup>5</sup> However, in study by Bhansali et al, the most common antacid drug was ranitidine.<sup>8</sup> Antacids are given before surgery to prevent aspiration. Proton pump inhibitors are more effective in suppressing acid output than other antacids.

Parenteral fluids prescribed were 14.28% of all drugs. Dextrose normal saline (4.33%) followed by ringer's lactate (3.44%) and dextrose (2.46%) were first three common fluids prescribed. This finding is in consonance with other studies.<sup>8,16</sup> Parenteral fluids are required for fluid and electrolytes replacement, nutrition and as a vehicle for drug infusion. Parenteral fluids prescribing increases injectable



formulation in a prescription, number of drugs in a prescription and cost.

Out of antiemetic drugs (6.70%), the most commonly used antiemetic was ondansetron (5.70%) as it is highly effective and possesses low side effect profile. It was present in 308 (50.99%) encounters and 3<sup>rd</sup> in more commonly prescribed drugs in this study. The finding is in consonance with other study.<sup>8</sup> This drug was mainly prescribed as brand name (zoffer) in prescription.

In this study, polypharmacy was observed as average number of drugs per prescription was 8.94. The finding is comparable with other studies.<sup>8,13,17</sup> Polypharmacy is relevant as patients in surgical wards require drugs for treatment of specific condition as well as for prophylaxis. However, it may also be responsible for more adverse drug reaction, drug interaction and increased cost of therapy. It is essential to keep a balance between the number of drugs and effective pharmacotherapy.<sup>18</sup>

Drugs prescribed by generic name were 87.27%. Other studies showed similar findings.<sup>7,13</sup> However, studies by Bansali et al, and Khade et al, showed lower percentage of drugs prescribed by generic names.<sup>8,11</sup> All encounters contained an injection prescribed, may be an injectable antibiotic, an injectable analgesic or intravenous fluid. This was comparable to the finding observed in other studies.<sup>8,11</sup> Average number of injection per prescription including parenteral fluid was 6.10.

Increased number of injections leads to increase in cost of treatment, patient morbidity and negatively influenced the WHO recommended prescribing indices. In present study, percentage of drugs prescribed from national list of essential medicine 2015 was 84.22%.<sup>6</sup> Other study had similar result.<sup>7</sup> However, Bansali et al, observed lower percentage of drugs prescribed from national list of essential medicine.<sup>8</sup>

Despite some limitations of our study like single centre study and relatively small sample size, we can conclude that there is a scope for improving prescribing pattern among practitioners. It is advisable to avoid drugs merely for blanket prophylactic therapy. Whenever possible, we suggest decreasing injectable drugs prescribing practice. Drugs should be prescribed from essential medicine list by their generic names with due cost consideration.

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