

A Prospective Observational Study on Drug Prescribing Pattern In General Surgery Patients of a Tertiary Care Hospital

Dr.Nuzhath Irfana¹,MadeehaNooreen Fatima², SyedaZebaHyder Zaidi²,QaziMohammedAsifUddin²,ZeeshanBegum²

¹Pharm D, Assistant Professor, Department of Pharmacy Practice, Nizam Institute of Pharmacy

²Pharm D, Department Of Clinical Pharmacy Practice, Nizam Institute of Pharmacy

Received 24 December 2019; Accepted 07 January 2020

ABSTRACT

BACKGROUND: In surgical wards, surgical management cannot be completed without the use of drugs for different reasons such as, Infections, Pain, Nausea, Vomiting etc. Therefore, it would be better if prescription monitoring is done periodically in the surgical wards for timely upgrading of prescribing pattern of medications and also to reduce the untoward effects

OBJECTIVE: To analyse the surgical conditions, pre and postoperative antibiotic prophylaxis, postoperative analgesics and antiemetic use. Also the use of other supportive therapies in improving patients Quality of Life

METHODOLOGY: A prospective Observational study involving analysis of surgical inpatients and there prescriptions using patient data collection form for a study period of 6 months.

RESULTS: Of the total 370 Patients, most of the cases were of Males (55.6%) compared to Females (44.3%). Most of the cases were between the age group of 41-60, 150 cases (40.5%). Commonest cause of hospitalization was renal calculi (51.5%) followed by hernia (8.3%). Antimicrobials (30.6%), Analgesics (13.5%), Anti-ulcer (19.9%), Anti-Emetic (12.9%) were the most commonly prescribed drugs. Among Antimicrobials, cephalosporin (47.5%) were most commonly used followed by metronidazole (10.3%). Paracetamol (41.2%) was the most commonly used analgesic followed by Tramadol (34.2%). Ondansetron (82%) and pantoprazole (77%) were the leading drugs prescribed from Anti-Emetic and Anti-ulcer respectively.

CONCLUSION: Renal calculi was the most common cause of hospitalisation. 3rd generation Cephalosporin were mainly prescribed among Antimicrobials. Paracetamol was the leading analgesic used. Ondansetron and Pantoprazole were the extensively prescribed Anti-emetic and Anti-ulcer drug respectively. There is a need to take steps to improve prescribing pattern as per international guidelines, especially cephalosporin antibiotics which is prescribed prophylactically.

I. INTRODUCTION

General surgery is a surgical speciality which focuses on abdominal contents, including esophagus, stomach, small bowel, colon, liver, pancreas, gall bladder, appendix and bile ducts, and also the thyroid gland. It also deal with diseases which involve the skin, breast, soft tissue, trauma, peripheral vascular surgery and hernias. They also deal with endoscopic procedures such as gastroscopy and colonoscopy. [1]

In surgical patients, many drugs are prescribed, in different patterns as surgical management cannot be completed without the use of drugs, mainly, Antimicrobial and analgesic drugs, to prevent post - operative infections and to relieve pain.[2]

EPIDEMIOLOGY: Commonest cause of hospitalization was renal calculi (10 (20%)) followed by acute abdomen and abscess (6, (12%)). Total of 255 numbers of drugs were used with an average of 5.1 drugs per patient. Most preferred route was intravenous route (174 drugs, 68.2%). Antimicrobial was the most common (97 (38.0%)) group of drugs followed by analgesic/antipyretics (50 (19.6%)). Among antimicrobials, ciprofloxacin (22 (22.7%)) was the most common drug followed by metronidazole (21 (18.5%)). All the cases were managed by empirical treatment.(noted from a study in a South Indian hospital, Andhra Pradesh.)^[3] The most common diagnosis in the surgical ward is acute appendicitis (26%) and hernia (16%). Out of 1017 drugs prescribed, most commonly prescribed drugs are antibiotics (31.66%) and antacids (13.76%). Out of 322 antibiotics prescribed, most commonly prescribed antibiotics are ceftriaxone (17.3%) and then metronidazole (16.77%).(noted from a study at a West Indian hospital, Gujarat.)^[4]

GENERAL SURGERY-DISEASE CONDITIONS: General surgery is a speciality dealing with pre-operative, operative and post-operative management of surgical problems of all kinds; especially those related to the abdomen, alimentary canal, soft tissues, endocrine system and, in many cases, the head and the neck.

A Prospective Observational Study on Drug Prescribing Pattern In General Surgery Patients of a ..

Patients who are critically ill or gravely injured are first brought to this department so that they can be stabilized before the next step of treatment. [5]

The doctors are specially trained to conduct emergency surgeries to contain excessive bleeding, bowel obstructions, organ perforations, burns and abdominal trauma. Other than emergencies, they also routinely carry out operations for complications such as appendicitis, hernia, gallbladder removal, thyroid and removal of tumours. [5]

Minimally invasive surgery is also known as keyhole surgery, band-aid surgery and laparoscopic surgery. It is a modern-day surgical technique, wherein a small incision of about 0.5-1.5 cm wide is made to perform surgeries in the abdomen. It has many benefits over traditional open surgery, namely; less pain, lesser infection risk, reduced chances of haemorrhage and post-operative scarring, reduced need for pain medication and shorter hospital stay. Laparoscopic procedures carried out include: [5]

- Cholecystectomy
- Appendicectomy and Hernia repair
- Splenectomy and Colectomy
- Pancreatic Pseudocyst Drainage
- Surgery for Morbid Obesity
- Hepatobiliary and Pancreatic Disease
- Endocrine and Colorectal surgery

MEDICATION PATTERN

- Medicines have an important role in health care delivery and disease prevention. [6]
- In surgical patients, number of drugs are prescribed to prevent post-operative infections and to relieve pain.
- Surgical procedures mainly need :
 1. Antimicrobial coverage
 2. Analgesia management
 3. Anti-emetics
 4. Supportive therapy
 5. Other drugs based on the patients conditions.

ANTIBIOTICS:

a. Choosing prophylactic antibiotics

- Antibiotics should be chosen on the basis of their effectiveness against the pathogens most likely to be encountered rather than against every possible pathogen. Skin flora (eg, Staphylococcus organisms) are the usual target, so first-generation cephalosporins are recommended (cephalexin, cephalothin) in most studies. Few studies also recommend cefuroxime.
- Patients with a history of anaphylaxis or urticaria after penicillin therapy should not receive prophylaxis with a beta-lactam antibiotic. Vancomycin or clindamycin should be used as alternative.

b. Timing of prophylactic antibiotics

- Antibiotics should be administered before an incision is made to ensure that antimicrobial levels in the tissue are adequate and maintained for the duration of the procedure.
- Prophylaxis should be started preoperatively in most circumstances, ideally within 30-60 minutes before incision, except for Vancomycin and Fluoroquinolones which need to be given 120 minutes before incision.

c. Route of administration

- Prophylactic antibiotics for surgical procedures are mainly administered intravenously. Also combination of oral and intravenous is also used in some cases.

d. Duration

- Continue no longer than 24 hours postoperatively (Except cardiac surgery where data is conflicting)
- Most studies have demonstrated efficacy of postoperative antibiotic prophylaxis for only 12 hours or less. Whenever short and long courses are compared, the shorter course has proven equally effective. A single dose is as effective as multiple doses, and antimicrobial prophylaxis after wound closure is unnecessary.

f. Re-dose for longer surgeries

- Patients undergoing surgery that extends beyond two half-lives of an antibiotic should be re-dosed intra-operatively.

A Prospective Observational Study on Drug Prescribing Pattern In General Surgery Patients of a ..

- An additional dose of prophylactic agent is not indicated in adults, unless there is blood loss of up to 1500 ml during surgery or haemodilution of up to 15 ml/kg.[7]

Table 1.2: Antibiotics for Treatment of Incisional Surgical Site Infections In culture confirmed cases of SSI/ soft tissue infections, antimicrobials should be based on Lab AST reports. [7]

Surgery	Common organisms	Peri-operative antimicrobial prophylaxis
Surgery of Intestinal or Genitourinary Tract	Gram Negative Bacilli, anaerobes	1st Line: Piperacillin-tazobactam 3.375 g every 6 h or 4.5 g every 8 h IV Or Imipenem-cilastatin 500 mg every 6 h IV 2nd Line (as in case of non ESBL organisms) : Ceftriaxone 1 g every 24 h + metronidazole 500 mg every 8 h IV
Surgery of trunk or extremity away from axilla or perineum	S. aureus, CONS	1st Line: Oxacillin/ nafcillin 2 g every 6 h IV Or Cefazolin 0.5–1 g every 8 h IV 2nd Line: Cefotaxime 500 mg every 6 h IV
Surgery of axilla or perineum	S.aureus, GNBs, anaerobes	1st Line: Metronidazole 500 mg every 8 h IV plus Levofloxacin 750 mg every 24 h 2nd Line: Metronidazole 500 mg every 8 h IV plus Ceftriaxone 1 g every 24 h

Table 1.3: Antimicrobial guidelines for treatment of Skin and Soft Tissue Infections. [7]

Clinical Syndrome/ condition	Most likely pathogens	Antibiotic	Comments
Impetigo and skin soft-tissue infections	Staphylococci & Streptococci	1st Line Clindamycin 300-400 mg qid PO Alternative: Amoxicillin-clavulanate 875/125 mg bid po	Local: Mupirocin ointment Apply to lesions bid
Erysipelas, Cellulitis, Necrotising fasciitis	Streptococci (usually GAS)	Penicillin 2–4 million units X 4–6 h IV or Alternative Clindamycin 600–900 mg X 8 h IV	In penicillin allergic patients: Clindamycin, vancomycin or linezolid,
Cutaneous anthrax	Bacillus anthracis	1st Penicillin G8–12 MU/day IV in divided doses every 4-6 h or Erythromycin 250 mg PO every 6 hours	
Necrotizing infections of the skin, fascia, and muscle	Mixed infections	1st Line Piperacillin-tazobactam + Vancomycin 3.37 g every 6–8 h IV+ 30 mg/kg/d in 2 divided doses Alternative Carbapenems	
Water related injuries (water sports etc)	Aeromonashydrophila Vibrio vulnificus	Doxycycline 100 mg every 12 h IV+ ciprofloxacin 500 mg every 12 h IV or Ceftriaxone 1 to 2 g every 24 h IV	

Diabetic Foot Infections			
Mild (treated with oral agents)	MSSA; Streptococcus spp	Cloxacillin/ cephalixin	
	MRSA	Linezolid, Daptomycin, Vancomycin	
Moderate (treated with oral or initial parenteral)	MSSA; Streptococcus spp;	Ceftriaxone, Ampicillin/sulbactam,	

agent) or severe (treated with parenteral agents)	Enterobacteriaceae; obligate anaerobes	Moxifloxacin, Ertapenem, Tigecycline	
---	--	--------------------------------------	--

ANALGESICS

Postoperative pain (POP) is a form of acute pain following surgery. It results from tissue injury during surgical procedure like skin incision, tissue dissection, manipulation and traction. The POP is one of the immediate postoperative complications.

The inadequate control of pain creates anxiety to patient, fear to ambulate and hence subjecting an individual to postoperative complications of which may be fatal.

Epidural analgesia is the commonest mode of analgesia used for post-operative pain often with opioid boluses by the concerned OT anesthesiologists. Managing a postoperative patient includes pain treatment.

PARACETAMOL: Paracetamol is an analgesic and an antipyretic. While it is commonly held to have little or no anti-inflammatory activity^[8]

Paracetamol inhibits both isoforms of cyclooxygenase (COX); the constitutive COX-1, and the inducible COX-2. It is a safe, well-tolerated drug with proven efficacy. Its clinical effects most likely arise from a central action, though the exact mechanisms are not yet clear. Intravenous administration provides rapid and predictable therapeutic plasma concentrations that can subsequently be maintained by oral absorption. The benefit of rectal administration is restricted by slow onset time and unpredictable bioavailability.^[9]

NSAIDS: Non-Steroidal Anti Inflammatory Drugs (NSAIDs) are commonly prescribed agents for treating pain and inflammation, over and inappropriate use of which leads to significant clinical problems.^[10] NSAIDs are safe and effective in the treatment of postoperative pain, and they should be administered to all postoperative surgical patients unless contraindicated.

OPIOID ANALGESICS: Opium and its semisynthetic and synthetic derivatives have come up to be the most effective analgesics in immediate postoperative period^[11]

According to the new guidelines, when administering opioids

- The oral route should be taken over intravenous (IV) administration, given that IV administration has not been shown to be superior.^[12]
- However, when administering acetaminophen and/or NSAIDs, IV administration may have a more rapid response.
- When the parental route is needed, IV patient-controlled analgesia (PCA) is recommended for postoperative systemic analgesia.
- However, long-acting opioids should be avoided in the immediate post-operative period.^[13] There may be some exception with patients that take them before the surgery.
- The intramuscular route also should be avoided, given its known to associate with significant pain and reduced absorption.

OTHER ANALGESICS: Dexamethasone as an anti-inflammatory corticosteroid is widely used in anaesthetic practice to prevent nausea and vomiting.^[14] Other effects include an improvement of the quality of recovery and reduced fatigue.^[15] In addition, dexamethasone in therapeutic doses reduces postoperative pain scores and opioid consumption.^[16] However, these effects are small and only statistically significant and might not be of clinical relevance.

Ketamine, Alpha-2-delta ligands (Pregabalin, Gabapentin), Alpha-2-adrenergic agonists (clonidine and dexmedetomidine) may also be used in surgical pain management.

ANTIEMETICS

Postoperative nausea and vomiting (PONV) is the second common complaint with pain being the most common. PONV is influenced by multiple factors which are related to the patient, surgery, and pre-, intra-, and post-operative anaesthesia factors.^[17]

PONV prophylaxis is administered to patients with medium and high risks based on this scoring system. Newer drugs such as neurokinin-1 receptor antagonist (aprepitant) are used along with serotonin (5-hydroxytryptamine subtype 3) receptor antagonist, corticosteroids, anti-cholinergics, anti-histaminics, and butyrophenones for PONV prophylaxis. Combination of drugs from different classes with different mechanism of action are administered for optimized efficacy in adults with moderate risk for PONV.^[17]

Table 1.4: Classification of antiemetic drugs based on receptor antagonism.

Receptor Antagonism	Antiemetic drug examples
---------------------	--------------------------

Serotonin (5 – Hydroxytryptamine subtype 3) antagonist	Ondansetron, granisetron, dolasetron, ramosetron, palonosetron, tropisetron, corticosteroids.
Anticholinergics/antimuscarinics (M)	Scopolamine.
Histamine (H ₁) antagonists	Promethazine, perphenazine, dimenhydrinate, diphenhydramine, meclizine, chlorpromazine.
Dopamine (D ₂) Antagonist	Domperidone, chlorpromazine, metoclopramide, droperidol, haloperidol.
Neurokinin – I antagonist	Aprepitant, cospitant, rolapitant.

Ondansetron Recommended dose is 4 mg IV at the end of surgery. In 2012, the US Food and Drug Administration (FDA) had recommended that single dose should not exceed 16 mg due to the risk of QT prolongation. The effect of 8 mg oral disintegrating tablet is equivalent to 4 mg IV dose. ^[18,19]

IV FLUIDS

Fluid management is an important part of overall surgical therapy. Proper administration of fluids is critical, especially in patients who undergo major surgeries such as emergency laparotomies, bowel resections and hepatectomy procedures. Body fluid composition may change in minutes or hours, resulting in impaired wound healing and homeostasis.

Types of the fluids, amount of the fluid given and timing of the administration are the main topics that determine the fluid management strategy.

Postoperative fluid management plays a key role in providing adequate tissue perfusion, stable hemodynamics and reducing morbidities related with hemodynamics.

Fluid management must be done based on the patient's body fluid status. Patients who are responsive to fluids can benefit from fluid resuscitation, whereas patients who are not fluid responsive are more likely to suffer complications of over-hydration.

TYPES OF INTRAVENOUS FLUIDS:

Intravenous fluids are classified into two main types:

- Crystalloids (consist of glucose or sodium chloride (saline) solutions)
- Colloids can be blood products, such as human albumin solution and fresh frozen plasma, or they can also be synthetic large molecules which are not able to distribute across vascular barrier such as gelatins, dextrans, and hydroxyethyl starches. ^[20]

OTHER DRUGS

MEDICATIONS GIVEN DURING SURGERY

1. **ANESTHESIA:** It may be local, regional or general Anesthesia. Based on the type of surgery.
2. Barbiturates and benzodiazepines, commonly known as “downers” or sedatives, are two related classes of prescription medications that are used to depress the central nervous system. They are sometimes used with anesthesia to calm a patient down just prior to surgery or during their recovery. Three examples of benzodiazepines sometimes used for sedation include: Lorazepam, Diazepam, Midazolam

MEDICATIONS GIVEN AFTER SURGERY (Post operative)

1. **Anticoagulants:** To prevent blood clots from forming and causing complications such as a stroke or a pulmonary embolus, anticoagulants are given through an IV, an injection, or in a pill form.

Examples: Warfarin, Heparin, Enoxaparin

2. **Symptom-Reducing Medications:** Doctor may prescribe other symptom-reducing medications to ease any discomforts associated with the surgery or with the pain medications taken (nausea and constipation are common with opioids). Examples may include:

- Acid reducers like the H-2 Blocker (Ranitidine)
- Stool softeners and stimulant laxative like Peri-Colace (docusate sodium/sennosides) ^[21]

DISCHARGE MEDICATIONS: Mainly include symptom reducing medications, such as:

- Analgesics : Mainly Paracetamol [SOS] is prescribed
- Anti-emetics : 5 HT antagonist (ondansetron) is mainly prescribed
- Acid reducers
- Stool softeners and stimulant laxative.
-

II. OBJECTIVES OF THE STUDY

The study was carried out with the following objectives:

A Prospective Observational Study on Drug Prescribing Pattern In General Surgery Patients of a ..

- To analyse the various surgical procedures in the department of general surgery.
- To study pre and post-operative antibiotic prophylaxis.
- To observe the prescription pattern of analgesics used post-operatively.
- To note the anti-emetics prescribed in general surgery patients.
- To examine the various supportive therapies used in improving patients quality of life.

III. METHODOLOGY

STUDY DESIGN:The study is prospective and observational to assess the drug prescribing pattern in the general surgery patients.

SOURCE OF DATA: Data from the Patients admitted in the department of general surgery was collected using patient data collection form designed to assess the drug prescribing pattern in the general surgery patients.

STUDY PROCEDURE

- This is a prospective observational study where patients eligible were enrolled in the study after obtaining the consent. The data collection form was prepared and used. This form mainly contains the demographic details of the patient and medication chart.
- All information relevant to the study was collected from the patient and the data was analysed using suitable method for statistical analysis.

DURATION OF THE STUDY:The study was conducted for a period of 6 months.

PLACE OF STUDY: The study was conducted at MAXCURE HOSPITAL.

STUDY CRITERIA:The study criteria was designed before collecting the case sheets of patients diagnosed and treated with diseases related to general surgery department.

INCLUSION CRITERIA

- Any Patient who has undergone surgery
- Any Patient who is under treatment with surgical plan of care

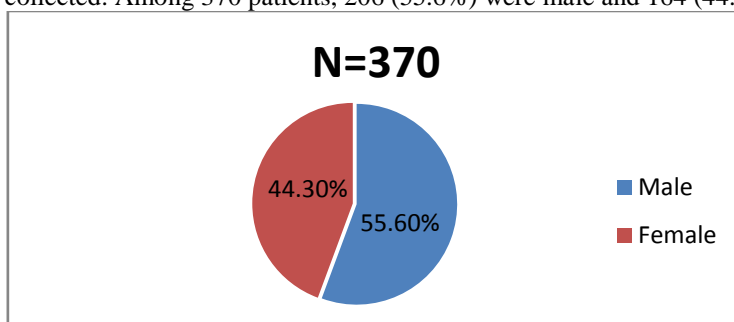
EXCLUSION CRITERIA

- Patient who doesn't have surgical history
- Patients who are under treatment without surgical plans

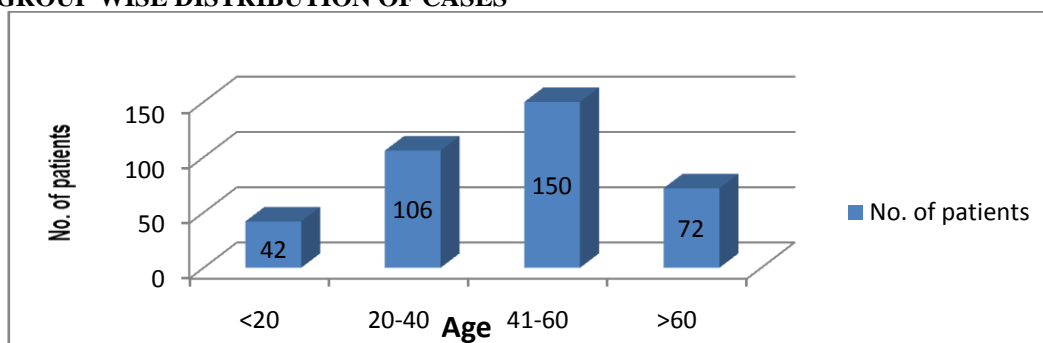
IV. RESULTS

THE PREVALENCE OF SURGICAL PROCEDURES ACCORDING TO GENDER

Total 370 cases were collected. Among 370 patients, 206 (55.6%) were male and 164 (44.3%) were female.

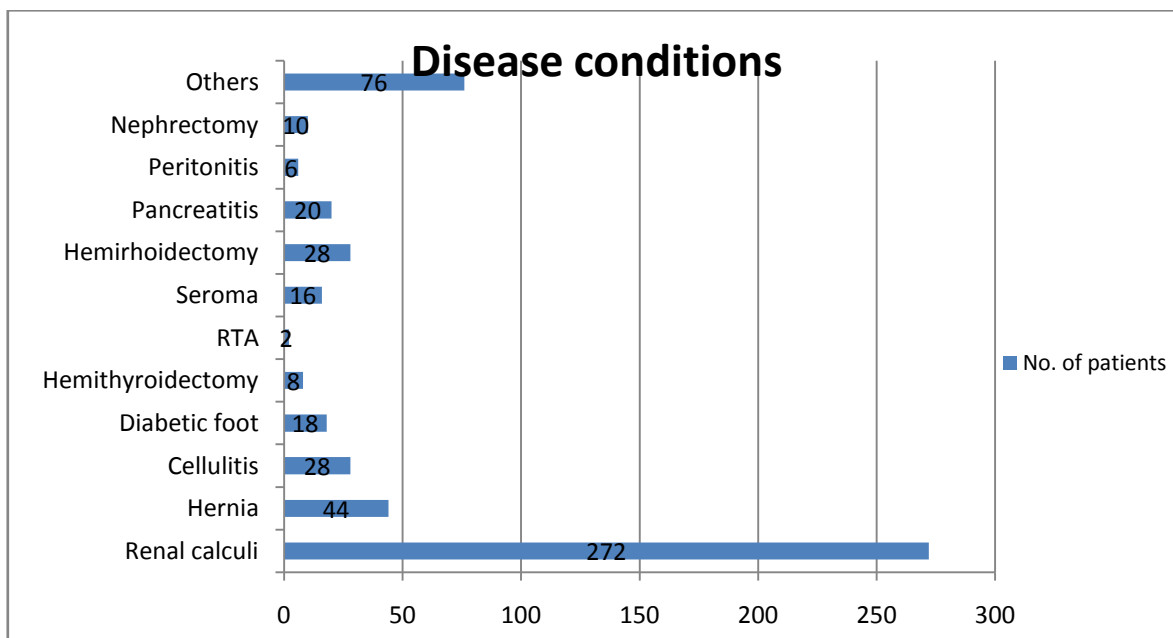


AGE GROUP WISE DISTRIBUTION OF CASES

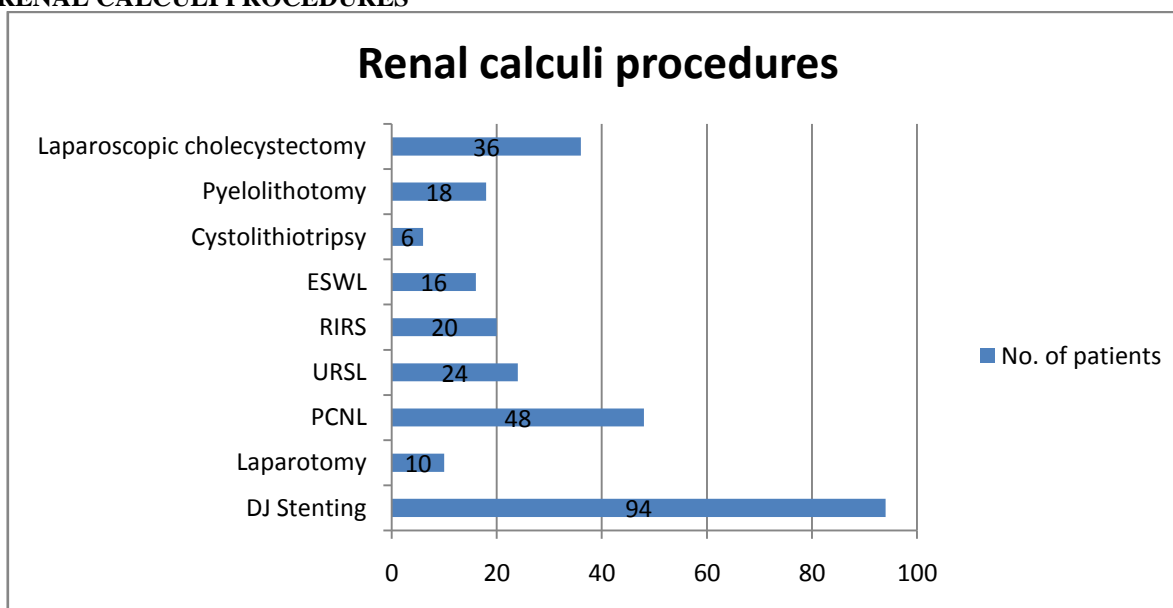


DISEASE CONDITIONS IN GENERAL SURGERY

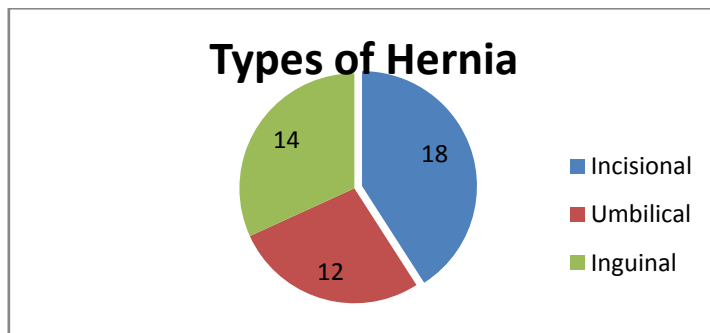
Commonest cause of hospitalization was as follows: renal calculi 272 (51.5%), hernia 44 (8.3%), cellulitis (28 (5.3%)), diabetic foot 18 (3.4%), hemithyroidectomy 8 (1.5%), RTA 2 (0.3%), seroma 16 (3%), hemirhoidectomy 28 (5.3%), pancreatitis 20 (3.7%), peritonitis 6 (1.1%), nephrectomy 10 (1.7%), others 76 (14.3%).



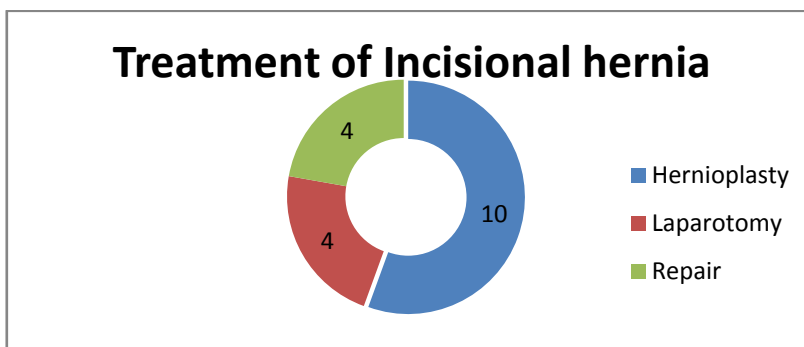
RENAL CALCULI PROCEDURES



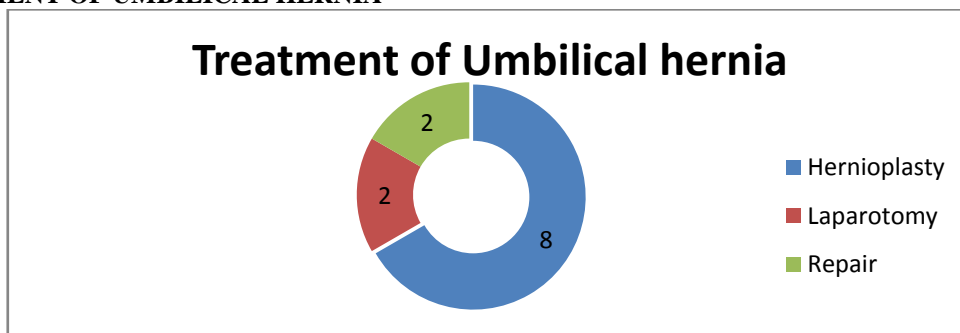
TYPES OF HERNIA



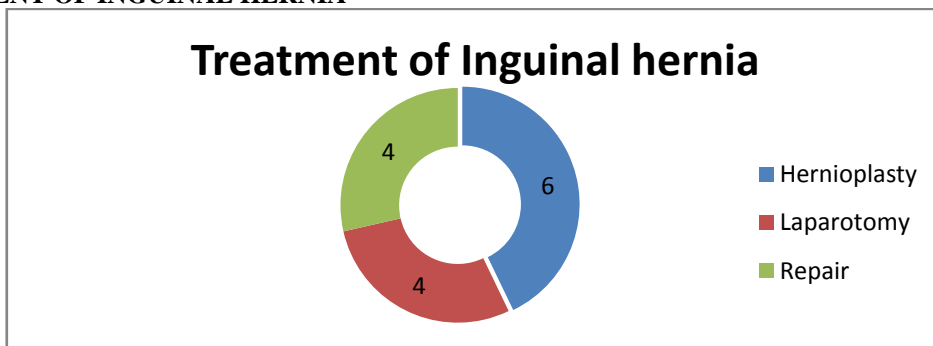
TREATMENT OF INCISIONAL HERNIA



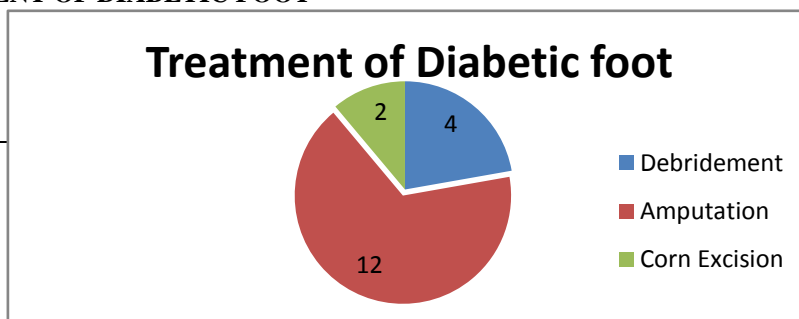
TREATMENT OF UMBILICAL HERNIA



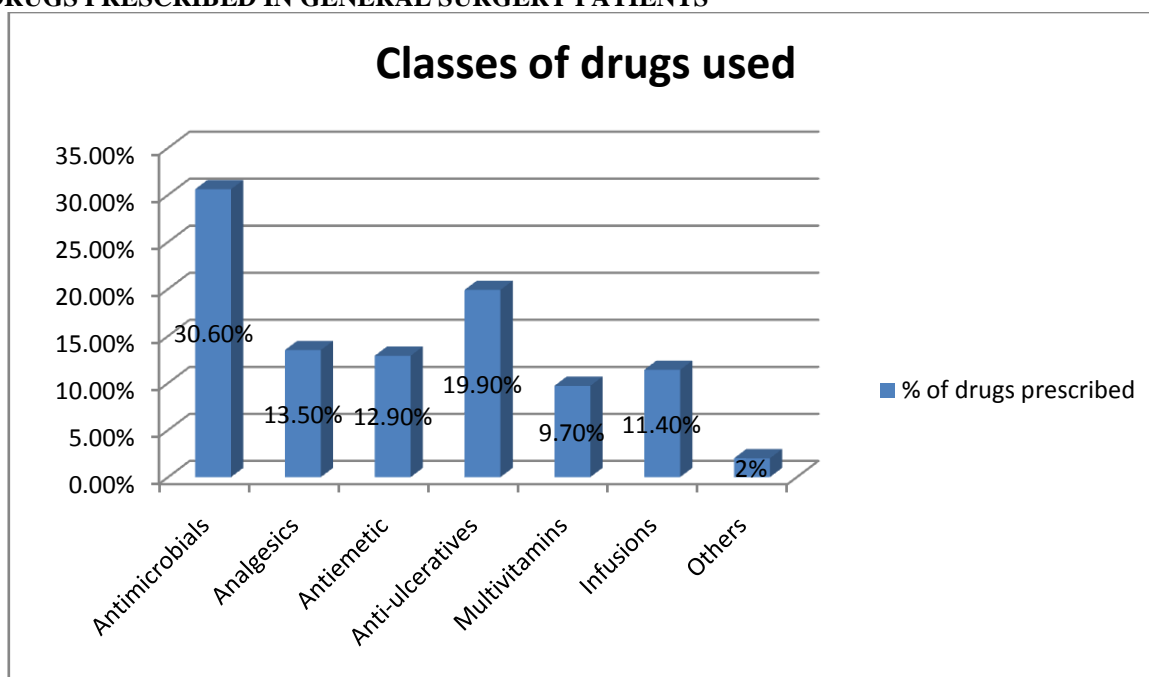
TREATMENT OF INGUINAL HERNIA



TREATMENT OF DIABETIC FOOT

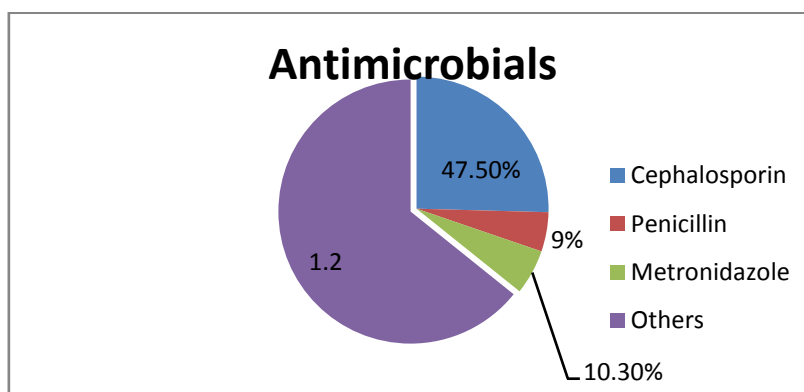


DRUGS PRESCRIBED IN GENERAL SURGERY PATIENTS



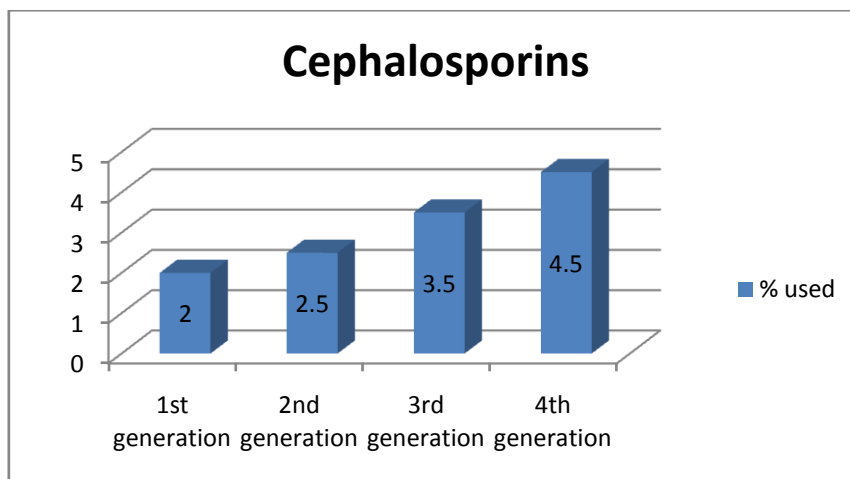
CATEGORIES OF ANTIMICROBIALS PRESCRIBED

The Most commonly used Antimicrobials were, Cephalosporin(47.5%), Penicillins (9%), Metronidazole (10.3%) and others (33%).



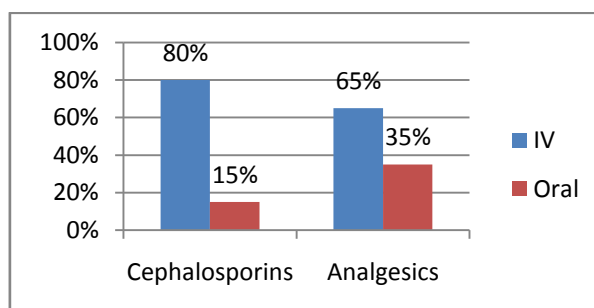
CEPHALOSPORINS PRESCRIBED

Among cephalosporin, first generation was used for about 2%, second generation 8.8%, third generation 83.6% and fourth generation about 5.4%.



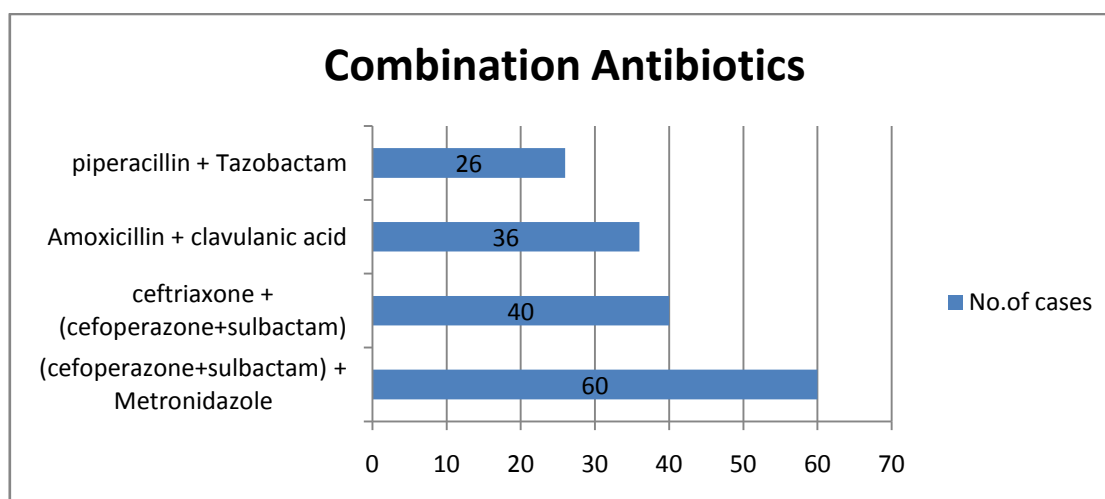
ROA OF CEPHALOSPORIN AND ANTIBIOTICS

Most preferred route of administration for cephalosporin antibiotics were, IV 250(80%) followed by oral 44(15%). Most preferred route of administration for Analgesics is IV (65%) followed by oral (35%).



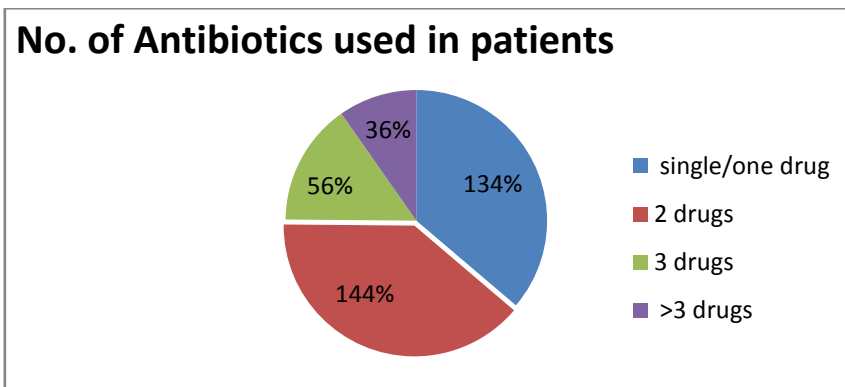
COMBINATION OF ANTIBIOTICS USED

Combination antibiotics were used in 162 cases, the most common was (cefoperazone+sulbactam) + Metronidazole in about 60 (37%) cases, ceftriaxone + (cefoperazone+sulbactam) in 40 (25%), Amoxicillin + clavulanic acid in 36 (22%) and piperacillin + Tazobactam in 26 (16%).

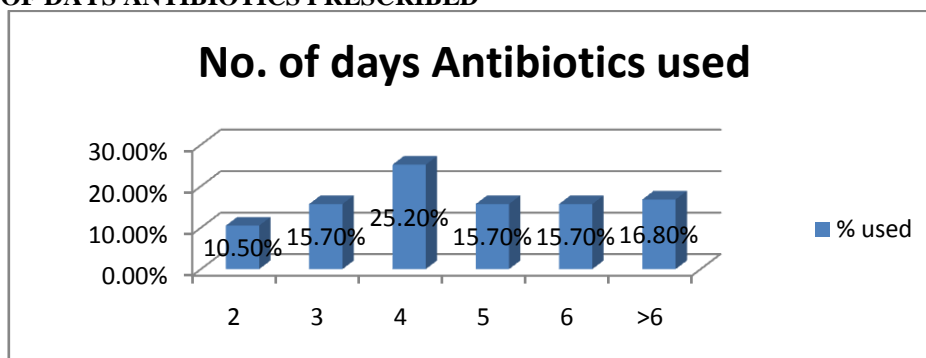


NUMBER OF ANTIBIOTICS PRESCRIBED PER PATIENT

Among 370 patients, 1 Antibiotic was prescribed to 134 (36.2%) patients, 2 Antibiotics in 144 (38.9%), 3 Antibiotics in 56 (15.1%) and >3 Antibiotics in 36 (9.7%).

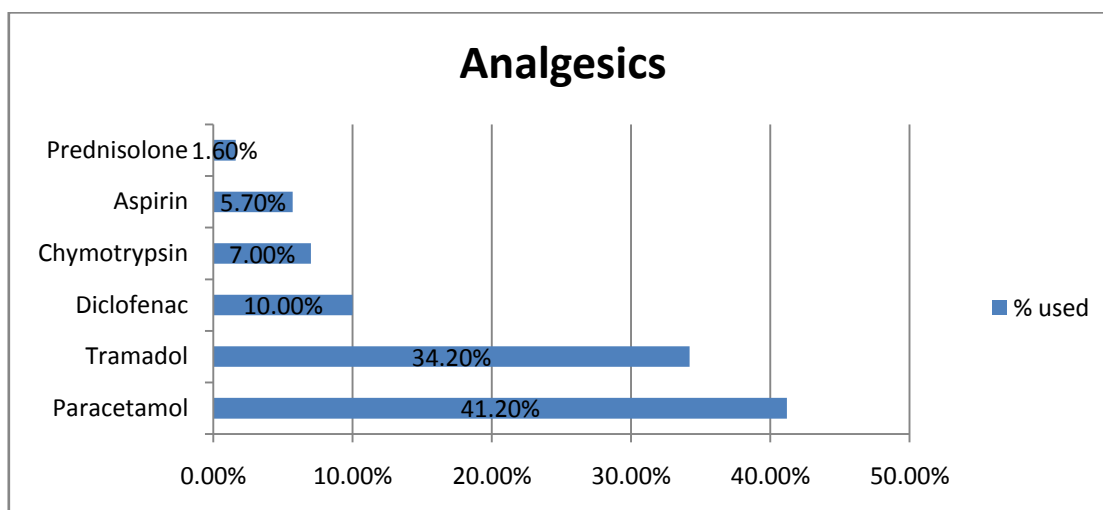


NUMBER OF DAYS ANTIBIOTICS PRESCRIBED



CATEGORIES OF ANALGESICS USED

Among Analgesics, most commonly used were, Paracetamol (41.2%), Tramadol (34.2%), Diclofenac (10%), chymotrypsin (7%), Aspirin (5.7%) and prednisolone (1.6%).



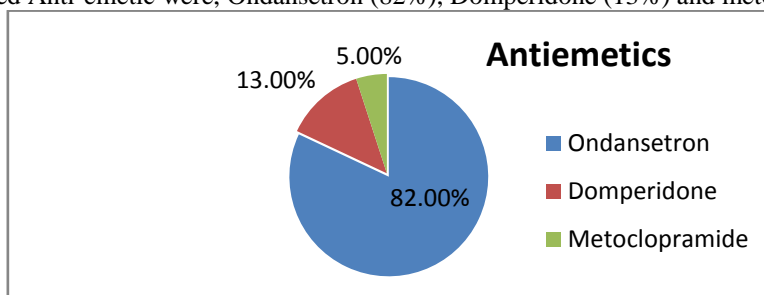
NUMBER OF ANALGESICS PRESCRIBED

Analgesics	%
1	44.5
2	38.6

>2	16.7
----	------

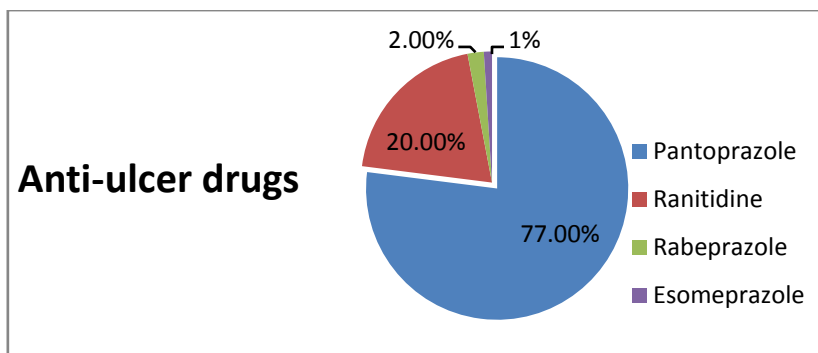
TYPES OF ANTI-EMETICS GIVEN

Most commonly used Anti-emetic were, Ondansetron (82%), Domperidone (13%) and metoclopramide (5%).



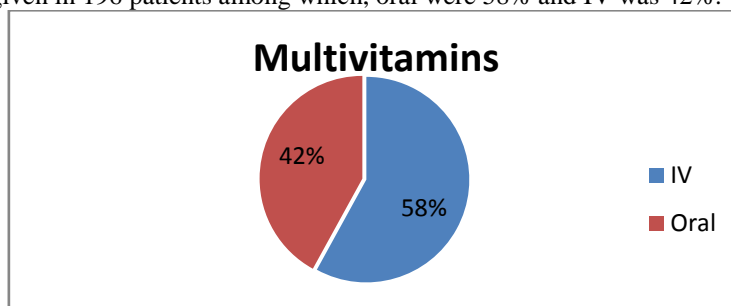
ANTI-ULCER DRUGS PRESCRIBED

Anti-ulcer drugs prescribed mainly include, Pantoprazole (77%), Ranitidine (20%), Rabeprazole (2%) and Esomeprazole (1%).



MULTIVITAMINS PRESCRIBED

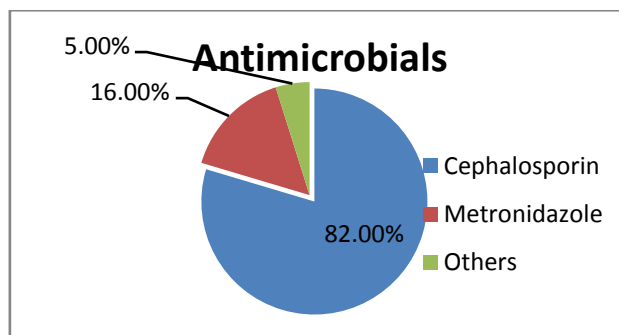
Multivitamins were given in 196 patients among which, oral were 58% and IV was 42%.



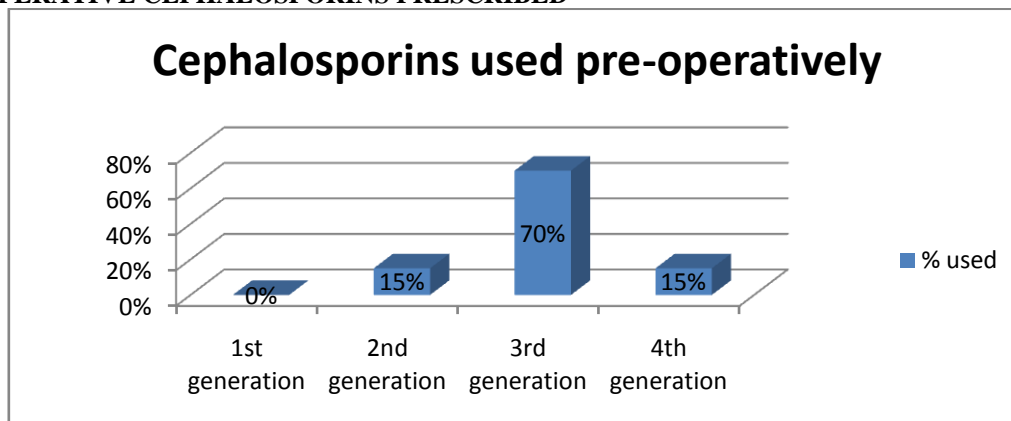
NUMBER OF DAYS ANTIMICROBIALS GIVEN PRE-OPERATIVELY

No. of days	%
1	42.1
2	37.2
3	17.2
>3	3.2

ANTIMICROBIALS USED PRE-OPERATIVELY



PRE-OPERATIVE CEPHALOSPORINS PRESCRIBED



V. DISCUSSION

- In this study we observed that majority of cases were of males 55.6% and 44.3% were of females. Similar preponderance was noted in a study.^[22]
- Most of the cases noted were between 41-60 (40%) years of age followed by 20-40 (28.6%) years of age. Least number of cases were found in >60 (19.4%) and <20 (11.3%) years of age.
- Disease patterns in this study were Renal calculi (51.5%), Hernia (8.3%), pancreatitis (3.7%) followed by others. Or findings are in consonance with other studies.^[3,22] Among Renal calculi patients the most common procedure done was DJ Stenting (25.4%), PCNL (12.9%) followed by others. Excess cases of renal calculi might be due to lack of awareness to get early medical help.
- Average number of drugs per encounter was 5.45. Similar result was interpreted in a study.^[3]
- In the studied population Antimicrobials (30.6%) were most commonly used, Analgesics (13.5%), followed by anti-ulcerative (19.9%), anti-emetics (12.9%) and others. The prescribing pattern of drugs was in consonance with other studies.^[3,22,23]
- Average number of antibiotics prescribed per prescription was 1.6. Salman MT et.al. Noted the average number of antibiotics per prescription as 2.2.^[23]
- The most commonly used antimicrobial was cephalosporins (47.5%), Metronidazole (10.3%) followed by others. Similar results were interpreted in other studies.^[22,25]
- Among cephalosporins, most commonly used were third generation (83.6%) similar results were interpreted in one study.^[23]
- For surgical prophylaxis, international guidelines recommend the use of first and second generation cephalosporin rather than 3rd and 4th generation and also other higher Antimicrobials are used.^[24]
- Use of two antimicrobial agents was also common which matched the findings as observed by Khade, et al.^[3]
- Antimicrobial use and combination of (cefoperazone+sulbactam) + metronidazole was most common followed by ceftriaxone + (cefoperazone+sulbactam), amoxicillin + clavulanic acid and piperacillin + tazobactam. Khade, et al observed combination of penicillin with beta-lactamase inhibitors followed by fluoroquinolones and third generation cephalosporins was common.^[3]
- The most commonly used analgesics were paracetamol (41.2%), tramadol (34.2%), diclofenac (10%) and others. Analgesics are required to manage pain due to disease or operative procedures. Patients in surgical wards have post-operative or inflammatory pain etc.

A Prospective Observational Study on Drug Prescribing Pattern In General Surgery Patients of a ..

- Opioid analgesics such as tramadol may be helpful to manage the pain. There is an advantage of tramadol over other opioid analgesics such as decreased chance of respiratory depression, dependence, abuse etc.^[26]
- The most commonly used anti-emetic was ondansetron (82%) as it is highly effective and possesses low side effect profile. The findings is in consonance with other study.^[22]
- Most common anti-ulcer drugs prescribed were pantoprazole (77%) and ranitidine (20%). Pantoprazole and ranitidine were the most extensively prescribed drugs among anti-ulcer drugs in a similar study.^[25]
- In our study multi-vitamins were prescribed for about 9.7% which matched the findings as observed by Kumar R *et.al* (10%).^[25]

VI. CONCLUSION

The research carried out was an observational study conducted to assess the surgery diseases, surgical procedures and pattern of drug prescription.

Patient with surgical diseases require more than one medication post operatively to prevent wound infection and to relieve pain. Renal calculi (51.5%) was the most common surgical disease noted. Followed by Hernia (8.3%). DJ Stenting (25.4%) was the most common surgical procedure done.

Majority of drugs prescribed were mainly Antimicrobials (30.6%) followed by Analgesics (13.5%), Anti-ulcer (19.9%), Antiemetic (12.9%). Among Antimicrobial agents, cephalosporin (47.5%) was mainly prescribed. Paracetamol (41.2%) was the most commonly used analgesic followed by Tramadol (34.2%). Ondansetron (82%) and Pantoprazole (77%) were the leading drugs used among anti emetic and anti ulcer drugs.

Average number of drugs per encounter was 5.45. Average number of antibiotics prescribed per prescription was 1.6. International guidelines indicates the use of 1st and 2nd generation cephalosporin rather than 3rd and 4th generation. There is a need to take steps to improve prescribing pattern as per international guidelines, especially cephalosporin antibiotics which is prescribed prophylactically.

ACKNOWLEDGEMENT

We express our deep sense of gratitude and indebtedness to our esteemed teacher and guide Dr. Nuzhath Irfana Mam, Pharm D, Assistant Professor, Department of Pharmacy Practice, Nizam Institute of Pharmacy, for her guidance, encouragement, inspiring advices and moral support in carrying out the study. It has been an honour and privilege for us to work under her guidance.

REFERENCES

- [1]. Jennifer Whitlock, RN, MSN, FN. What Is General Surgery? American Board of Surgery. Training and certification. Web. 2017. American College of Physicians. General surgery. Web. 2017. Updated October 28, 2018
- [2]. Haley RW. The scientific basis for using surveillance and risk factor data to reduce nosocomial infection rates. *J Hosp Infect.* 1995;30(Suppl):3–14. [PubMed]
- [3]. A Khade, MSM Bashir, and ASheethal. Prescription Pattern in the Department of Surgery in A Tribal District Hospital of Andhra Pradesh, India. *Ann Med Health Sci Res.* 2013 Jul-Sep; 3(3): 438–441.
- [4]. Khyati Patel and ShilpaJadav. Drug prescribing pattern in surgical wards of a tertiary care hospital. M P Shah Medical College, Gujarat, ScientificTracks Abstracts-Workshop: *J Pharma Care Health Sys,* 7(8):1587-1592
- [5]. Manipal international patient care, general surgery, <https://www.manipalinternationalpatientcare.com/our-specialities/general-surgery>
- [6]. BP Satish Kumar, PrayasGhimire, Praveen Kumar, B Anjaiah. A Study on drug use pattern using WHO Prescribing indicators in inpatients of medicine department in a rural tertiary care teaching hospital. Vol 5, Issue 05, 2015. ISSN NO: 2231-6876
- [7]. Supriyakashyap ICMR Antimicrobial guidelines for prophylaxis and treatment of Surgical Site Infections.
- [8]. Rang H, Dale M, Ritter J, Flower R. *Rang and Dale's Pharmacology*, 6th edn. London: Churchill Livingstone, 2007.
- [9]. C.D Oscier, Q.J.W Milner; Peri-operative use of paracetamol, published: 05 December 2008. Vol 64, Issue 1.
- [10]. Maheshwari, N &Wagh, R.J. &Chincholkar, A.S. & Gupta, Manjeeta. (2015). Prescription pattern monitoring of non-steroidal antiinflammatory drugs in urban health centre in talegaon: A retrospective study. *International Journal of Pharma and Bio Sciences.* 6. P596-P602.
- [11]. GR Hamilton, TF Baskett. In the arms of Morpheus the development of morphine for postoperative pain relief. *Can J Anaesth.* 2000; 47(4):367–74.

- [12]. Ruetzler K, Blome C, Nabecker S, et al. A randomized trial of oral versus intravenous opioids for treatment of pain after cardiac surgery. *J Anesth*. 2014;28:580-586.
- [13]. U.S. Food and Drug Administration: Extended Release - Long Acting Opioid Analgesics. Available at: <http://www.fda.gov/Safety/MedWatch/SafetyInformation/ucm396503.htm>. Accessed February 6, 2016.
- [14]. De Oliveira GS Jr, Castro-Alves LJ, Ahmad S, Kendall MC, McCarthy RJ. Dexamethasone to prevent postoperative nausea and vomiting: an updated meta-analysis of randomized controlled trials. *AnesthAnalg* 2013; 116:58–74.
- [15]. Murphy GS, Szokol JW, Greenberg SB, Avram MJ, Vender JS, Nisman M, Vaughn J. Preoperative dexamethasone enhances quality of recovery after laparoscopic cholecystectomy: effect on in-hospital and postdischarge recovery outcomes. *Anesthesiology* 2011; 114:882–90.
- [16]. Waldron NH, Jones CA, Gan TJ, Allen TK, Habib AS. Impact of perioperative dexamethasone on postoperative analgesia and side-effects: systematic review and meta-analysis. *Br J Anaesth* 2013; 110:191–200.
- [17]. SafiyaImtiazShaikh, D. Nagarekha, GanapatiHegade, and M. Marutheesh. Postoperative nausea and vomiting: A simple yet complex problem. *Anesth Essays Res*. 2016 Sep-Dec; 10(3): 388–396.
- [18]. Grover VK, Mathew PJ, Hegde H. Efficacy of orally disintegrating ondansetron in preventing postoperative nausea and vomiting after laparoscopic cholecystectomy: A randomised, double-blind placebo controlled study. *Anaesthesia*. 2009; 64:595–600.
- [19]. Hartsell T, Long D, Kirsch JR. The efficacy of postoperative ondansetron (Zofran) orally disintegrating tablets for preventing nausea and vomiting after acoustic neuroma surgery. *AnesthAnalg*. 2005; 101:1492–6.
- [20]. SelamiIlgazKayilioglu, TolgaDinc, [...], and FarukCoskun. Postoperative fluid management. *World J Crit Care Med*. 2015 Aug 4; 4(3): 192–201. Published online 2015 Aug 4.
- [21]. Jennifer Whitlock, Common Medications Before, During, and After Surgery. Updated November 25, 2018
- [22]. <https://www.verywellhealth.com/drugs-used-before-during-and-after-surgery-3156830>
- [23]. Khyati Patel and ShilpaJadav. Drug prescribing pattern in surgical wards of a tertiary care hospital in western part of India. *Int J Basic ClinPharmacol*. 2018 Aug;7(8):1587-1592.
- [24]. Salman MT, Akram MF, Rahman S, Khan FA, Haseen MA, Khan SW. Drug Prescribing Pattern in Surgical Wards of a Teaching Hospital in North India. Vol. 5, No. 2 (2008-05 - 2008-06). ISSN : 0973-516X
- [25]. Bratzler DW, Houck PM. Antimicrobial prophylaxis for surgery: An advisory statement from the National Surgical Infection Prevention Project. *Am J Surg*. 2005; 189:395–404.
- [26]. Kumar R *et.al* An in-depth study of drugs prescribing pattern in the Surgery Department of a Tertiary Care Teaching Institute in Northern India. *Int J Basic ClinPharmacol*.doi: 10.5455/2319-2003.ijbcp20140824, 2014 Aug;3(4):681-686
- [27]. Chaturvedi S, Chaturvedi A. Postoperative pain and its management. *Indian J Crit Care Med*. 2007; 11:204-11.