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Original Research Article

A cross-sectional study on drug utilization evaluation in urology department of a tertiary care hospital

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Abstract

Background: Urology department is a surgical specialty department which provides health care that deals with diseases of the male and female urinary tract (kidneys, ureters, bladder and urethra. It is a cross-sectional study which aims to study the Drug Utilization Evaluation in the Urology Department and to assess the individual and potential synergistic effects of medicine used. Drug Utilization Evaluation (DUE) is an ongoing, systematic quality-improvement activity that is designed to ensure the effective and appropriate use of medicines which involves monitoring of Drug dose adjustments, inappropriate duration of drug treatment, therapeutic interchange, or generic substitution which are often addressed during the duration of therapy.

Materials and Methods: It is a cross-sectional study which was carried out among 323 in-patients in a tertiary care hospital, Bangalore. After obtaining approval from the Institutional Ethics Committee SIMS & RC / EC-10/RR-07/2024-25, Patients above 18 years admitted to the urology department and diagnosed with the urological disorders were included in the study. The data were collected from the patient case profile and prescriptions and noted in a self-designed data collection form. The statistical analysis of the collected data was performed using excel and SPSS software.

Results: The study analyzed 323 urology cases, revealing a significant male predominance (67.5%) and the highest age group represented was 29–38 years (22.3%). Benign Prostate Hyperplasia (BPH) was the most common urological disorder, affecting 15.78% of patients. Out of 323 cases, 189 patients are found with co-morbidities, Type-2 Diabetes Mellitus (43.39%) and Hypertension (40.21%) were most prevalent. Patients typically stayed an average of 4.38 days in the hospital, with 79.3% reporting treatment as effective. Preoperative medications primarily included PPIs and cephalosporins, while post-operative care also emphasized PPIs. The average number of medications prescribed in Pre-operative therapy is 66.38% while in Post-operative therapy is 68.30% which indicate significant polypharmacy. Notably, 15 Drug-Drug Interactions and 17 medication errors were identified, highlighting the need for improved medication management in the study.

Conclusion: The study highlights the complexity of managing urological patients with prevalent co-morbidities like diabetes and hypertension, emphasizing the need for careful drug management due to frequent polypharmacy. Notable drug-drug interactions and adverse reactions underline the importance of personalized care and vigilant monitoring. The focus on essential medicines and effective treatments, particularly in pre- and post-operative care, demonstrates the department's commitment to evidence-based, efficient urological care, ultimately improving patient safety and treatment outcomes.

Keywords: Drug Utilization Evaluation, Benign Prostate Hyperplasia, co-morbidities, World Health Organization

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1. Introduction

Drug Utilization Evaluation (DUE) is an ongoing, systematic quality-improvement activity designed to ensure the effective and appropriate use of medicines. It involves reviewing drug use or prescribing patterns, providing feedback to clinicians and other relevant groups, developing criteria and standards to describe optimal drug use, and promoting appropriate drug use through education and other interventions.[1] The aims of DUE include reducing drug and health-related treatment costs, improving the quality of medical treatment and health-related quality of life, decreasing medication-related

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problems and errors, and enhancing prescriber awareness and practices. By providing a comprehensive review of a patient's health and medication history before, during, and after dispensing medicines, DUE optimizes patient outcomes, ensures quality assurance, facilitates corrective actions, and evaluates healthcare services. It helps improve patient care, therapeutic outcomes, prevent adverse drug reactions, and reduce inappropriate pharmaceutical expenditures, ultimately promoting better healthcare services.[2]

The DUE process involves monitoring aspects like drug dose adjustments, inappropriate treatment duration, therapeutic interchange, or generic substitution during therapy. It also addresses misuse, abuse, drug-drug interactions, drug-disease contraindications, and drug-patient precautions, including considerations for age, allergies, and pregnancy. By identifying the overuse or underuse of medicines, DUE promotes rational drug use. According to the World Health Organization (WHO), drug use evaluation focuses on the marketing, distribution, prescription, and use of pharmaceuticals, with medical, social, and economic implications.[3] WHO recommends a physician-to-population ratio of 1:1000, but India, with a population of 1.38 billion, falls short with a ratio of 0.68 doctors per 1000 people, indicating a need for 4.3 lakh additional doctors to meet global standards.[4]

DUE promotes rational drug use in populations and individual patients by providing information to improve prescribing habits, analyzing prescribing patterns, patient symptoms, laboratory investigations, and addressing drug-related problems like adverse drug reactions and drug interactions. DUE programs assist healthcare organizations in understanding, assessing, and improving medication use. Prescribing indicators such as the percentage of medications prescribed by generic names, average number of medicines per prescription, percentage of antibiotics and injectables prescribed, and adherence to the national Essential Drug List help assess prescriber performance and reduce irrational practices.

DUE can be classified into three types: prospective, concurrent, and retrospective. Prospective DUE involves evaluating pharmacological therapy before prescribing to prevent potential problems like drug interactions or therapy duplication. Concurrent DUE monitors medication use while the patient is undergoing treatment, enabling timely interventions in cases of drug-drug interactions, incorrect dosages, or overuse. Retrospective DUE analyzes past medication schedules to identify patterns and provide insights for future healthcare improvements, particularly for patients with special conditions like diabetes, hypertension, asthma, or pregnancy.

The steps in the DUE process include establishing responsibilities, defining objectives, developing criteria for medicine review, collecting and analyzing data, providing prescriber feedback, implementing corrective actions, and re-evaluating to ensure continuous improvement. These steps help identify and address challenges, promote safe and effective prescribing, and ultimately enhance healthcare quality.

In the context of the urology department, DUE is particularly relevant. Urology encompasses a wide range of clinical problems, including diseases of the urinary tract and male reproductive organs. The urinary system, comprising the kidneys, ureters, bladder, and urethra, plays a critical role in waste removal and fluid regulation. Common urologic conditions include urinary tract infections (UTIs), kidney and ureteral stones, benign prostatic hyperplasia (BPH), urinary incontinence, erectile dysfunction, and prostatitis. UTIs are caused by pathogenic bacteria or viruses and are more common in women. Symptoms include burning during urination, frequent urges to urinate, and back pain. Treatment typically involves antibiotics. Kidney stones, formed from dissolved minerals in urine, can cause severe pain if lodged in the ureter. They are treated with medical or surgical interventions such as extracorporeal shock wave lithotripsy (ESWL).[5-13]

BPH is characterized by an enlarged prostate gland, commonly seen in older men, causing difficulty in urination and incomplete bladder emptying. Alpha blockers are the first-line treatment, with surgery required in severe cases. Urinary incontinence, the loss of bladder control, can result from diabetes, pregnancy, weak muscles, or diseases like Parkinson's. Erectile dysfunction, commonly seen in older men, can be caused by stress, lifestyle factors, or aging, impacting mental and relational well-being. Prostatitis, involving inflammation of the prostate gland, can lead to urinary difficulties and discomfort.[14-14] By implementing DUE in the urology department, healthcare providers can enhance medication management, improve therapeutic outcomes, and ensure cost-effective and patient-centered care.

2. Aim

This cross-sectional study aims to study the Drug Utilization Evaluation in the Urology Department and to assess the individual and potential synergistic effects of medicine used.

3. Objectives of Study

The objectives of the study are

3.1. Primary objective

To study the Drug Utilization Evaluation in Urology department.

4. Secondary Objectives

1. To assess the prevalence of different medication used in patient with documented renal diseases, indications for use, dosage forms, duration of therapy, and patient outcomes related to medication.

2. To identify co-morbidity conditions and risk factors of patients with renal diseases and opportunities for improvement within the tertiary care hospital setting.
3. To assess the quality of life of patient.

5. Materials and Methods

5.1. Study design

It was a cross-sectional study.

5.2. Site of study

The study was conducted at SIMS & RC / EC-10/RR-07/2024-25, Bangalore.

5.4. Inclusion criteria

Patients above 18 years admitted to the Urology Department.
Patients with urological diseases along with other co-morbidities.

5.5. Exclusion criteria

Patients with incomplete data.
Pregnant and lactating women.
Patients with HIV infection.

5.6. Source of data collection and materials

Patient case sheets.
Patient profile forms.
Patient medication treatment charts.
Nursing charts.

5.7. Method of data collection

Patients who visited the Urology Department were approached and convinced to take part in the study.
The data required for the study were collected by reviewing the prescription lists, patient case sheets, nursing charts, medication histories, and medical records in a self-designed data collection form.
Selected patients were observed and assessed for outcomes.
Descriptive analysis was performed, describing demographic details, medication prevalence, and prescribing patterns of medicines.
The data collected were entered into Microsoft Excel.
The association between medication use and outcomes was determined using statistical tests like Chi-square and t-tests.

5.8. Study procedure

The study was a cross-sectional study.
Patients who were admitted with renal diseases were monitored.
Patient case sheets, progress charts, medication charts, and lab data were collected.
Selected patients were monitored for the presence of any co-morbidities, and the risk factors were assessed.
Statistical evaluation of the data was performed to determine the final results using Microsoft Excel.

5.9. Duration of study

The study was conducted over a period of 6 months.

5.10. Has ethical clearance been obtained from your institution?

Ethical approval for the study was obtained from the Ethical Committee of SIMS & RC / EC-10/RR-07/2024-25.

6. Results

6.1. Age distribution

Table 1: Age distribution

Age	Frequency	Percent
18	4	1.2 %
19 - 28	36	11.1 %
29 - 38	72	22.3 %
39 - 48	48	14.9 %
49 - 58	47	14.6 %
59 - 68	55	17.0 %
69 - 78	43	13.3 %
79 - 88	18	5.6 %
Total	323	100 %
Average Age	**40.375**	

Out of 323 cases, the different age group is displayed in the data. With 72 individuals (22.3% of the total), the 29–38 age group had the highest frequency. With only 4 individuals (1.2%), the group <= 18 years old has the lowest frequency. There are significant concentrations in the 29–38 age range, and the distribution is well balanced. The demographic distribution within the sample is highlighted in this overview.

7. Gender Distribution

The analysis of the participant data revels that male represent higher percentage of admission compared to female. Out of 323 cases, 218 patients occupying 67.5% were males, making up the majority whereas 105 patients were females occupying 32.5%.

Table 2: Gender distribution

Gender	Frequency	Percentage
M	218	67.5%
F	105	32.5%
Total	323	100%

8. Patient's Diagnosis

Out of 323 cases, the most frequent urological disorder is Bening prostate hyperplasia (BPH), which has affects 51 patients (15.78%), 36 patients (11.14%) had ureteric calculus, 24 patients (7.43%) had renal calculi. Vesico

ureteric junction calculus (VUJ calculus), phimosis, Urinary tract infection (UTI) and stricture urethra, pyelonephritis, urinary retention, staghorn calculus, prostate cancer, epididymitis, vesical calculi, pyocele, bilateral obstructive uropathy are seen to be least frequent.

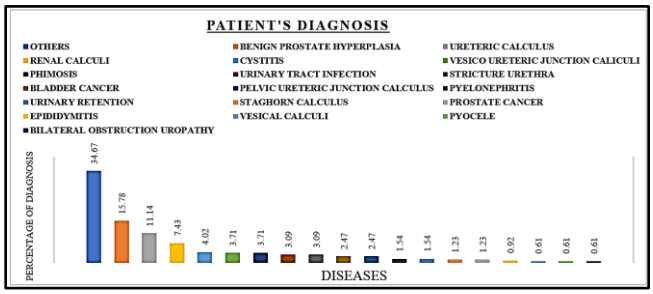

Figure 1: Patient's diagnosis

9. Patients With Co-Morbidities

Out of 323 patients, 189 patients have co-morbidities. Type-2 diabetes mellitus (T2DM) is the common co-morbidity which is found in 82 cases (43.39%), while 76 (40.21%) have Hypertension (HTN), 17 (8.99%) have ischemic heart disease (IHD), 6 (3.17%) have hypothyroidism, 2 patients (1.06%) are having Urinary tract infections (UTIs), chronic kidney disease (CKD) and HTN with T2DM both affect three people each (1.59%).

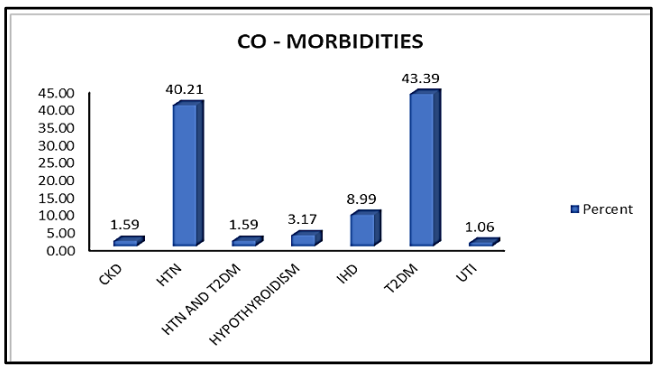

Figure 2: Percentage of patient's co-morbidities

10. Average Length of Hospital Stay

The duration of hospital stays varies significantly, with the majority of patients staying for 4 days (76 instances), followed by 3 days (75 instances) and 5 days (46 instances). Shorter stays include 1 day (10 instances) and 2 days (41 instances). Longer stays include 10 days (3 instances), 14 days (2 instances) and 15 days (1 instance), 13 days (1 instance). The average day stayed by patients is 4.38 days.

Table 3: Average length of hospital stay

No of days	No. of patients stay
1 DAY	10
10 DAYS	3
11 DAYS	2
13 DAYS	1
14 DAYS	2
15 DAYS	1
2 DAYS	41
3 DAYS	75
4 DAYS	76
5 DAYS	46
6 DAYS	31
7 DAYS	13
8 DAYS	17
9 DAYS	5
Total no. of subject	323
Total no. of days	1417 Days
Average days stay	4.38 Days

11. Therapeutic Effectiveness

The treatment given in the urology department is efficient. The result shows 256 patient (79.3%) reported the therapy as effective, while the 67 patients (20.7%) found it partially effective.

Table 4: Therapeutic effectiveness of therapy

Therapeutic effectivenss	No' of patient	Percentage
Effective	256	79.3
Partially effective	67	20.7
Total	323	100

12. Class of Drugs Prescribed for Pre-Operative

The information shows the distribution of different drug classes that are prescribed in the urology department prior to surgery. PPIs (20.61%) and cephalosporins (20.03%) are the most commonly recommended medications, demonstrating their important significance in preoperative treatment. Moreover, often used are 5HT3 Receptor Blockers (11.96%) and Benzodiazepines (10.01%). Less frequently recommended are alkalinizing agents (1.26%) and alpha blockers (1.17%). There are 2,057 medication prescriptions written in all.

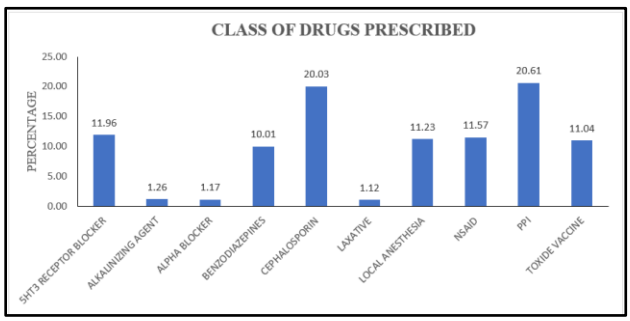

Figure 3: Percentage of class of drugs prescribed for pre-operative

13. Class of Drugs Prescribed for Post-Operative

Proton pump inhibitors (PPI) account for the majority of post-operative therapy with 22.5%, followed by non-opioid analgesics at 20.1%. Cephalosporins come in second at 18.1%, then benzodiazepines at 13.6% and 5HT3 receptor blockers at 9.4%. Opioid analgesics (1.9%) and calcium channel blockers (1.6%) are less common medications.

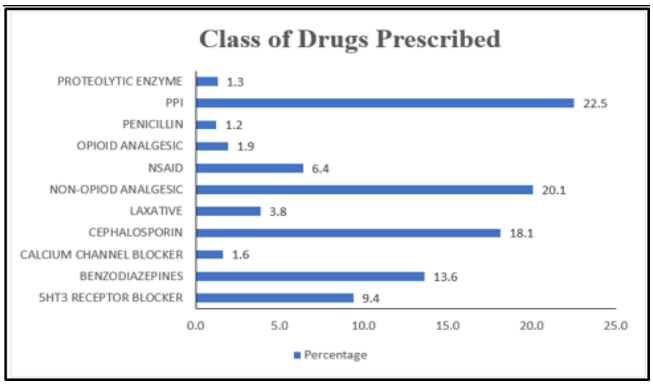

Figure 4: Percentage of class of drugs prescribed for post-operative

14. Number of Prescription According to Who Prescribing Indicator

14.1. For pre-operative

The average number of medications prescribed in the urology department is 66.30%, which indicates a significant amount of polypharmacy. In 21% of cases, antibiotics are prescribed, whereas injections are prescribed in 79.20% of cases. In 40% of cases, prescriptions are written under their generic names, while an astounding 98% of medications come from necessary medicines. The figures emphasize the importance of injections in preoperative treatment and the department's focus on essential medications.

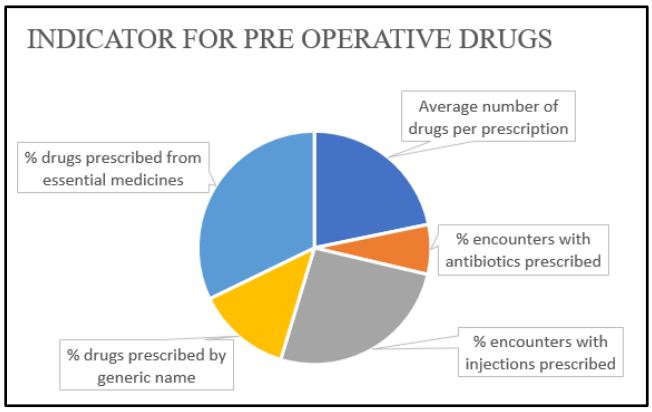

Figure 5: % of Prescribing Indicator for Pre-op

14.2. Post-operative

The average number of prescriptions for medications for post-operative care is 68.30%. In 38% of the cases, an antibiotic prescription is given, and in 79% of the cases, an injection is given. 45% of prescriptions are for generic names, and the remaining 99% are for necessary medications.

Table 5: Prescription according to WHO indicator for post-op

Indicator	Value in percentage
Average number of drugs per prescription (8)	68.30%
% encounters with antibiotics prescribed	38%
% encounters with injections prescribed	79.00%
% drugs prescribed by generic name	45%
% drugs prescribed from essential medicines	99%

15. Drug Prescribed by Brand and Generic Name

The most commonly prescribed brand-name medications in the dataset are INJ. PAN and INJ. PCT (136 each), whereas TAB. Pantoprazole (280) and Tab. Paracetamol (264) are the most commonly prescribed generic-name medications. There are 1,085 brand-name medications and 1,157 generic-name medications in overall frequency.

Table 6: Drugs prescribed according to brand name and generic name.

According to brand name and generic name drugs prescribed			
Most drugs prescribed in brand name	**No. of drugs**	**Most drugs prescribed in generic name**	**No. of drugs**
Inj. Axobactam	85	Tab. Alprazolam	175
Inj. Cefomax	101	Inj. Cefoperazone + sulbactum	46
Inj. Dollwin aq	39	Inj. Ceftriaxone	125
Inj. Emeset	115	Tab. Diclofenac sodium	64
Inj. Pan	136	Syp. Liquid paraffin	33
Inj. Pct	136	Inj. Ondansetron	121
Inj. Tramadol	47	Tab. Pantoprazole	280
Inj. Xone	27	Tab. Paracetamol	264
Inj. Zylpan	32	Inj. Tramadol hydrochloride	32
Syrup. Parafid	24	Tab. Trypsin chymotrypsin	17
Tab. Anxit	153		
Tab. Chymoral fort	17		
Tab. Dolo	102		
Tab. Pan	71		
Grand total	1,085	Total	1,157

15.1. Drug interactions

The following is a distribution of drug-related problems by severity: 3 cases include major issues, 10 involve moderate

issues, and 2 involve minor issues. There are 15 cases in total, including all severity levels. Major interactions include combinations like alprazolam with tramadol, while moderate interactions involve drugs such as itraconazole with sodium bicarbonate. Minor interactions feature bisoprolol with ivabradine. Each interaction indicates potential clinical significance and the number of reported cases.

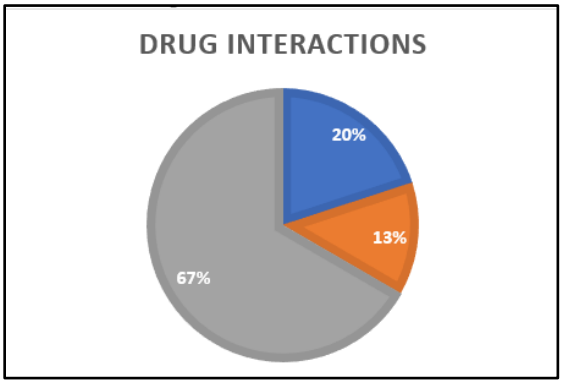

Figure 6: Drug interactions based on severity

15.2. Type of ADRS

The table summarizes the frequency of various adverse drug reactions (ADRs), indicating a total of 17 occurrences. The most common reaction is nausea and tiredness, with 7 cases, followed by headache and tiredness, each with 2 cases. Other reactions, such as bloating, breathlessness, confusion, dry mouth, feeling of sickness, and sleepiness, were reported once each. This highlights the varied impact of drug combinations on patient well-being.

Table 7: Type of ADRs

Type of adrs	Frequency of occurance
Bloating	1
Breathlessness	1
Confusion	1
Nausea and tiredness	7
Dry mouth	1
Feeling of sick	1
Headache	2
Sleepiness	1
Tirdeness	2
Total	17

15.3. Medication error

Out of 323, 17 cases are found having medication errors. 8 patients (47.1%) are missed with anti-diabetic drugs, while 9 patients (52.9%) are missed with anti-hypertensive drugs. Missed drugs have shown significant changes in the glucose and blood pressure (B.P) level in patient having these disease as co-morbidities.

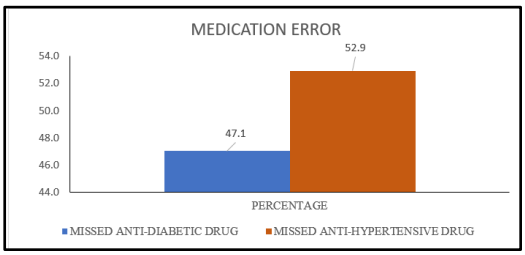

Figure 7: Medication error

15.4. Discharge medication

The table shows the medication which are prescribed during the discharge. The mostly prescribed discharge medication is analgesic and anti-pyretic followed by, proton pump inhibitors, antibiotics, anti-anxiety medications.

Table 8: Discharge medication

Discharged medication	Count of discharge medications
Tab. Alprazolam 0.5mg 0-0-1 for 3 days	141
Tab. Cefuroxime 500mg + clavulanic acid 125mg 1-0-1 for 5 days	194
Tab. Pantoprazole 40mg 1-0-0 for 5 days	219
Tab. Paracetamol 650mg 1-1-1 for 5 days	230
Total	784

16. Discussion

1. **Age Distribution**: Among 323 cases, the highest frequency of admissions is in the age group 29–38 years (72 cases, 22.3%), while the lowest is ≤18 years (4 cases, 1.2%). Patients above 50 years: 163; below 50 years: 160. (**Table 1**)
2. **Gender Distribution**: Males were 218 (67.5%), females were 105 (32.5%). (**Table 2**)
3. **Urological Disorders**: Most common disorder was BPH (51 cases, 15.78%), followed by ureteric calculus (36 cases, 11.14%) and renal calculi (24 cases, 7.43%). Other disorders include prostate cancer, epididymitis, vesical calculi, and obstructive uropathy. (**Figure 1**)
4. **Co-Morbidities**: 189 patients had co-morbidities. T2DM (82 cases, 43.39%) and HTN (76 cases, 40.21%) were most common. IHD (17 cases, 8.99%), hypothyroidism (6 cases, 3.17%), and CKD (3 cases, 1.59%) were less frequent. (**Figure 2**)
5. **Hospital Stay**: Average stay in the urology department was 4.38 days. Therapy was effective in 256 patients (79.3%), partially effective in 67 (20.7%). (**Table 3**)
6. **Drug Prescriptions**:
7. **Total drugs:** 2,057 from 323 cases.

8. **Most prescribed:** PPIs (427) and cephalosporins (412). Least prescribed: alkalinizing agents (24) and alpha blockers (26). (**Table 4**)
9. **Post-operative prescriptions:** PPIs (293), non-opioid analgesics (261), and cephalosporins (236). Least: anti-emetics, opioid analgesics, and calcium channel blockers. (**Figure 4**)
10. **Polypharmacy**: Average drugs per prescription: 7.3 (WHO benchmark: 2). Antibiotics: 21%, injections: 79.2%, generic names: 40%, essential medicines: 98%. (**Figure 5**)
11. **Post-operative:** antibiotics (38%), injections (79%), generic names (45%), essential medicines (99%). (**Figure 6**)
12. **Branded vs. Generic Drugs:** Generic: 1,157 drugs. Branded: 1,058 drugs.
13. Most common brand-name drugs: INJ. PAN and INJ. PCT (136 each). Common generic drugs: TAB. PANTOPRAZOLE (280) and TAB. PARACETAMOL (264). (**Figure 7**)
14. **Drug-Drug Interactions (DDIs)**: Total: 15 DDIs. Major (3), moderate (10), minor (2). Major: alprazolam + tramadol. Moderate: itraconazole + sodium bicarbonate. Minor: bisoprolol + ivabradine. (**Table 5**)
15. **Adverse Drug Reactions (ADRs)**: Total: 17 ADRs. Most common: nausea and tiredness (7 cases). Others: headache (2), bloating, breathlessness, confusion, dry mouth, sickness, and sleepiness (1 each). (**Table 6**)
16. **Medication Errors**: Total: 17 errors. Missed anti-diabetic drugs (8 cases, 47.1%) and anti-hypertensive drugs (9 cases, 52.9%). Errors led to significant glucose/BP changes.
17. **Discharge Medications**: Most prescribed: analgesics/anti-pyretics, PPIs, antibiotics, and anti-anxiety medications. (**Table 7**)

17. Conclusion

The study highlights the complexity of managing urological patients with prevalent co-morbidities like diabetes and hypertension, emphasizing the need for careful drug management due to frequent polypharmacy. Notable drug-drug interactions and adverse reactions underline the importance of personalized care and vigilant monitoring. The focus on essential medicines and effective treatments, particularly in pre- and post-operative care, demonstrates the department's commitment to evidence-based, efficient urological care, ultimately improving patient safety and treatment outcomes.

18. Etherence Clearance

Ethical No SIMS & RC/EC-10/RR-07/2024-25.

19. Source of Funding

None.

20. Conflict of Interest

None.

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