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## DRUG UTILISATION PATTERN & POST-OPERATIVE MEDICATION MANAGEMENT IN HYSTERECTOMY PATIENTS IN A GYNECOLOGY WARD

P. USHA SREE<sup>1</sup>, RANGAM CHARITHA<sup>2\*</sup>, AZRA NAMREEN<sup>3</sup>, CHIRUMALLA SAHITHI<sup>3</sup>, SAI NIKITHA<sup>3</sup>, J SHIRISHA<sup>3</sup>

<sup>1</sup>Associate Professor, Department of Pharmacy Practice, Smt. Sarojini Ramulamma College of Pharmacy, Palamuru University, Seshadri Nagar, Mahabubnagar District, Telangana State, India.

<sup>2\*</sup>Assistant Professor, Department of Pharmacology, Smt. Sarojini Ramulamma College of Pharmacy, {Palamuru University}, Seshadri Nagar, Mahabubnagar District, Telangana State, India.

<sup>3</sup>Pharm. D Intern, Smt. Sarojini Ramulamma College of Pharmacy, {Palamuru University}, Seshadri Nagar, Mahabubnagar District, Telangana State, India.

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### ABSTRACT

Cellulitis is a common bacterial infection involving the skin and subcutaneous tissues that requires prompt and appropriate antibiotic therapy. Inappropriate or excessive antibiotic use contributes to antimicrobial resistance, increased healthcare costs, and suboptimal clinical outcomes. This prospective observational study was conducted over six months in the Department of Surgery at a tertiary care hospital to evaluate antibiotic prescribing patterns in cellulitis patients and assess adherence to standard treatment guidelines using drug utilization metrics. A total of 100 hospitalized patients diagnosed with cellulitis were included. Data were collected from case records, medication charts, and laboratory reports. Antibiotic utilization was evaluated using the World Health Organization (WHO) Defined Daily Dose (DDD) and Drug Utilization 90% (DU90%) methodologies, while statistical analysis was performed using descriptive statistics, Chi-square test, and one-way ANOVA. The majority of patients were aged 41–60 years (68%), with a predominance of males (65%), and lower limb cellulitis was the most common presentation (74%). Ceftriaxone (46%) was the most frequently prescribed antibiotic, followed by amoxicillin–clavulanate (17%) and clindamycin (16%). DU90% analysis demonstrated that ceftriaxone, amoxicillin–clavulanate, linezolid, and clindamycin accounted for most antibiotic consumption. The overall clinical recovery rate was 73%, whereas patients with severe cellulitis experienced prolonged hospital stays and comparatively lower recovery rates. A statistically significant association was observed between disease severity and length of hospital stay ( $p < 0.05$ ). The findings indicate that antibiotic prescribing was predominantly empirical, with considerable reliance on broad-spectrum antibiotics. Although treatment outcomes were generally favorable, improving adherence to evidence-based treatment guidelines and promoting culture-directed antimicrobial therapy are essential to optimize antibiotic use, minimize antimicrobial resistance, and enhance patient outcomes.

**Keywords:** Cellulitis, Antibiotic prescribing pattern, Drug utilization evaluation, Defined Daily Dose (DDD), DU90%, Antimicrobial resistance, Rational antibiotic use.

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### \*Corresponding Author

Rangam Chariitha

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### INTRODUCTION

Hysterectomy is one of the most commonly performed major gynecological surgical procedures worldwide and represents the definitive treatment for a wide range of benign and malignant disorders affecting the female reproductive system, including uterine fibroids, abnormal uterine bleeding,

adenomyosis, endometriosis, uterine prolapse, and gynecological cancers [1,2]. It remains one of the most frequently performed major surgical procedures among women and has undergone remarkable advancements with improvements in surgical techniques, anesthesia, and perioperative care, resulting in enhanced patient safety and clinical outcomes [3]. Depending on the underlying pathology, patient characteristics, and surgeon expertise, hysterectomy may be performed through abdominal, vaginal, or laparoscopic approaches, each having distinct advantages and postoperative recovery profiles [4]. Postoperative medication management is an integral component of hysterectomy care and plays a crucial

role in preventing surgical complications, controlling pain, reducing postoperative morbidity, and facilitating early recovery [5]. The pharmacological regimen commonly includes antibiotics, analgesics, antiemetics, proton pump inhibitors, intravenous fluids, anticoagulants where indicated, and other supportive medications. Appropriate medication selection and rational prescribing are essential to minimize adverse drug reactions, reduce healthcare costs, shorten hospital stay, and improve the quality of postoperative care [6].

Antibiotic prophylaxis is considered a standard practice in hysterectomy to reduce the incidence of surgical site infections, which remain one of the most common postoperative complications following gynecological surgery [7]. Current international guidelines recommend the use of appropriate prophylactic antibiotics administered within the recommended time before surgical incision to achieve optimal tissue concentrations and reduce infectious morbidity [8]. However, prolonged postoperative antibiotic therapy without clear clinical indications continues to be reported in many healthcare settings and contributes to antimicrobial resistance, increased treatment costs, and unnecessary drug exposure [9]. Similarly, effective postoperative pain management is essential to enhance patient comfort, facilitate early ambulation, decrease pulmonary and thromboembolic complications, and accelerate hospital discharge [10]. Contemporary pain management emphasizes multimodal analgesia using combinations of non-steroidal anti-inflammatory drugs (NSAIDs), paracetamol, and selective opioid analgesics when required. Such approaches provide superior analgesia while minimizing opioid-related adverse effects and improving postoperative recovery [11].

Drug utilization research, as defined by the World Health Organization (WHO), is the study of the marketing, distribution, prescription, and use of medicines in society, with particular emphasis on their medical, social, and economic consequences [12]. Drug utilization studies are valuable tools for assessing prescribing practices, identifying irrational medication use, evaluating adherence to standard treatment guidelines, and promoting evidence-based pharmacotherapy [13]. Evaluation of prescribing patterns using WHO prescribing indicators has become an important quality assurance measure in hospital practice [14]. These indicators assess the average number of drugs prescribed per encounter, percentage of drugs prescribed by generic name, percentage of encounters involving antibiotics and injections, and prescribing from the Essential Medicines List [15].

Several studies conducted in tertiary care hospitals have demonstrated considerable variation in postoperative prescribing patterns following hysterectomy, particularly regarding antibiotic prophylaxis, analgesic therapy, and supportive medications [16–18]. Therefore, the present study was undertaken to evaluate the drug utilization pattern in patients undergoing hysterectomy and assess the rationality of postoperative prescribing using WHO prescribing indicators [19,20].

## **MATERIALS AND METHODS**

### **Study Design and Setting**

A hospital-based prospective observational study was conducted over a period of six months in the Department of Obstetrics and Gynecology at SVS Medical College and Hospital, Mahabubnagar, Telangana, India. The study aimed to evaluate postoperative drug utilization patterns, prescribing practices, medication adherence, and adverse drug reactions (ADRs) among patients undergoing hysterectomy.

### **Study Population and Sample Size**

A total of 100 female patients who underwent hysterectomy during the study period were enrolled. The sample size was determined based on the availability of eligible patients who fulfilled the predefined inclusion criteria.

### **Eligibility Criteria**

#### **Inclusion Criteria**

- Female inpatients aged 35–70 years.
- Patients undergoing total abdominal, vaginal, or laparoscopic hysterectomy.
- Patients willing to provide written informed consent.
- Patients with complete postoperative medication records.

#### **Exclusion Criteria**

- Patients unwilling to participate or discharged against medical advice.
- Patients with incomplete medication records.
- Patients diagnosed with gynecological malignancies.

### **Data Collection**

Eligible patients were enrolled after obtaining written informed consent. Data were collected prospectively using a structured data collection form. Information recorded included demographic characteristics, clinical diagnosis, indication for hysterectomy, type of surgical procedure, associated comorbidities, and postoperative pharmacotherapy, including drug name, dose, dosage form, route of administration, frequency, and duration of treatment. Medication adherence was assessed using the 8-item Morisky Medication Adherence Scale (MMAS-8), and patients were categorized into high, medium, and low adherence groups according to the standard scoring system. Adverse drug reactions (ADRs) were monitored throughout hospitalization and documented. Prescriptions were evaluated for their rationality based on institutional treatment protocols and the World Health Organization (WHO) core prescribing indicators.

### **Outcome Measures**

The primary outcome was to evaluate postoperative drug utilization patterns among patients undergoing hysterectomy. Secondary outcomes included assessment of antibiotic, analgesic, and proton pump inhibitor utilization, medication adherence, incidence of adverse drug reactions, average number of drugs prescribed per prescription, and rationality of prescribing according to WHO prescribing indicators.

### **Statistical Analysis**

Data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics version 23.0. Continuous variables were expressed as mean  $\pm$  standard deviation (SD), while categorical variables were summarized as frequencies and percentages. The Chi-square test was used to evaluate associations between

categorical variables, including the relationship between the type of hysterectomy and postoperative antibiotic prescribing patterns, medication adherence, and adverse drug reactions. A p-value of <0.05 was considered statistically significant. The findings were presented using tables, charts, and graphs to facilitate interpretation.

### Ethical Considerations

The study protocol was reviewed and approved by the Institutional Ethics Committee of SVS Medical College and Hospital before commencement of the study (Reference No. IEC/DHR-03/{04/9}/2025). Written informed consent was obtained from all participants prior to enrollment. Confidentiality of patient information was strictly maintained, and all collected data were used solely for research purposes in accordance with institutional ethical guidelines and the principles of the Declaration of Helsinki.

## RESULTS AND DISCUSSION

The results are organized according to the study objectives and include patient demographics, indications for hysterectomy, surgical approaches, postoperative drug utilization patterns, medication adherence, adverse drug reactions, duration of hospital stay, and WHO prescribing indicators. The findings are presented using tables and figures, followed by a concise interpretation of each result to facilitate understanding and discussion.

### Distribution of Patients Based on Age

Table 1 and Figure 1 show the age distribution of patients who underwent hysterectomy. The majority of patients (57%) belonged to the 45–54 years age group, followed by 25% aged 55–64 years and 18% aged 35–44 years. No patients were reported in the 65–70 years age group. These findings indicate that hysterectomy was most frequently performed among women in the perimenopausal age group.

Table 01: Distribution of Patients Based on Age

| Age Group (Years) | Number of Patients | Percentage (%) |
|-------------------|--------------------|----------------|
| 35–44             | 18                 | 18             |
| 45–54             | 57                 | 57             |
| 55–64             | 25                 | 25             |
| 65–70             | 0                  | 0              |
| <b>Total</b>      | <b>100</b>         | <b>100</b>     |

Age-wise Distribution of Patients (n = 100)

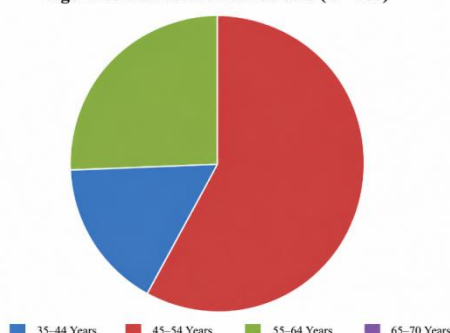


Figure 01: Age-wise Distribution of Patients Included in the Study (n = 100)

### Distribution of Patients Based on Indication for Hysterectomy

Table 02 and Figure 02 present the indications for hysterectomy among the study participants. Abnormal uterine bleeding was the leading indication (31%), followed by uterine fibroids (21%), uterine prolapse (15%), adenomyosis (13%), endometrial hyperplasia (11%), and ovarian cysts (9%). These findings suggest that benign gynaecological disorders were the primary reasons for hysterectomy.

Table 02: Distribution of Patients Based on Indication for Hysterectomy

| Indication                | Number of Patients | Percentage (%) |
|---------------------------|--------------------|----------------|
| Uterine fibroids          | 21                 | 21             |
| Abnormal uterine bleeding | 31                 | 31             |
| Adenomyosis               | 13                 | 13             |
| Uterine prolapse          | 15                 | 15             |
| Ovarian cyst              | 9                  | 9              |
| Endometrial hyperplasia   | 11                 | 11             |
| <b>Total</b>              | <b>100</b>         | <b>100</b>     |

Indications for Hysterectomy (N = 100)

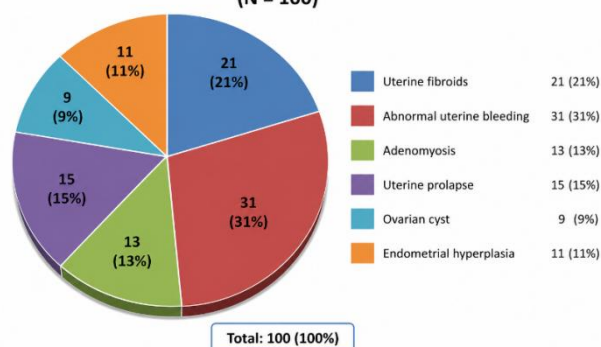


Figure 02: Distribution of Patients According to Indication for Hysterectomy

### Distribution of Patients Based on Type of Surgical Approach for Hysterectomy

Table 03 presents the distribution of patients according to the type of surgical approach used for hysterectomy. Total abdominal hysterectomy was the most commonly performed procedure, accounting for 56% of all surgeries, followed by total abdominal hysterectomy with bilateral salpingo-oophorectomy (33%). Vaginal hysterectomy was performed in 10% of patients, whereas laparoscopic-assisted vaginal hysterectomy was carried out in only 1% of cases. Overall, open abdominal surgical approaches predominated, reflecting their preference for managing the majority of gynaecological conditions among the study participants.

Table 03: Distribution of Patients Based on Type of Surgical Approach for Hysterectomy

| Type of Surgical Approach                                      | Number of Patients | Percentage (%) |
|----------------------------------------------------------------|--------------------|----------------|
| Laparoscopic-Assisted Vaginal Hysterectomy                     | 1                  | 1              |
| Total Abdominal Hysterectomy                                   | 56                 | 56             |
| Total Abdominal Hysterectomy + Bilateral Salpingo-Oophorectomy | 33                 | 33             |
| Vaginal Hysterectomy                                           | 10                 | 10             |
| <b>Total</b>                                                   | <b>100</b>         | <b>100</b>     |

#### Distribution of Patients Based on Postoperative Antibiotic Utilisation Pattern

Table 4 and Figure 3 summarise the postoperative antibiotic utilisation pattern among the study participants. Ceftriaxone was the most frequently prescribed antibiotic (36%), followed by metronidazole (29%). Cefuroxime-clavulanate accounted for 17% of prescriptions, while cefixime-ofloxacin and cefoperazone-sulbactam represented 9% and 6%, respectively. Doxycycline was prescribed least frequently (3%). The predominance of cephalosporin-based antibiotics indicates their routine use for postoperative infection prophylaxis and treatment following hysterectomy.

Table 04: Postoperative Antibiotic Utilization Pattern

| Antibiotic               | Number of Patients | Percentage (%) |
|--------------------------|--------------------|----------------|
| Ceftriaxone              | 83                 | 36             |
| Metronidazole            | 67                 | 29             |
| Cefixime + Ofloxacin     | 21                 | 9              |
| Cefuroxime + Clavulanate | 39                 | 17             |
| Cefoperazone + Sulbactam | 14                 | 6              |
| Doxycycline              | 7                  | 3              |
| <b>Total</b>             | <b>231*</b>        | <b>100</b>     |

\*Multiple antibiotics were prescribed to some patients.

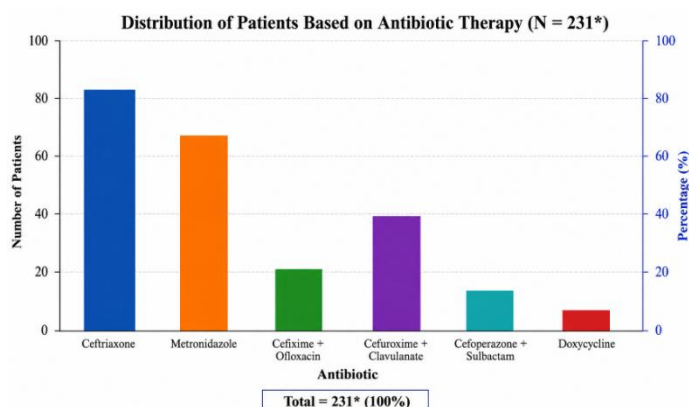


Figure 03: Postoperative Antibiotic Utilization Pattern Among Study Participants

#### Distribution of Patients Based on Postoperative Analgesic Utilization Pattern

The analgesic utilization pattern following hysterectomy. Diclofenac was the most commonly prescribed analgesic (58%), followed by the combination of aceclofenac with paracetamol (25%). Paracetamol alone accounted for 17% of prescriptions. These findings indicate a preference for non-steroidal anti-inflammatory drugs (NSAIDs), particularly diclofenac, for postoperative pain management because of their effective analgesic and anti-inflammatory properties.

#### Distribution of Patients Based on Postoperative Antiemetic Utilization Pattern

Table 4 illustrates the postoperative antiemetic utilization pattern among the study participants. Metoclopramide was administered alone to 46% of patients, making it the most frequently prescribed antiemetic. Promethazine alone was prescribed in 21% of cases, while 33% of patients received both agents. The findings indicate that metoclopramide, either as monotherapy or in combination with promethazine, was the preferred medication for preventing and managing postoperative nausea and vomiting following hysterectomy.

Table 04: Postoperative Antiemetic Utilization Pattern

| Antiemetic     | Number of Patients | Percentage (%) |
|----------------|--------------------|----------------|
| Metoclopramide | 46                 | 46             |
| Promethazine   | 21                 | 21             |
| Both Drugs     | 33                 | 33             |
| <b>Total</b>   | <b>100</b>         | <b>100</b>     |

#### Distribution of Patients Based on Supplement Therapy

Table 05 and Figure 4 presents the supplement therapy prescribed during the postoperative period. Limcee (Vitamin C) was the most frequently prescribed supplement (29%), followed by Chymoral Forte (23%) and Orofer-XT (20%). Beplex Forte accounted for 15% of prescriptions, while Ostemust-XT represented 13%. The findings indicate that vitamin supplementation, enzyme preparations, and hematinic agents were routinely incorporated into postoperative management to facilitate wound healing, nutritional support, and recovery after hysterectomy.

Table 05: Distribution of Patients Based on Supplement Therapy

| Supplement         | Number of Patients | Percentage (%) |
|--------------------|--------------------|----------------|
| Limcee (Vitamin C) | 67                 | 29             |
| Beplex Forte       | 34                 | 15             |
| Orofer-XT          | 47                 | 20             |
| Ostemust-XT        | 29                 | 13             |
| Chymoral Forte     | 53                 | 23             |
| <b>Total</b>       | <b>230*</b>        | <b>100</b>     |

\*More than one supplement was prescribed to several patients.

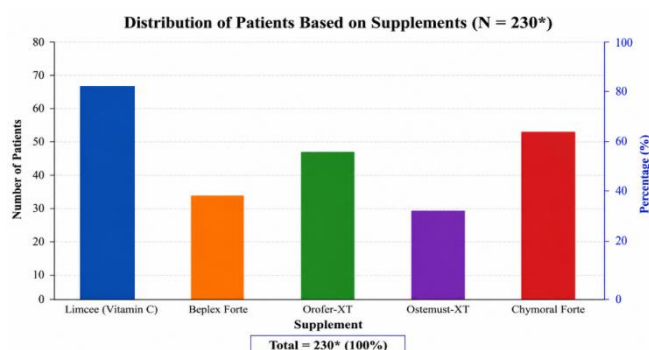


Figure 4: Distribution of Patients Based on Supplement Therapy Following Hysterectomy

#### Distribution of Patients Based on Adverse Drug Reactions

Table 06 and Figure 05 presents the adverse drug reactions (ADRs) observed among the study participants during the postoperative period. The majority of patients (72%) did not experience any adverse drug reactions. Among the reported ADRs, gastritis associated with non-steroidal anti-inflammatory drugs (NSAIDs) was the most common (12%), followed by nausea related to metronidazole (8%), injection site pain associated with ceftriaxone (5%), and drowsiness following promethazine administration (3%). Overall, the postoperative medications were well tolerated, with only a small proportion of patients experiencing mild and manageable adverse reactions.

Table 06: Distribution of Patients Based on Adverse Drug Reactions

| Adverse Drug Reaction | Suspected Drug           | Number of Patients | Percentage (%) |
|-----------------------|--------------------------|--------------------|----------------|
| Gastritis             | Diclofenac / Aceclofenac | 12                 | 12             |
| Nausea                | Metronidazole            | 8                  | 8              |
| Injection Site Pain   | Ceftriaxone              | 5                  | 5              |
| Drowsiness            | Promethazine             | 3                  | 3              |
| No ADR Observed       | —                        | 72                 | 72             |
| <b>Total</b>          | —                        | <b>100</b>         | <b>100</b>     |

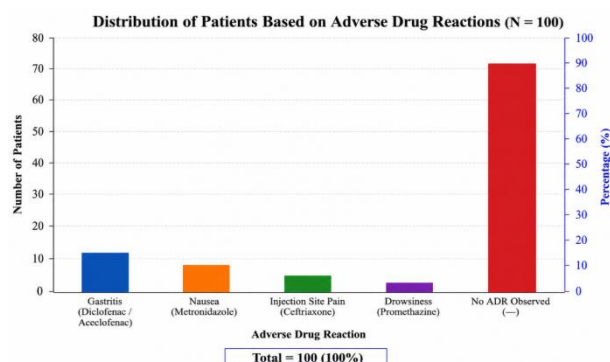


Figure 05: Distribution of Patients Based on Adverse Drug Reactions Observed During the Study

#### Distribution of Patients Based on Medication Adherence

Table 07 illustrates the medication adherence levels among the study participants. Moderate adherence was observed in the majority of patients (63%), while 20% demonstrated low adherence and only 17% exhibited high adherence to their prescribed medications. These findings suggest that although most patients followed postoperative medication instructions reasonably well, a considerable proportion showed inadequate adherence, highlighting the importance of patient counselling and follow-up to improve compliance with prescribed therapy.

Table 07: Distribution of Patients Based on Medication Adherence

| Medication Adherence Level | Number of Patients | Percentage (%) |
|----------------------------|--------------------|----------------|
| High                       | 17                 | 17             |
| Moderate                   | 63                 | 63             |
| Low                        | 20                 | 20             |
| <b>Total</b>               | <b>100</b>         | <b>100</b>     |

#### Distribution of Patients Based on Number of Drugs per Prescription

Table 08 presents the distribution of prescriptions according to the number of drugs prescribed per patient. More than half of the prescriptions (57%) contained more than six medications, while 43% included four to six drugs. No patient received fewer than four medications. The findings indicate the frequent use of multidrug therapy during the postoperative period, reflecting the comprehensive pharmacological management required for pain control, infection prevention, symptom management, and recovery following hysterectomy.

Table 08: Distribution of Patients Based on Number of Drugs per Prescription

| Number of Drugs | Number of Patients | Percentage (%) |
|-----------------|--------------------|----------------|
| 1-3             | 0                  | 0              |
| 4-6             | 43                 | 43             |
| >6              | 57                 | 57             |
| <b>Total</b>    | <b>100</b>         | <b>100</b>     |

#### Distribution of Patients Based on Duration of Postoperative Hospital Stay

Table 9 presents the duration of postoperative hospital stay among the study participants. A majority of patients (70%) remained hospitalized for 4-7 days following hysterectomy, while 25% required hospitalization for more than one week. Only 5% of patients were discharged within 1-3 days. These findings suggest that a postoperative hospital stay of approximately one week was the most common recovery period, reflecting routine postoperative monitoring and management in the study setting.

Table 9: Distribution of Patients Based on Duration of Postoperative Hospital Stay

| Duration of Hospital Stay | Number of Patients | Percentage (%) |
|---------------------------|--------------------|----------------|
| 1-3 Days                  | 5                  | 5              |

|              |            |            |
|--------------|------------|------------|
| 4–7 Days     | 70         | 70         |
| >7 Days      | 25         | 25         |
| <b>Total</b> | <b>100</b> | <b>100</b> |

### WHO Prescribing Pattern Analysis

Table 10 summarizes the prescribing practices according to the World Health Organization (WHO) core prescribing indicators. The average number of drugs prescribed per prescription was six, indicating the use of multidrug therapy during postoperative management. Antibiotics were prescribed in all encounters (100%), while injectable medications were used in 78% of patients. A high proportion of medications (82%) were prescribed from the Essential Medicines List, demonstrating adherence to evidence-based prescribing practices. However, only 5.5% of drugs were prescribed by their generic names, indicating scope for improving cost-effective prescribing and promoting rational drug use. Overall, the prescribing pattern reflected comprehensive postoperative pharmacotherapy with good adherence to essential medicine recommendations but limited utilization of generic prescribing.

Table 10: WHO Prescribing Pattern Analysis

| WHO Prescribing Indicator                      | Result |
|------------------------------------------------|--------|
| Average Number of Drugs per Prescription       | 6      |
| Encounters with Antibiotics                    | 100%   |
| Encounters with Injections                     | 78%    |
| Drugs Prescribed by Generic Name               | 5.5%   |
| Drugs Prescribed from Essential Medicines List | 82%    |

### CONCLUSION

This prospective observational study evaluated the demographic profile, surgical indications, prescribing patterns, medication adherence, and postoperative outcomes among patients undergoing hysterectomy. Women aged 45–54 years constituted the largest patient group, with abnormal uterine bleeding being the most common indication for surgery. Total abdominal hysterectomy, with or without bilateral salpingo-oophorectomy, was the most frequently performed procedure. Ceftriaxone and metronidazole were the most commonly prescribed antibiotics, diclofenac was the preferred analgesic, and metoclopramide and supportive supplements were routinely administered. Most patients demonstrated good medication adherence, adverse drug reactions were minimal, and the average postoperative hospital stay was 4–7 days. Overall, the prescribing pattern was consistent with standard postoperative management, highlighting the importance of rational prescribing, pharmacovigilance, and patient counselling to ensure safe and effective postoperative care.

### LIMITATIONS AND RECOMMENDATIONS

This single-centre study with a sample size of 100 may limit the generalizability of the findings. Medication adherence was partly based on patient self-report, which may have introduced reporting bias, and only short-term postoperative outcomes were assessed. Future multicentre studies with larger sample sizes and longer follow-up are recommended to evaluate long-

term clinical outcomes, quality of life, and medication adherence. Strengthening patient counselling, antimicrobial stewardship, and adverse drug reaction monitoring may further improve postoperative care.

### FUNDING

Nil

### CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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We also thank the patients who consented to participate in this research.

### AUTHOR CONTRIBUTIONS

P. Usha Sree and Rangam Chariitha conceived and designed the study, supervised the research work, and drafted the manuscript. Azranamreen, chirumalla Sahithi, saiNikitha, and J Shirisha contributed to data collection, data analysis, and manuscript preparation. All authors reviewed and approved the final version of the manuscript.

### ETHICAL STATEMENT

The ethical committee clearance was obtained from SVS MEDICAL COLLEGE HOSPITAL before initiating the study. Reference number: IEC/DHR-03/{04/9}/2025

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