

# A Prospective Study of Drug Utilization and Evaluation in Gastrointestinal Disorders at a Tertiary Care Teaching Hospital

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## Abstract

Drug Utilization Evaluation (DUE) is a comprehensive study examining the marketing, distribution, prescription, and use of medications within a society. This evaluation encompasses a range of medical, social, and economic factors related to drug use, with the primary goal of ensuring that drug therapy adheres to current standards of care. This prospective observational study conducted at Navodaya Medical College Hospital and Research Centre (NMCH & RC) from 15th February to 15th August 2024 aimed to evaluate prescription patterns for gastrointestinal disorders, focusing on drug utilization from the Essential Drug List (EDL) and adherence to WHO core prescribing indicators. 150 prescriptions were analyzed, revealing that 64.66% of patients were male, with the majority aged 20-39 years. Acute gastroenteritis was the most common diagnosis (34%), and common symptoms included abdominal pain, loose stools, and vomiting. Antibiotics, particularly metronidazole, were the most prescribed drug class (25.35%). Of the prescribed drugs, 75.95% were from the EDL, but only 8.91% were prescribed by generic name, and 64.82% involved injections. The average number of drugs per prescription was 6.65, indicating polypharmacy and drug interactions were prevalent. The study highlighted concerns about moderate antibiotic use, high injection rates, low generic drug prescriptions, and polypharmacy, underscoring the need for improved rational prescribing practices to enhance patient safety and cost efficiency.

**Keywords:** WHO-Core Indicators, Essential Medicine List, In-Patient Unit, Drug Utilization Evaluation, Proton Pump Inhibitors, Drug-Drug Interactions.

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## INTRODUCTION

Gastrointestinal diseases refer to conditions that impact any part of the digestive system, including the esophagus, stomach, intestines, rectum, and accessory digestive organs such as the liver, gallbladder, and pancreas. Some of the most common GI problems are constipation, irritable bowel syndrome, hemorrhoids, anal fissures, anal fistula, peri-anal abscesses, diverticular disease, colon polyps, colitis, gastro-esophageal reflux disease (GERD), Barrett's esophagus, Hiatal hernia, esophagitis [1, 2], and also gastritis, peptic ulcer disease, gastric lymphoma, pancreatic pseudo-cyst, acute hepatitis, alcoholic liver disease, diarrhea, nausea and vomiting [3].

Constipation, one of the many conditions that can impact the gastrointestinal system, affects about 27% of people worldwide [4]. The causes of general GI problems vary widely [5]. For instance, they may be a

result of diseases such as mal-absorption disorders, previous bowel surgery, alcoholism, gallstones, cigarette smoking, cystic fibrosis, bacterial infection, and malfunctioning of the immune system [6]. Additionally, other factors can lead to the appearance of these disorders, such as the use of some drugs [7] improper sanitation, contaminated food and drinking water, poverty, low literacy rate, rapid modernization, and lifestyle changes [8-10]. Digestive problems can usually be identified by various tests such as Endoscopy, Colonoscopy, Laparoscopy, X-rays, Ultrasound, CT and MRI scans, samples of stools may be examined, and physical examination [11].

The need for DUE is to make possible the rational use of drugs in population and individual patients and provide information to improve the prescribing habits of physicians about the pattern of medicine prescribed, signs and symptoms of the patients, lab investigations, and their correlation with the therapy

and drug-related problems like adverse drug reactions (ADRs), drug interactions, etc [12].

There is a need for prescribing indicators that are useful for assessing the prescribing practice of the healthcare delivery system. The prescribing indicators assess the performance of prescribers in five main categories to reduce irrational use of prescribing patterns:

- 1) Percentage of medications prescribed by generic name
- 2) Average percentage of medicines per prescription
- 3) Percentage of antibiotics in prescriptions
- 4) Percentage of injectable drugs in prescriptions
- 5) Percentage of drugs prescribed from the most recent edition of National Essential Drug Lists or formulary [13-15].

By analyzing drug utilization data, healthcare providers can implement interventions to optimize therapy, reduce medication errors, and enhance overall treatment efficacy. This comprehensive approach helps ensure that patients with GI disorders receive appropriate pharmacotherapy tailored to their needs, ultimately improving health outcomes and quality of life. Therefore, the present study, drug utilization and evaluation in gastrointestinal disorders at a tertiary care teaching hospital is undertaken to improve drug therapeutic efficacy and promote rational practice.

## MATERIALS AND METHODS

A prospective observational study was carried out for a period of 6 months from 15<sup>th</sup> February to 15<sup>th</sup> August 2024 in Navodaya Medical College Hospital and Research Centre (NMCH & RC) Raichur, Karnataka, India.

### Inclusion Criteria

- Patients of any gender above 18 years of age from the in-patient units of the general medicine and surgery department with gastrointestinal disorders.

### Exclusion Criteria

- Patients aged below 18 years.
- Patients diagnosed with other than gastrointestinal disorders.
- Pregnant and breastfeeding women.

### Ethical Consideration

The study was approved by the Research and the Institutional Human Ethics Committee of Navodaya

Medical College and Hospital. Data was collected from the patient's medical record admitted in the general medicine and surgery department. Anonymity and confidentiality for study participants were upheld at all times. The research was conducted in accordance with the standards of Good Clinical Practice.

### Study Design

The study design was a prospective–observational study carried out for a period of six months from 15<sup>th</sup> February to 15<sup>th</sup> August 2024.

### Designing of Data Entry Form

A data entry form for incorporating patient details was designed. The form contains provisions to enter details such as Name, Age, Height & weight, Gender, IP No., Date of admission, any known allergy, social history, ward/department name, patient Address, other investigations, diagnosis, prescribed drugs, dose, ROA, FREQ and lastly duration.

### WHO Prescribing Indicator

The WHO prescribing indicator form is a tool designed to assess and improve the quality of prescribing practices in healthcare settings. It typically includes various indicators like the average number of drugs per encounter, percentage of drugs prescribed by generic name, percentage of encounters with an antibiotic prescribed, percentage of encounters with an injection prescribed, and percentage of drugs prescribed from essential drug list.

### Collection of Data

Data was collected from the in-patient medical records and entered in our specially designed data entry form during the study period from 15 February to 15 August 2024 for the patients visiting the general medicine and surgery department with gastrointestinal disorders at NMCH & RC. A total of 150 cases were collected and documented.

### Statistical Analysis

The data from the data entry form was analysed using descriptive statistics, such as total numbers, mean, frequency, and percentage.

## RESULTS

150 prescriptions that met the inclusion criteria were recruited into the study. The gender-wise distribution of the patients' demographic profile was plotted. **Table 1** highlights that 64.66 % were male patients and 35.33% were female patients.

**Table 1: Gender-wise distribution of disease**

Gender	No of patients (n= 150)	Percentage (%)
Male	97	64.66
Female	53	35.33

**Table 2** indicates that, among 150 patients, a higher percentage of male patients (32.66%) had a history of smoking compared to female patients (0.66%).

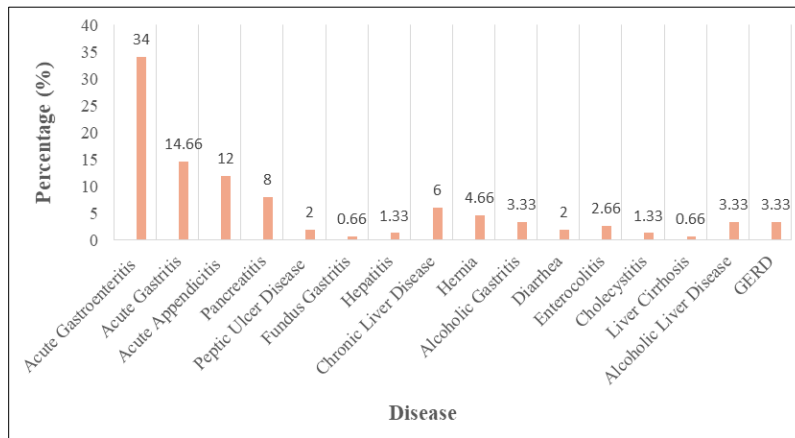
Additionally, a greater proportion of male patients (30%) had a history of alcohol consumption, while only 0.66% of female patients reported the same.

**Table 2: Distribution of subjects based on personal habits**

Personal Habit	No. of subjects (n=150)			
	Male	Percentage (%)	Female	Percentage (%)
Smokers	49	32.66	1	0.66
Non-smokers	51	34	49	32.66
Alcoholic	45	30	1	0.66
Non-Alcoholic	55	36.66	49	32.66

**Figure 1** illustrates pattern of disease. Among 150 patients, 51 patients were diagnosed with acute gastroenteritis (34%) which was the maximal diagnosed clinical condition, followed by 22 patients with acute gastritis (14.66) and 18 patients with acute appendicitis

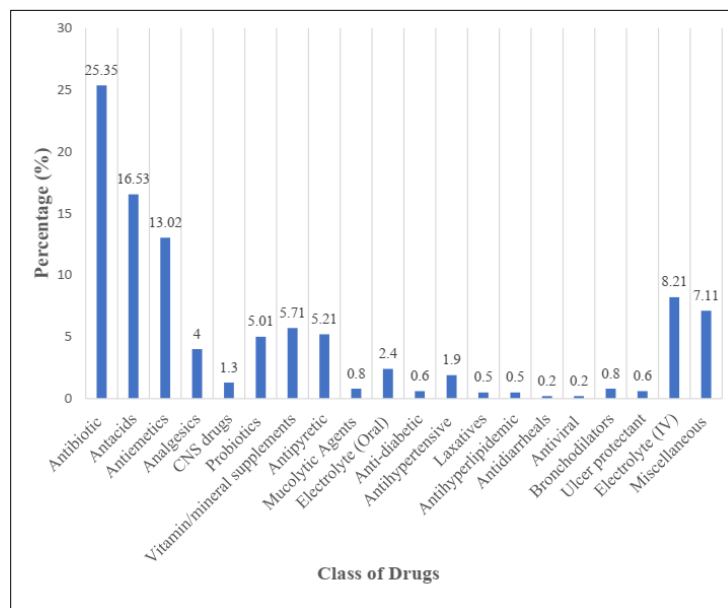
(12%). The least common type of gastrointestinal disease diagnosed were peptic ulcer disease (2%), hepatitis (1.33%), cholecystitis (1.33%), fundus gastritis (0.66%) and liver cirrhosis (0.66%).



**Figure 1: Pattern of disease**

**Figure 2** depicts the types of drugs prescribed to 150 patients, with antibiotics being the most frequently prescribed category (25.35%), followed by

antacids (16.53%) and antiemetics (13.02%). The least commonly prescribed drugs were antidiarrheals and antivirals, each accounting for 0.20%.



**Figure 2: Class of drugs prescribed**

**Table 3** shows commonly prescribed antimicrobials in gastrointestinal disorders. Out of 150 patients, the most common category of antibiotic prescribed was metronidazole (34.38%) followed by

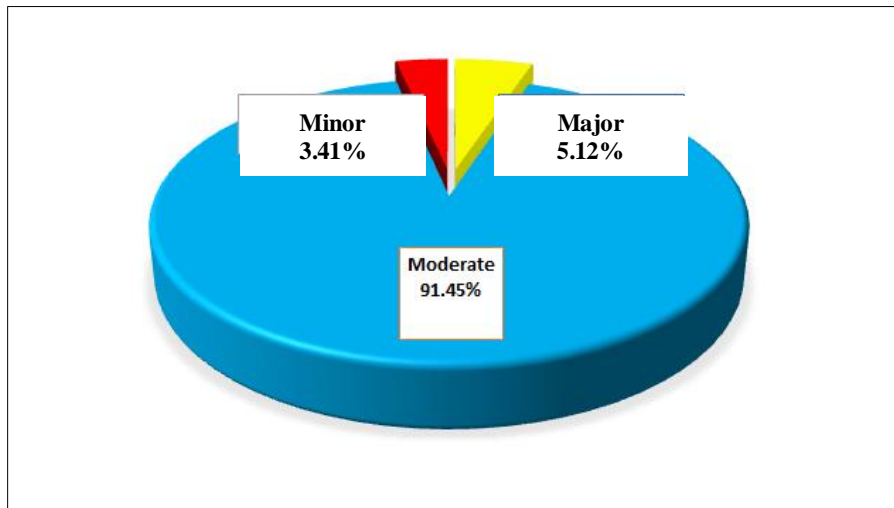
ceftriaxone (26.08%) and the least category of antibiotics prescribed were azithromycin (0.39%), rifamycin (0.39%) and nitrofurantoin (0.39%).

**Table 3: Commonly prescribed antimicrobials in gastrointestinal disorder**

Antimicrobials	No. of times prescribed (N=253)	Percentage (%)
Ceftriaxone	66	26.08
Ciprofloxacin	11	4.34
Metronidazole	87	34.38
Amoxicillin	12	4.74
Ofloxacin	28	11.06
Piperacillin	10	3.95
Amikacin	16	6.32
Doxycycline	08	3.16
Azithromycin	01	0.39
Cefotaxime	12	4.74
Rifamycin	01	0.39
Nitrofurantoin	01	0.39
TOTAL	253	100

**Figure 3** illustrates the number of drug-drug interactions observed in the study. Among 150

prescriptions, 12 major, 214 moderate, and 8 minor drug-drug interactions were reported.



**Figure 3: Number of drug-drug interactions observed in the study**

**Table 4** presents the WHO core drug indicators used to analyze the prescriptions. Among 150 prescriptions, the average number of drugs per prescription was 6.65. The percentage of drugs prescribed by their generic name was 8.91%. Drugs

listed in the essential drugs list accounted for 75.95%, while 64.82% of prescriptions included injections. Additionally, 25.35% of the prescriptions were for antibiotics.

**Table 4: WHO core drug indicator used to study prescription**

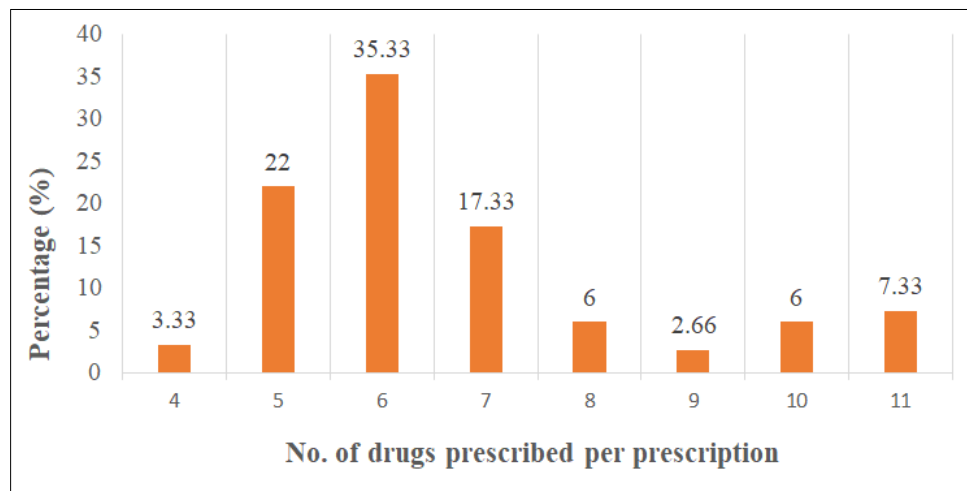
Indicators	Study value	Standard value
Average number of drugs per prescription	6.65	1.6-1.8
Percentage of drugs prescribed by generic name	8.91 %	100 %
Percentage of encounters with an antibiotic prescribed	25.35 %	20-26 %
Percentage of encounters with an injection prescribed	64.82 %	13.4-24.1 %
Percentage of drugs prescribed from essential medicine list	75.95 %	100 %

**Table 5: Drug utilization parameters used to analyze the study prescriptions. The findings indicated that prescription writing errors were minimal.**

Parameters	Study value (%)
Dosage form recorded	100
Frequency of therapy recorded	97.97
Duration of therapy recorded	84.04
Diagnosis recorded	100
Dose recorded	98.06

**Figure 4** illustrates the incidence of polypharmacy. The data shows that 3.33% (5) of prescriptions contained 4 drugs, followed by 22% (33) with 5 drugs, 35.33% (53) with 6 drugs, 17.33% (26)

with 7 drugs, 6% (9) with 8 drugs, 2.66% (4) with 9 drugs, 6% (9) with 10 drugs, and 7.33% (11) with 11 drugs. The findings indicate the presence of polypharmacy.

**Figure 4: Incidence of polypharmacy**

## DISCUSSION

The gender-wise distribution of the disease revealed that 64.66% (97) of the patients were male, while 35.33% (53) were female. These findings align with the study conducted by **Adamu N *et al.***, [11], and **Sumithra M *et al.***, [16], where a higher prevalence of the disease was observed in males compared to females. This could be attributed to various factors, such as biological differences, lifestyle choices, or environmental influences, which may contribute to a higher susceptibility or exposure to the condition in males.

Gastrointestinal disorders were prevalent, with acute gastroenteritis being the most common diagnosis (34%). This study is in contrast to the study of **Dutta SB *et al.***, [17].

The study population was categorized based on personal habits, including smoking (smoker and non-smoker) and alcohol consumption (alcoholic and non-alcoholic). It was observed that 32.66% (49) of male patients had a significant smoking history, compared to only 0.66% (1) of female patients. Similarly, 30% (45) of male patients had a history of alcohol consumption, while only 0.66% (1) of female patients reported the same. These findings align with the study conducted by **Adamu N *et al.***, [11], which also found a higher

prevalence of smoking and alcohol consumption among male patients.

The analysis of prescriptions for gastrointestinal disorders and comorbidities revealed that antibiotics were the most frequently prescribed medication, comprising 25.35% (253). In contrast, antidiarrheals and antivirals were the least prescribed, each accounting for just 0.20% (2). The result was similar to the study conducted by **Adamu N *et al.***, [11]. Based on their study, 53.33% of antibiotics were prescribed followed by analgesics and other drugs. Another study conducted by **Dutta SB *et al.***, [17], showed 30% of antibiotics of overall prescriptions.

Upon evaluating 150 prescriptions, the most common category of antibiotic prescribed was metronidazole (34.38%) followed by ceftriaxone (26.08%) and the least category of antibiotics prescribed was azithromycin (0.39%). The results closely resembled those of the study conducted by **Koyani H *et al.***, [18], and according to their study metronidazole was a commonly prescribed antibiotic. It was most commonly prescribed due to its broad-spectrum antimicrobial activity, effectiveness against protozoal infections, ability to target anaerobic bacteria, and good tissue penetration for a range of gastrointestinal disorders.

Out of 150 prescriptions analyzed, the majority (91.45%, 214) exhibited moderate drug interactions, followed by 5.12% (12) with major interactions and 3.41% (8) with minor interactions. This highlights a predominant occurrence of moderate interactions, indicating the need for careful monitoring and management of drug combinations in these prescriptions.

Upon analyzing prescriptions by using WHO core indicators it was found that an average of 6.65 drugs per prescription, with only 8.91% of drugs prescribed by their generic name, suggesting a low preference for generic drugs. Antibiotics were prescribed in 25.35% of encounters, while injections were used in 64.82% of cases, indicating a significant reliance on injectable treatments. These patterns highlight areas for improvement in promoting generic prescriptions and optimizing the use of injections. These results align with the findings of studies conducted by **Koyani H *et al.***, [18]. In their study, 7.55 was the average number of drugs per prescription.

The drug utilization parameters for analyzing study prescriptions showed high accuracy in recording essential information, with 100% documentation of dosage form and diagnosis. However, while the frequency of therapy (97.97%) and dose (98.06%) were nearly complete, the recording of therapy duration was somewhat lower at 84.04%.

The analysis of prescriptions for polypharmacy revealed that the majority contained 6 drugs, accounting for 35.33% (53) of prescriptions. Additionally, 22% (33) of prescriptions included 5 drugs, and 17.33% (26) contained 7 drugs. These results indicate a notable occurrence of polypharmacy in the study population.

These trends highlight the importance of adopting more rational prescribing practices, aimed at minimizing unnecessary polypharmacy and encouraging safer, evidence-driven treatment approaches.

## CONCLUSION

Our study reveals a high incidence of polypharmacy, with a notable preference for antibiotics and injectable treatments in gastrointestinal disorder management. The low use of generic drugs and the prevalence of moderate drug interactions suggest the need for more careful and cost-effective prescribing. These findings highlight the importance of optimizing prescription practices to improve patient safety and treatment efficacy.

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