



ISSN: 2278-2648

# International Journal of Research in Pharmacology & Pharmacotherapeutics (IJRPP)

IJRPP | Vol.14 | Issue 3 | Jul - Sept -2025

www.ijrpp.com

DOI: <https://doi.org/10.61096/ijrpp.v14.iss3.2025.356-367>

## Research

### Evaluation of Prescribing Pattern of Drugs in Tertiary Care Hospital Sector

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	<b>Abstract</b>
Published on: 17 July 2025	<p>This study evaluates the prescribing patterns of drugs in a tertiary care hospital. It looks at the rationality, safety, and effectiveness of treatments. The study uses a cross-sectional design and analyzed 80 prescriptions over three months at a tertiary care hospital. The evaluation focuses on important World Health Organization (WHO) prescribing indicators. These include the average number of drugs per encounter, the percentage of drugs prescribed by generic name, the percentage of encounters with antibiotics or injections prescribed, and adherence to the Essential Medicines List (EML). Findings from the literature review highlighted common issues. These include polypharmacy, low rates of generic prescribing, and varying adherence to clinical guidelines across different specialties. The study aims to identify gaps in prescribing practices, such as irrational drug use, over-reliance on brand-name medications, and deviations from evidence-based protocols. By analyzing these patterns, the study intends to propose targeted interventions. These include prescriber education, regular audits, and the implementation of standardized treatment protocols. The goal is to improve rational drug use, reduce medication errors, and enhance patient outcomes in hospital settings. This research contributes to the broader goal of improving prescribing practices in tertiary care. It aims to ensure safe, cost-effective, and patient-centered pharmacological treatments.</p>
Published by: Futuristic Publications	
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	<b>Keywords:</b> Prescribing patterns, rational drug use, WHO indicators, polypharmacy, tertiary care hospital.

## INTRODUCTION

### Prescription

According to the World Health Organization (WHO), a prescription is: "A written or electronic order for a medicine or other therapeutic intervention, issued by a licensed healthcare professional, such as a doctor, dentist, or nurse practitioner, for a specific patient."

### Prescribing pattern

Prescribing pattern refers to how healthcare professionals, like doctors or nurse practitioners, prescribe medications to their patients. This includes several aspects, such as:

1. Choice of medication: The specific medication(s) chosen for a certain condition or patient.
2. Dosage and frequency: The amount and timing of medication given.
3. Duration of treatment: The length of time a patient takes a medication.
4. Route of administration: The method by which a medication is given (e.g., oral, topical, injectable).

### Evaluation of prescribing patterns

WHO (World Health Organization) has defined five core drug use indicators to evaluate prescribing patterns in healthcare settings. These are used to promote rational use of medicines.

They are

1. Average Number of Drugs per Encounter
2. Percentage of Drugs Prescribed by Generic Name
3. Percentage of Encounters with an Antibiotic Prescribed
4. Percentage of Encounters with an Injection Prescribed
5. Percentage of Drugs Prescribed from the Essential Drugs List (EDL)

### Average number of drugs per encounter

This indicator measures the average number of medications prescribed to patients during a single healthcare visit or encounter. It is calculated by dividing the total number of medications prescribed by the total number of patient encounters.

### Importance

**Polypharmacy:** A high average number of drugs per encounter may indicate polypharmacy. This can raise the risk of harmful drug interactions, medication errors, and reduced patient adherence.

**Irrational prescribing:** An excessive number of medications may point to irrational prescribing practices, including overprescribing or giving unnecessary medications.

**Healthcare costs:** Prescribing multiple medications can lead to higher healthcare costs, which can strain patients and healthcare systems.

### Indications

**Prescribing habits:** This indicator shows the prescribing habits of healthcare providers and can help spot areas for improvement.

**Patient complexity:** A greater average number of drugs per encounter may suggest that patients have complex or multiple health conditions that require various medications.

**Need for medication review:** A high average number of drugs per encounter may indicate a need for regular medication reviews. These reviews ensure that patients are on the right medications and help minimize potential harm.

### Improvement strategies

**Medication review:** Regular medication reviews can find unnecessary medications and optimize treatment plans.

**Evidence-based prescribing:** Healthcare providers can follow evidence-based guidelines to ensure that medications are prescribed effectively and responsibly.

**Prescriber education:** Teaching healthcare providers about responsible prescribing practices and the importance of reducing polypharmacy can help enhance prescribing habits.

### **The formula to calculate the average number of drugs per encounter is**

Average number of drugs per encounter = Total number of drugs prescribed / Total number of encounters

#### **Where:**

- Total number of drugs prescribed is the total number of medications given to patients during a specific period.
- Total number of encounters is the total number of patient visits or encounters during the same period.

### **Percentage of drugs prescribed by generic name**

This parameter measures the proportion of medications prescribed using generic names rather than brand names. It is calculated by dividing the number of drugs prescribed by generic name by the total number of drugs prescribed, and then multiplying by 100.

#### **Formula**

Percentage of drugs prescribed by generic name = (Number of drugs prescribed by generic name ÷ Total number of drugs prescribed) x 100

#### **Importance**

**Cost-effective:** Generic medications are often less expensive than brand-name medications, which can help reduce healthcare costs.

**Improved accessibility:** Prescribing generic medications can increase access to essential medicines, particularly for patients with limited financial resources.

**Rational prescribing:** Prescribing generic medications promotes rational prescribing practices and can help reduce the influence of pharmaceutical marketing on prescribing decisions.

#### **Benefits**

**Reduced healthcare costs:** Increased use of generic medications can lead to significant cost savings for patients and healthcare systems.

**Improved patient adherence:** Lower costs for generic medications can improve patient adherence to treatment regimens.

**Enhanced transparency:** Prescribing generic medications can promote transparency in prescribing practices and reduce the potential for conflicts of interest.

#### **Strategies to improve**

**Promote generic prescribing:** Encourage healthcare providers to prescribe generic medications whenever possible.

**Education and training:** Provide education and training for healthcare providers on the benefits and use of generic medications.

**Policies and guidelines:** Develop and implement policies and guidelines that support generic prescribing and use.

### **Percentage of encounters with an antibiotic prescribed**

This parameter measures the proportion of patient visits or encounters where an antibiotic is prescribed. It is calculated by dividing the number of encounters with an antibiotic prescribed by the total number of encounters, and then multiplying by 100.

#### **Formula**

Percentage of encounters with an antibiotic prescribed = (Number of encounters with an antibiotic prescribed ÷ Total number of encounters) x 100

#### **Importance**

**Antimicrobial resistance:** Overuse and misuse of antibiotics contribute to the development of antimicrobial resistance, making infections harder to treat.

**Rational prescribing:** Monitoring antibiotic prescribing practices helps promote rational use and reduces the risk of resistance.

**Patient safety:** Inappropriate antibiotic use can lead to adverse reactions, interactions, and increased healthcare costs.

#### **Benefits of monitoring**

**Reduced antimicrobial resistance:** Promoting responsible antibiotic use helps preserve their effectiveness.

**Improved patient outcomes:** Optimizing antibiotic prescribing practices enhances patient safety and treatment outcomes.

**Cost savings:** Reducing unnecessary antibiotic use can lead to cost savings for patients and healthcare systems.

#### **Strategies to improve**

**Guideline adherence:** Encourage healthcare providers to follow evidence-based guidelines for antibiotic prescribing.

**Education and training:** Provide education on appropriate antibiotic use and resistance prevention.

**Monitoring and feedback:** Regularly monitor antibiotic prescribing practices and provide feedback to healthcare providers.

### **Percentage of encounters with an injection prescribed**

This parameter measures the proportion of patient visits or encounters where an injectable medication is prescribed. It is calculated by dividing the number of encounters with an injection prescribed by the total number of encounters, and then multiplying by 100.

#### Formula

Percentage of encounters with an injection prescribed = (Number of encounters with an injection prescribed ÷ Total number of encounters) x 100

#### Importance

**Safety and risk:** Injections carry risks, such as infection, allergic reactions, and needle-stick injuries.

**Cost and resource utilization:** Injections can be more expensive than oral medications and require additional resources.

**Patient comfort and adherence:** Injections can be painful and may affect patient adherence to treatment.

#### Benefits of monitoring

**Optimized treatment:** Ensuring injections are prescribed only when necessary, promotes optimal treatment and minimizes risks.

**Cost savings:** Reducing unnecessary injection use can lead to cost savings for patients and healthcare systems.

**Improved patient experience:** Minimizing injections can enhance patient comfort and satisfaction.

#### Strategies to improve

**Evidence-based guidelines:** Follow guidelines for injectable medication use.

**Alternative treatments:** Consider oral or topical alternatives when possible.

**Education and training:** Educate healthcare providers on safe and effective injectable medication use.

#### Percentage of drugs prescribed from the essential medicines list (eml)

This parameter measures the proportion of medications prescribed that are included on the Essential Medicines List (EML). The EML is a list of essential medications that meet priority healthcare needs.

#### Formula

Percentage of drugs prescribed from EML = (Number of drugs prescribed from EML ÷ Total number of drugs prescribed) x 100

#### Importance

**Evidence-based treatment:** EMLs promote evidence-based treatment and ensure medications are selected based on efficacy, safety, and cost-effectiveness.

**Access to essential medications:** EMLs help ensure access to essential medications for priority healthcare needs.

**Rational prescribing:** Prescribing from the EML promotes rational prescribing practices and reduces unnecessary medication use.

#### Benefits

**Improved patient outcomes:** Ensuring access to essential medications improves patient outcomes.

**Cost savings:** Prescribing from the EML can lead to cost savings due to the selection of cost-effective medications.

**Standardized treatment:** EMLs promote standardized treatment and reduce variability in prescribing practices.

#### Strategies to improve

**Adopt and implement EMLs:** Healthcare facilities and providers should adopt and implement EMLs.

**Education and training:** Educate healthcare providers on the EML and its importance.

**Regular updates:** Regularly update the EML to reflect current evidence and best practices.

#### Factors affecting prescribing patterns

##### Clinical guidelines and protocols

Clinical guidelines and protocols play a significant role in shaping prescribing patterns. These guidelines are developed based on evidence-based medicine and provide recommendations for best practices.

##### Healthcare provider knowledge and training

Healthcare provider knowledge and training are critical factors that influence prescribing patterns. Providers who are well-informed about the latest research, guidelines, and treatment options are more likely to make informed prescribing decisions.

##### Patient characteristics

Patient characteristics, such as age, sex, medical history, and comorbidities, can significantly impact prescribing patterns. Providers must consider these factors when making treatment decisions to ensure that patients receive safe and effective care.

**Pharmaceutical industry influence**

The pharmaceutical industry can influence prescribing patterns through various means, including marketing and advertising, sales representatives, and sponsored events. Providers may be influenced by industry promotions, which can impact their prescribing decisions.

**Healthcare system and policy**

The healthcare system and policy can significantly impact prescribing patterns. Reimbursement policies, insurance coverage, and healthcare financing models can influence treatment decisions.

**Availability and accessibility of medications**

The availability and accessibility of medications can impact prescribing patterns. Providers may need to consider formulary restrictions, medication shortages, or availability of alternative treatments when making treatment decisions.

**Patient expectations and demands**

Patient expectations and demands can influence prescribing patterns. Patients may have specific expectations or preferences for treatment, which can impact provider decision-making. Providers must balance patient expectations with evidence-based medicine and clinical judgment.

**Colleague and peer influence**

Colleague and peer influence can shape prescribing patterns. Providers may seek input or guidance from colleagues or peers when making treatment decisions. Peer review and feedback can also help providers identify areas for improvement and optimize their prescribing practices. Collaboration and communication among healthcare providers can promote best practices and improve patient outcomes.

**Hospital or institutional policies**

Hospital or institutional policies can impact prescribing patterns. These policies may include treatment protocols, medication use evaluations, or antimicrobial stewardship programs. Providers must adhere to these policies to ensure safe and effective care.

**Socioeconomic factors**

Socioeconomic factors, such as income level, education, and cultural background, can influence prescribing patterns. Providers must consider these factors when making treatment decisions to ensure that patients receive care that is tailored to their needs.

**Medication safety and risk management**

Medication safety and risk management are critical considerations when prescribing medications. Providers must be aware of potential adverse effects, interactions, and risks associated with medications. Implementing strategies to minimize risks, such as medication reconciliation or monitoring, can help promote safe and effective care.

**Technological advancements**

Technological advancements, such as electronic health records and clinical decision support systems, can impact prescribing patterns. These technologies can provide providers with real-time information and support evidence-based decision-making.

**Regulatory framework**

The regulatory framework can shape prescribing patterns by establishing standards and guidelines for medication use. Regulatory agencies can also influence prescribing practices through approvals, labeling, and safety alerts.

**Research and evidence**

Research and evidence play a critical role in shaping prescribing patterns. Providers must stay up-to-date with the latest research and evidence-based guidelines to ensure that patients receive the best possible care. Research can also inform treatment decisions and promote innovation in therapeutics.

**Prescriber's personal experience and preference**

A prescriber's personal experience and preference can influence prescribing patterns. Providers may develop preferences for certain medications or treatment approaches based on their clinical experience. However, it's essential for providers to balance personal experience.

### Aim & objective

To evaluate impact of pharmacist on improving therapeutic outcome in patient & observing prescription patterns

- To present rational use of drugs & Antibiotics in various ways of medical fields.
- To assess the prescribing pattern among outpatient using WHO indicators.
- To reduce morality & morbidity.
- To improve quality of life.

## MATERIALS AND METHODS

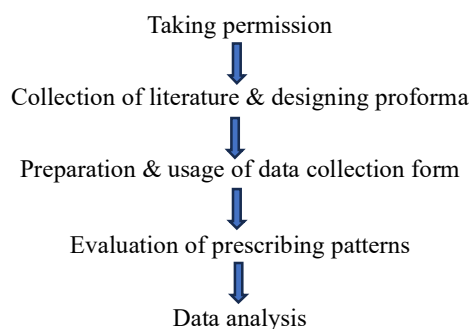
**Study site:** malla reddy hospital

**Study period:** 2 months

**Sample size:** 80

**Study design:** cross sectional

**Study procedure**



### Assessing precribing patterns

1. Average Number of Drugs per Encounter
2. Percentage of Drugs Prescribed by Generic Name
3. Percentage of Encounters with an Antibiotic Prescribed
4. Percentage of Encounters with an Injection Prescribed
5. Percentage of Drugs Prescribed from the Essential Drugs List (EDL)

### Inclusion criteria

1. Patient who are willing to participate in study.
2. Patient age between 0-60 years.
3. Inpatients who are hospitalized for various disease.

### Exclusion criteria

1. Patients who are not willing to co-operate with study.
2. ICU patients & terminally ill patients & unconscious patient.
3. Out patients are excluded

### Data collection

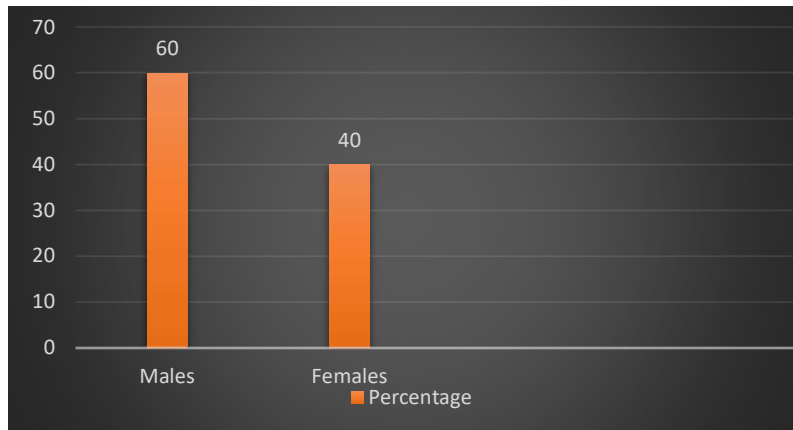
Offline collection

## RESULTS

### Parameter 1: Distribution of patients based on gender.

Gender	No of patients	Percentage
Male	48	60%
Female	32	40%

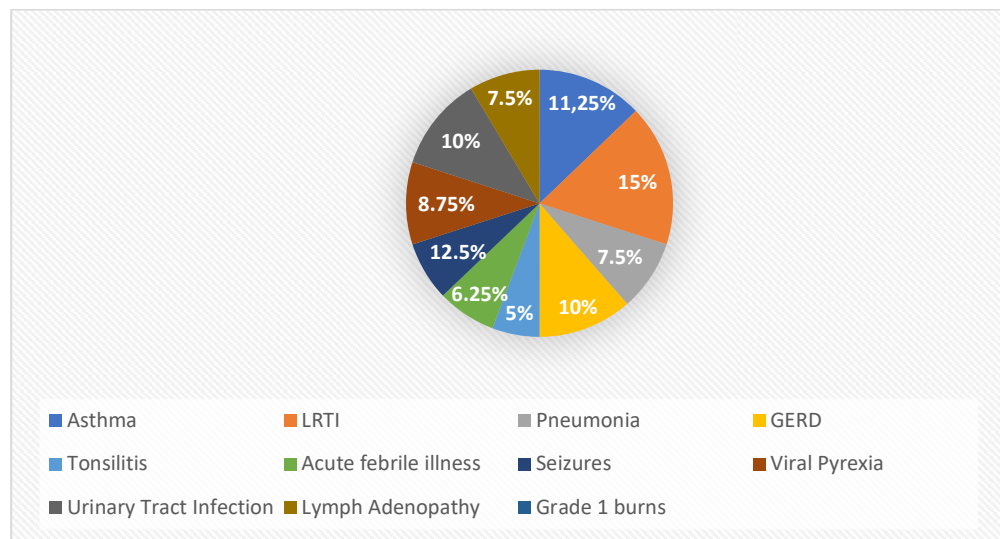
- In a total of 80 patients, 60% were males and 40% were females.



#### Parameter 2: Based on diagnosis.

Diagnosis	No of patients	Percentage
Asthma	9	11.25%
LRTI	12	15%
Pneumonia	6	7.5%
GERD	8	10%
Tonsilitis	4	5%
Acute febrile Illness	5	6.25%
Seizures	5	6.25%
Viral pyrexia	7	8.75%
Urinary tract infection	8	10%
Lymph Adenopathy	6	7.5%
Grade 1 Burns	10	12.5%

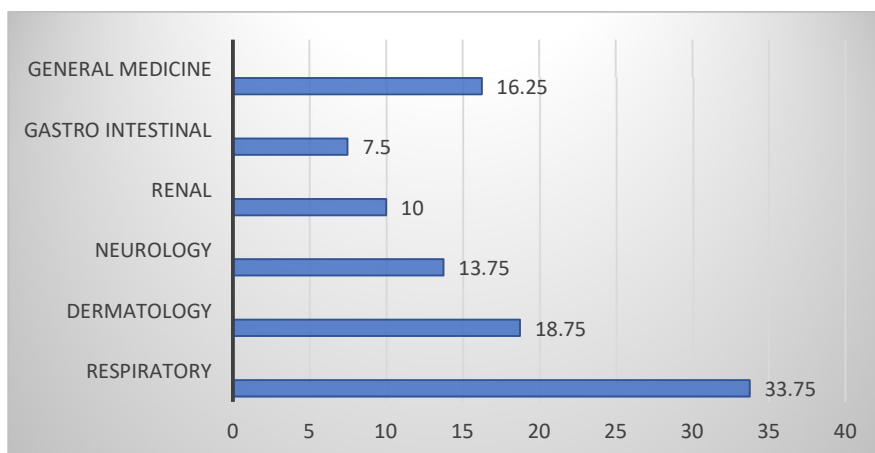
- In a total of 80 patients, most patients (15%) were diagnosed with LRTI and least patients (5%) were diagnosed with Tonsilitis.



#### Parameter 3: Based on branches.

Branches	No of patients	Percentage
Respiratory	27	33.75%
Dermatology	15	18.75%
Neurology	11	13.75%
Renal	8	10%
Gastro Intestinal	6	7.5%
General Medicine	13	16.25%

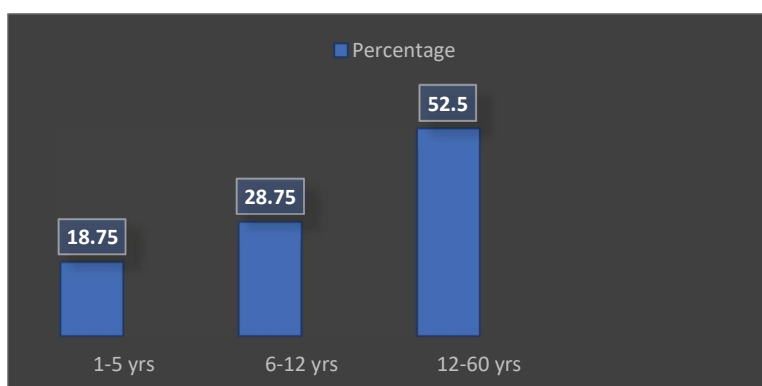
- In relation to parameter 3, most patients (33.75%) were from the Respiratory department and least (7.5%) were from Gastro intestinal department.



#### Parameter 4: Based on Age.

Age	No. of patients	Percentage
1-5 years	15	18.75%
6-12 years	23	28.75%
12-60 years	42	52.5%

- In relation to parameter 4, most patients (52.5%) are in the age group 12-60 years

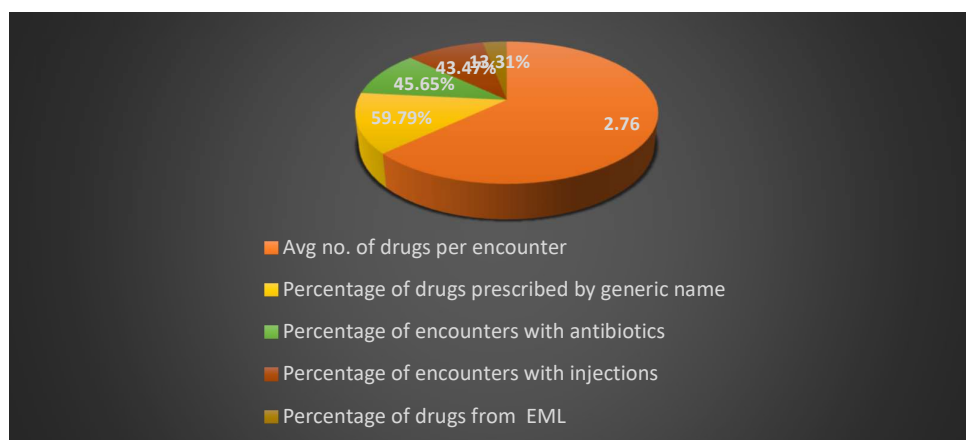


#### Parameter 5: Based on WHO indicators

Indicators	Study value	Standard value
Average number of drugs per encounter	2.76	1.6 - 1.8
Percentage of drugs prescribed by generic name	59.79%	100%
Percentage of encounters with an antibiotic prescribed	45.65%	20% – 26.8%
Percentage of encounters with an injection prescribed	43.47%	13.4% - 24.1%
Percentage of drugs prescribed from the essential medicines list	13.31%	100%

- Most of the drugs were prescribed by Generic names.
- 13.31% of drugs were from the EML.

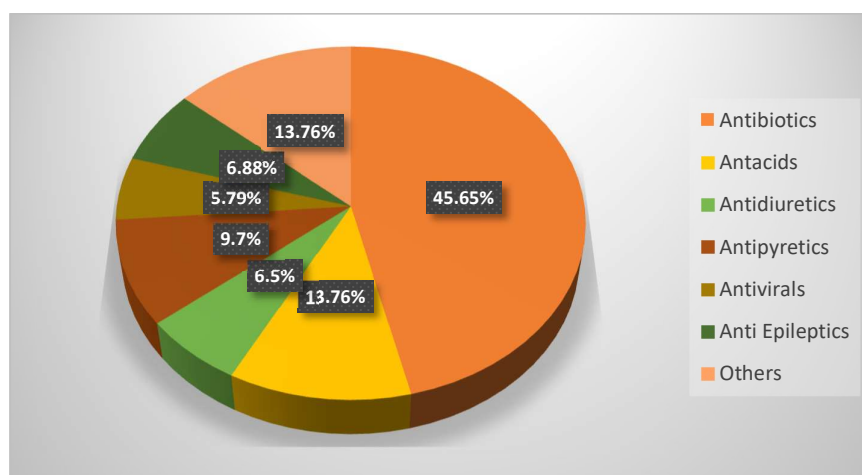




**Parameter 6: Category and Drugs prescribes per prescription**

Category	No of drugs used in prescription	Percentage
Antibiotics	126	45.65%
Antacids	32	11.59%
Antidiuretics	18	6.5%
Antipyretics	27	9.7%
Antivirals	16	5.79%
Anti epileptics	19	6.88%
Others	38	13.76%

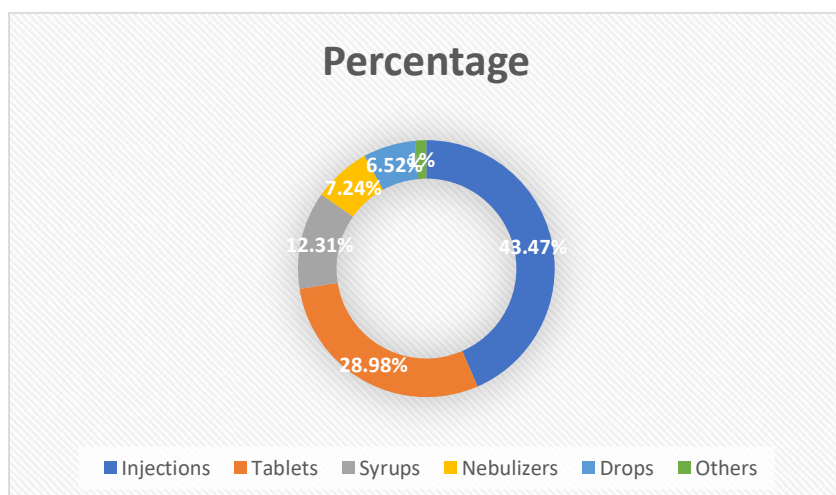
- In relation to parameter 6, Antibiotics are prescribed the highest (45.65%)



**Parameter 7: Dosage forms of prescribed drugs.**

Dosage forms	No of drugs	Percentage
Injections	120	43.47%
Tablets	80	28.98%
Syrups	34	12.31%
Nebulizers	20	7.24%
Drops	18	6.52%
Others	04	1.44%

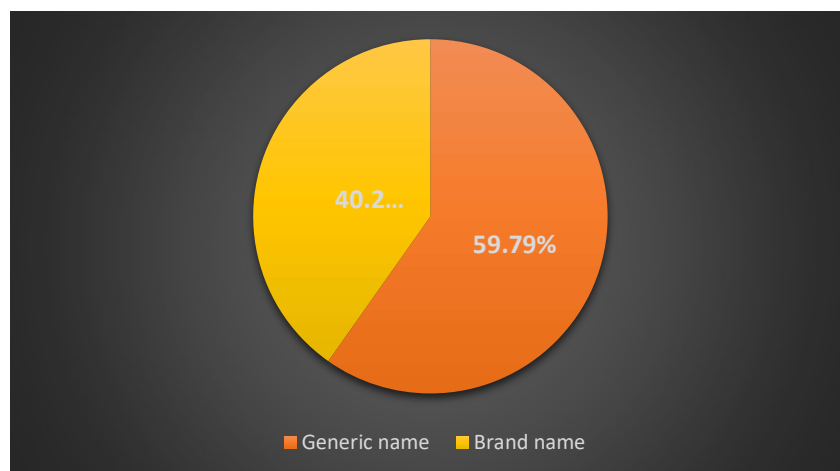
- In relation to parameter 7, highest number of dosage forms prescribed are Injections (43.47%)



**Parameter 8: Drugs prescribed by Generic name and Brand name**

Drug name type	No. of drugs	Percentage
Generic name	165	59.79%
Brand name	111	40.21%

- In relation to parameter 8, the maximum drugs are prescribed by generic name (59.79%)



## DISCUSSIONS

The evaluation of prescribing patterns at Tertiary Care Hospital using WHO core prescribing indicators has provided significant insights into current medication practices and their alignment with rational drug use guidelines. The average number of drugs per encounter in this study was 2.76, which is notably higher than the WHO standard range of 1.6 to 1.8. This finding indicates a trend toward polypharmacy, which raises concerns about potential drug-drug interactions, increased treatment costs, and reduced patient adherence. While complex patient conditions may justify multiple medications, this result suggests the need for regular medication review and efforts to minimize unnecessary prescriptions.

Generic prescribing was found in 59.79% of drugs, which, although encouraging, still falls short of the ideal 100% recommended by WHO. Prescribing by generic name improves affordability, accessibility, and reduces the influence of pharmaceutical marketing. Therefore, educational initiatives and institutional policies promoting generic use should be strengthened to bridge this gap.

The percentage of encounters with an antibiotic prescribed was within the WHO recommended range of 20% to 26.8%, which is a positive finding, suggesting rational antibiotic use. However, antibiotics still accounted for 45.65% of total drugs prescribed, indicating a possible overemphasis on antibiotic therapy in prescriptions. This disparity suggests that while antibiotic encounters are limited, when they are prescribed, they tend to be in

combination or in large numbers. Continuous monitoring and adherence to evidence-based guidelines can further improve the prudent use of antibiotics.

Encounters with injections were also within the standard range of 13.4% to 24.1%, and injectable dosage forms accounted for 43.47% of all prescribed drugs. Although within limits, the high percentage of injections among the total dosage forms suggests a preference for parenteral therapy, which should be evaluated for necessity to avoid injection-related complications and reduce costs.

Prescribing trends varied across departments, with respiratory conditions representing the highest proportion (33.75%) of cases. This aligns with the high use of antibiotics, nebulizers, and antipyretics observed in the data. The age-wise distribution showed a greater number of adult patients (52.5%), yet pediatric groups (47.5%) formed a significant portion, justifying the focus on safety and age-appropriate prescribing.

In terms of dosage forms, tablets (28.98%), syrups (12.31%), and nebulizers (7.24%) were also commonly used, reflecting diverse clinical needs and age-specific formulations. The use of brand names in 40.21% of prescriptions suggests scope for further reduction to ensure uniformity, reduce cost, and support policy compliance.

Overall, the findings suggest moderate adherence to WHO prescribing standards, with areas of excellence such as essential medicine use and rational antibiotic encounters, and areas needing improvement like reducing polypharmacy, enhancing generic prescribing, and evaluating injectable use. A sustained focus on prescriber education, adherence to clinical guidelines, and pharmacist-led interventions can drive further improvements in rational prescribing practices and therapeutic outcomes.

## CONCLUSION

This study provided a comprehensive evaluation of drug prescribing patterns at Tertiary Care Hospital using the World Health Organization's core indicators. The findings illustrate a mixed adherence to rational drug use standards. The complete utilization of the Essential Medicines List and antibiotic prescription rates within WHO-recommended limits are commendable and suggest efforts toward evidence-based and cost-effective treatment. However, the average number of drugs per encounter (2.76) surpasses the recommended range, indicating a trend toward polypharmacy, which can contribute to increased healthcare costs, adverse drug reactions, and reduced patient compliance. Additionally, the rate of generic prescribing at 59.79% highlights an area that requires focused improvement to ensure more affordable and accessible healthcare.

Another significant observation was the high proportion of injectable drug usage, which, while within acceptable encounter rates, formed a large part of the dosage forms prescribed. This suggests a possible overreliance on injections, which may not always be necessary and could be replaced by safer and more comfortable oral alternatives where applicable. The study also reflected a wide range of cases across departments like respiratory, dermatology, and neurology, and a patient demographic spanning children to older adults. These findings stress the importance of individualized treatment, careful medication selection, and age-appropriate formulation use.

In conclusion, while the hospital demonstrates strong performance in key areas of rational prescribing, there remains a critical need for ongoing improvements. Interventions such as structured prescriber education, regular prescription audits, better implementation of generic policies, and increased involvement of clinical pharmacists are essential. These steps can promote safer, more effective, and economically viable medication practices. Ultimately, continual monitoring and commitment to WHO standards will ensure better therapeutic outcomes and enhanced quality of patient care in tertiary healthcare settings.

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