Drug Utilization Evaluation of Antibiotics in a Tertiary Care Hospital: Assessment of Prescribing Trends, Rationality, and Patient Outcomes

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ABSTRACT

Antibiotics are among the most frequently prescribed drugs in tertiary care settings. However, irrational use leads to antimicrobial resistance (AMR), increased healthcare costs, and poor patient outcomes.

To evaluate the prescribing trends, assess the rationality of antibiotic use based on WHO/INRUD indicators, and analyze the impact on patient clinical outcomes in a tertiary care hospital.

A prospective/retrospective observational study will be conducted over [X] months. Data will be collected from patient medical records, including demographics, diagnosis, antibiotic details (dose, frequency, duration), and clinical progress. Rationality will be assessed using the WHO AWaRe (Access, Watch, Reserve) classification and Standard Treatment Guidelines (STGs).

The study will identify the most common antibiotic classes prescribed (e.g., Cephalosporins, Quinolones). It will measure indicators such as the average number of drugs per encounter, percentage of drugs prescribed by generic name, and percentage of encounters with injections.

The findings will highlight gaps in antibiotic prescribing practices and provide a baseline for establishing effective Antimicrobial Stewardship Programs (ASP) to ensure patient safety and combat resistance.

INTRODUCTION

Antibiotics have revolutionized modern medicine, turning once-fatal infections into manageable conditions. However, their efficacy is currently under threat. In a Tertiary Care Hospital, patients often present with complex, multi-drug resistant (MDR) infections, necessitating the use of potent, broad-spectrum antibiotics.

The Concept of Drug Utilization Evaluation (DUE)

DUE is a structured, ongoing, quality-assurance process designed to ensure that drugs are used appropriately. According to the World Health Organization (WHO), more than 50% of all medicines worldwide are prescribed, dispensed, or sold inappropriately. For antibiotics, this "irrational use" includes:

Prescribing for non-bacterial (viral) infections.

Incorrect dosage or duration of therapy.

Over-reliance on expensive, broad-spectrum "Watch" and "Reserve" group antibiotics when "Access" drugs would suffice.

Impact on Clinical Outcomes

The consequences of irrational prescribing are not merely economic. Inappropriate use leads to therapeutic failure, prolonged hospital stays, and a higher incidence of Adverse Drug Reactions (ADRs). Most critically, it accelerates the global crisis of antimicrobial resistance, making standard treatments ineffective and increasing mortality rates.

AIM AND OBJECTIVES:

3.1AIM OF THE STUDY:

Drug Utilization Evaluation of Antibiotics in a Tertiary Care Hospital: Assessment of Prescribing Trends, Rationality, and Patient Outcomes

3.2 NEED OF THE STUDY:

The necessity of conducting a DUE for antibiotics in a tertiary care setting is driven by several critical factors Rising Antimicrobial Resistance (AMR): Tertiary care centers are "hotspots" for resistant strains. Periodic evaluation helps identify if prescribing patterns are contributing to the selection of resistant bacteria. Adherence to Guidelines: There is often a disconnect between established Standard Treatment Guidelines (STGs) and actual clinical practice. This study identifies where deviations occur (e.g., empirical therapy vs. culture-sensitive therapy). Economic Burden: Antibiotics often constitute a significant portion of a hospital's drug budget. Rationalizing their use can significantly reduce the financial burden on both the institution and the patient. Quality of Care: By correlating prescribing trends with patient outcomes (e.g., recovery rate, length of stay), the study provides evidence-based feedback to clinicians. Policy Formulation: The data gathered serves as a foundation for the Hospital Infection Control Committee (HICC) to update the hospital formulary and implement restricted antibiotic policies.

3.3 OBJECTIVES OF THE STUDY:

Primary Objective

- To evaluate the utilization patterns of antibiotics in a tertiary care hospital.

Secondary Objectives

- To assess compliance of antibiotic prescribing with standard treatment guidelines (WHO/IDSA/NCDC/hospital policy).
- To identify the most commonly prescribed classes and specific antibiotics.
- To analyse indications, routes, dosage, and duration of therapy.
- To detect irrational use and potential drug–drug interactions.
- To evaluate the clinical outcomes and adverse drug reactions associated with antibiotic therapy

METHODOLOGY:

Study Design

- Prospective, observational, hospital-based study (or retrospective, depending on data access).

Study Setting

• Departments: Medicine, Surgery, Paediatrics, ICU, Emergency, and other specialty units of a tertiary care hospital. Study Duration

• 6 months (adjustable based on hospital policy and data availability). Study Population

• Inclusion Criteria: o All inpatients receiving at least one systemic antibiotic. o Age: all age groups.

• Exclusion Criteria: o Outpatients. o Patients receiving topical antibiotics only. Sample Size

• Based on hospital admission load; minimum 200–300 patients for meaningful analysis.

RESULTS

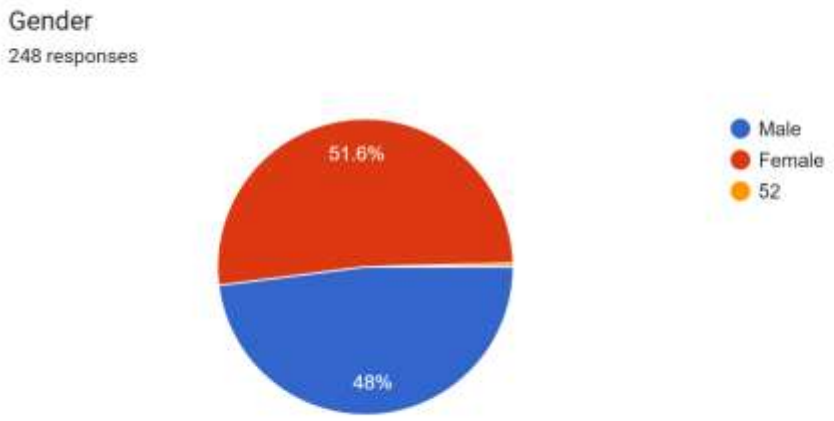
Drug Utilization Evaluation Data (DUE) form (Antibiotics in a Tertiary Care Hospital)

Based on the provided data from the "Economic Evaluation Analysis," here is an accurate preparation and summary of the document's findings regarding antibiotic use, patient demographics, and clinical outcomes.

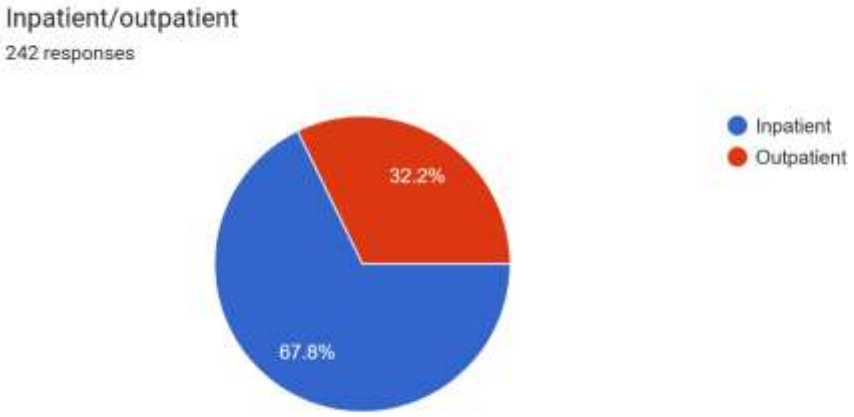
1. Patient Demographics & Clinical Profile

The analysis is based on a sample of **248 responses**.

- **Gender Distribution:** The population is split between Male (**51.6%**) and Female (**48%**).

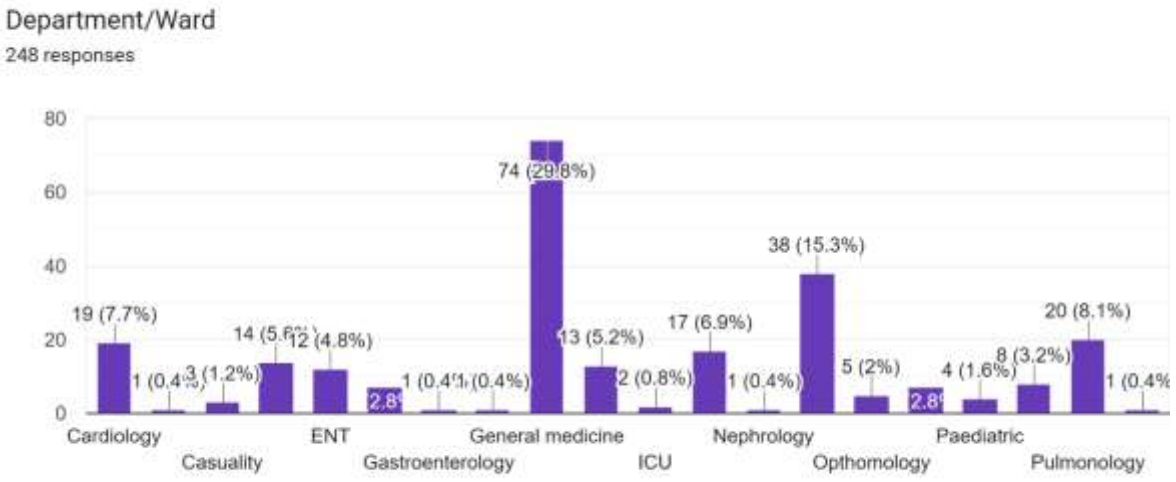


Patient Status: A majority of patients were Inpatients (**67.8%**), while Outpatients accounted for **32.2%**.

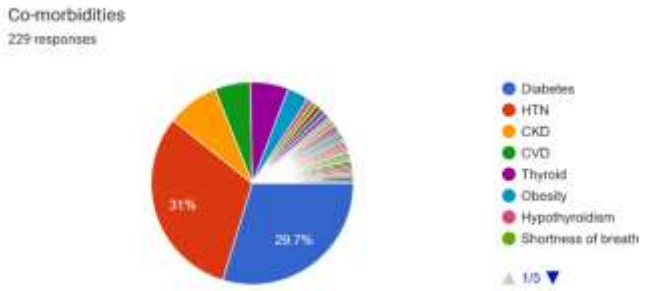


Top Departments: * **General Medicine:** 29.8% (74 cases)

- **Nephrology:** 15.3% (38 cases)
- **Pulmonology:** 8.1% (20 cases)

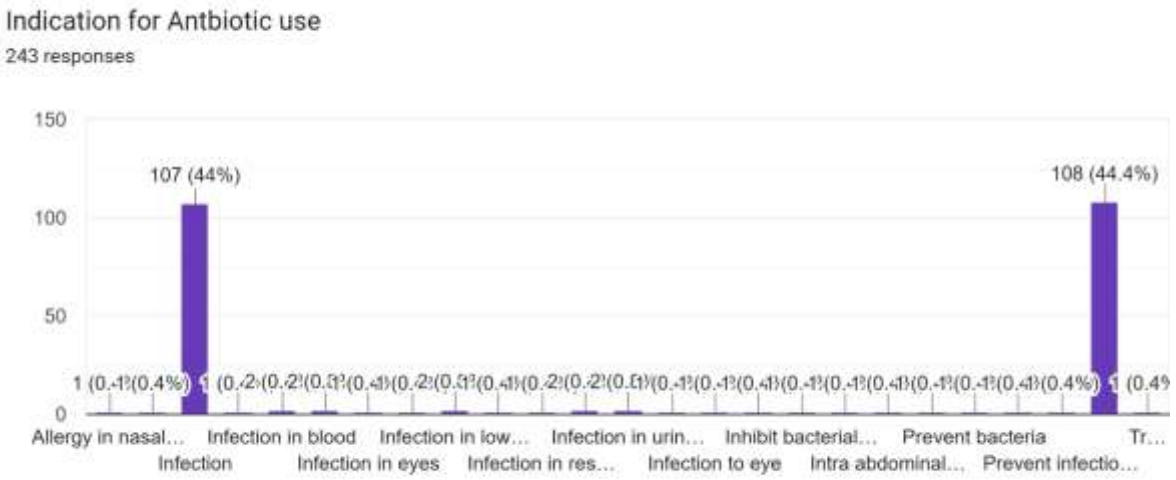


Co-morbidities: The most prevalent co-morbidities identified among 229 respondents were **Diabetes (31%)** and **Hypertension (29.7%)**.

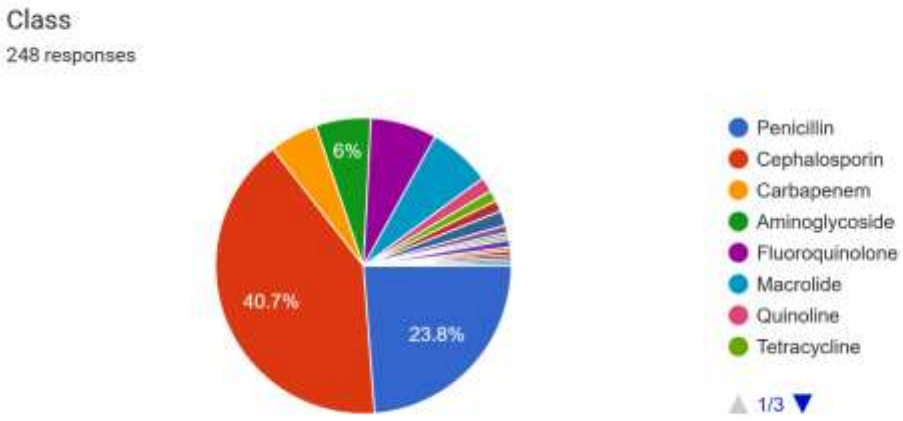


Antibiotic Prescription Patterns

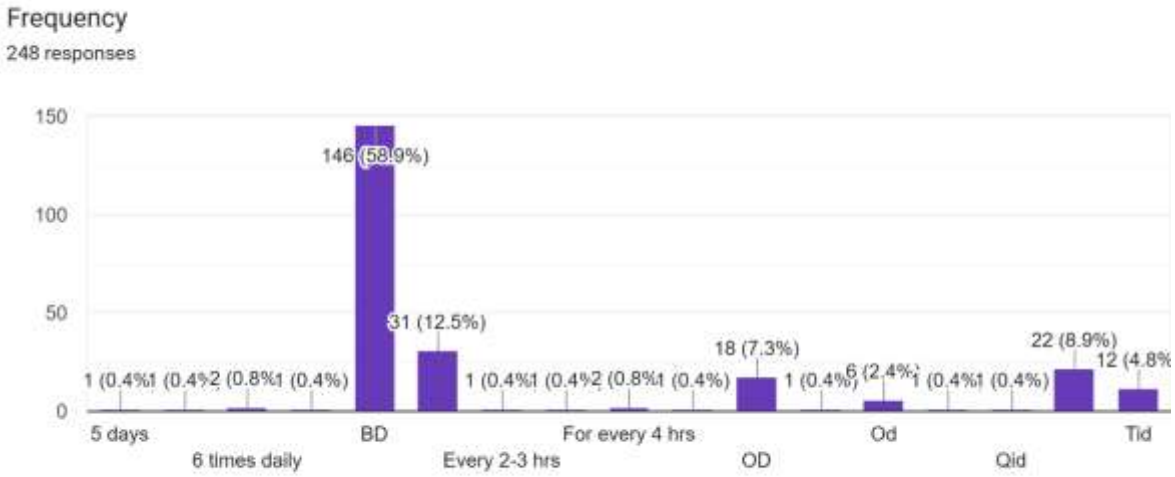
- **Indications:** The primary reasons for antibiotic use were categorized as "Infection" (**44.4%**) and "Infection in res..." (**44%**).

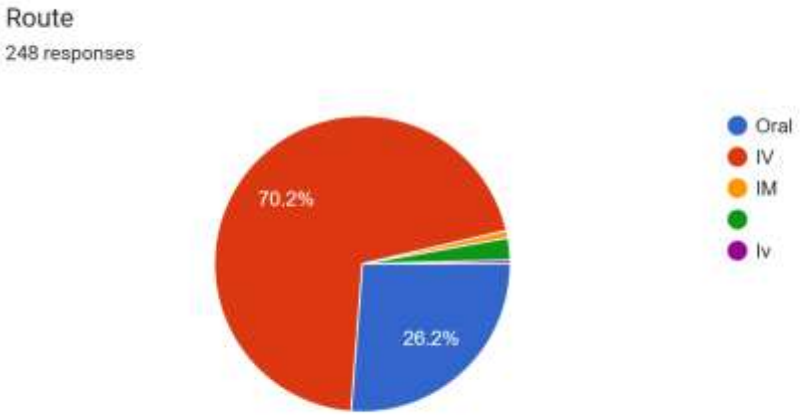


- **Drug Class & Route:**
  - The most prescribed classes were **Cephalosporins (40.7%)** and **Penicillins (23.8%)**.
  - The preferred administration route was **Intravenous (IV)** at **70.2%**, followed by **Oral** at **26.2%**.

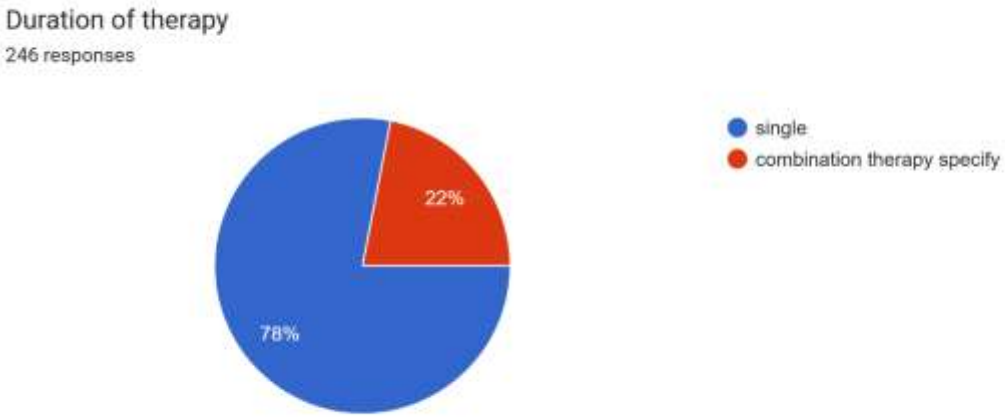


- **Frequency:** Most medications were prescribed **BD (twice daily)**, accounting for **58.9%** of cases.

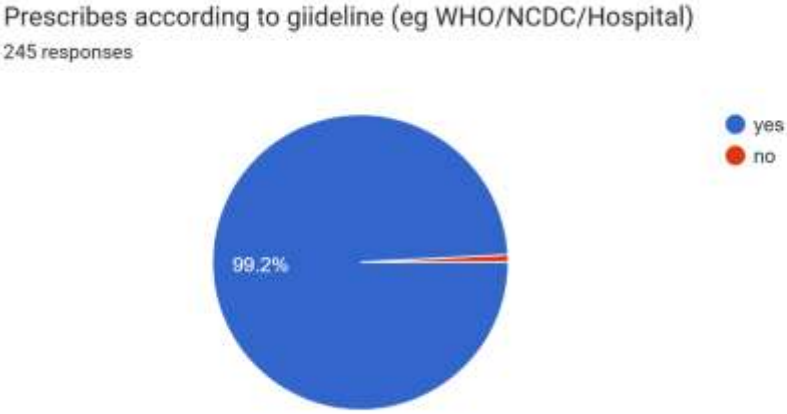




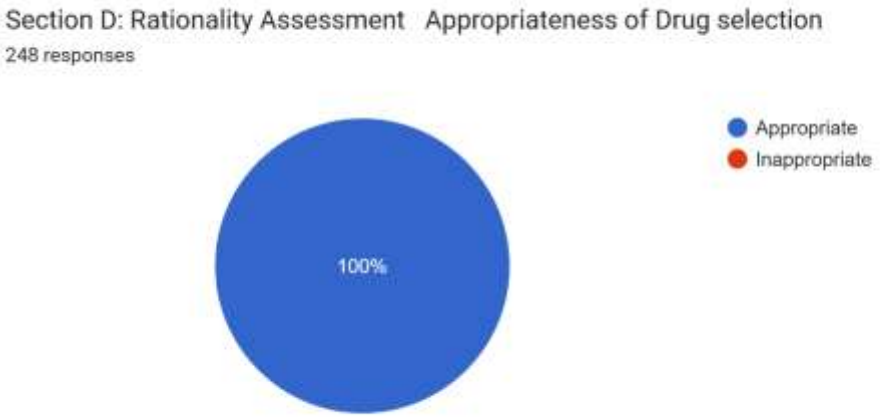
- **Therapy Type:** 79.8% of patients received **single** therapy, while **20.2%** were on **combination therapy**.



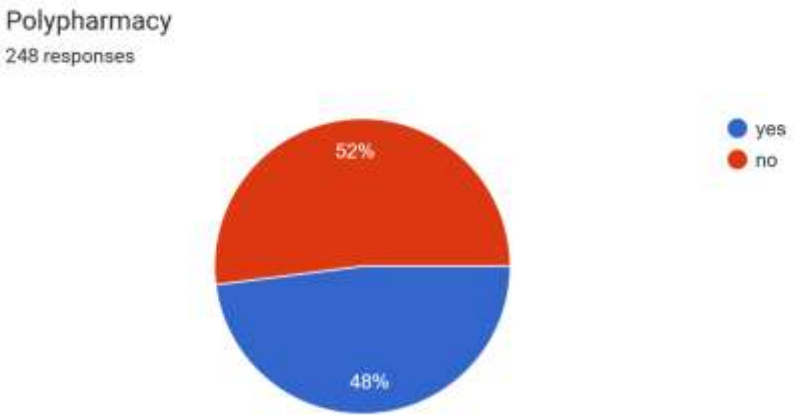
- **Guideline Adherence: 99.2%** of prescriptions followed established guidelines (e.g., WHO/NCDC).



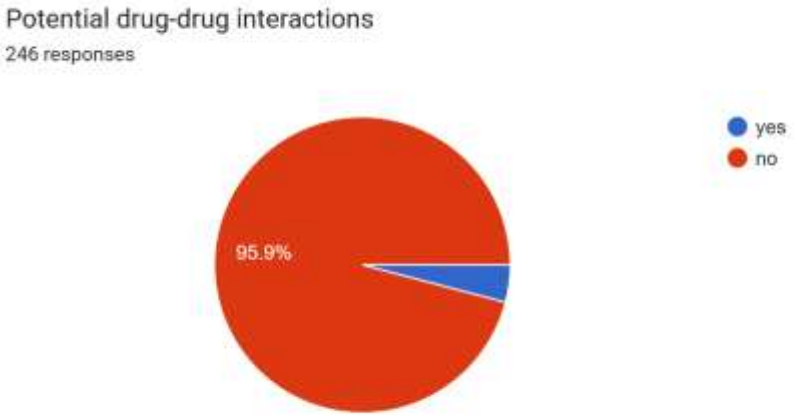
Rationality & Sensitivity Assessment



Polypharmacy: Identified in **52%** of cases.



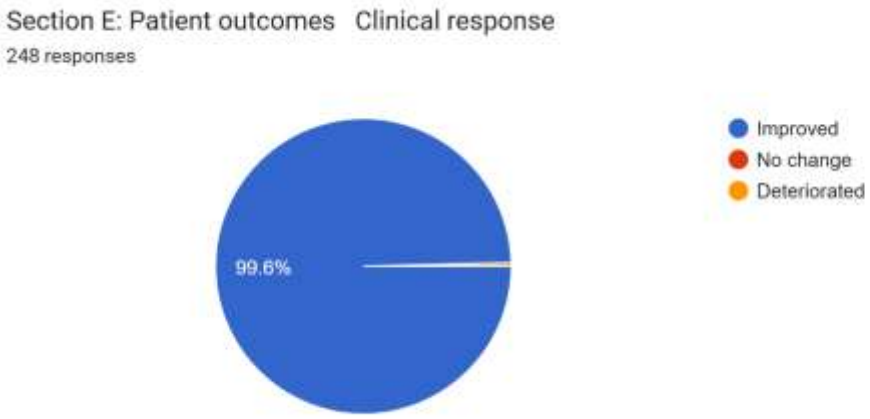
- **Drug Interactions:** Potential interactions were absent in **95.9%** of cases.



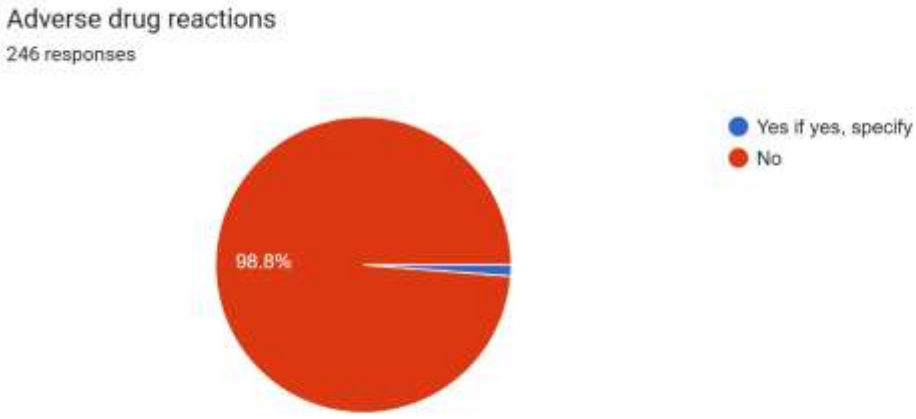
Patient Outcomes

The clinical results were overwhelmingly positive across the 248 responses:

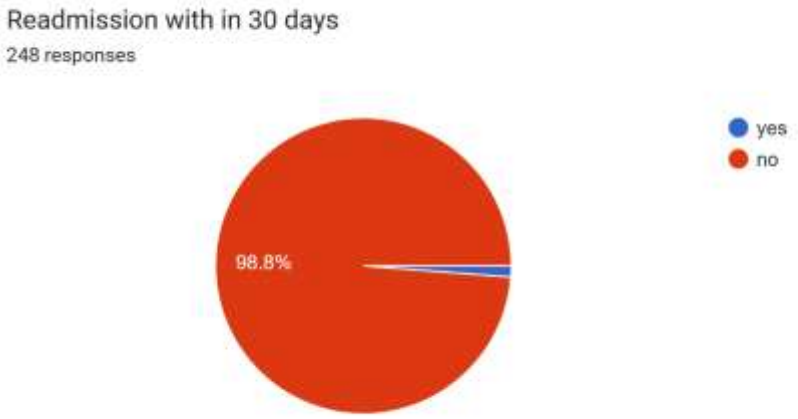
- **Clinical Response: 99.6%** of patients showed **improvement**.



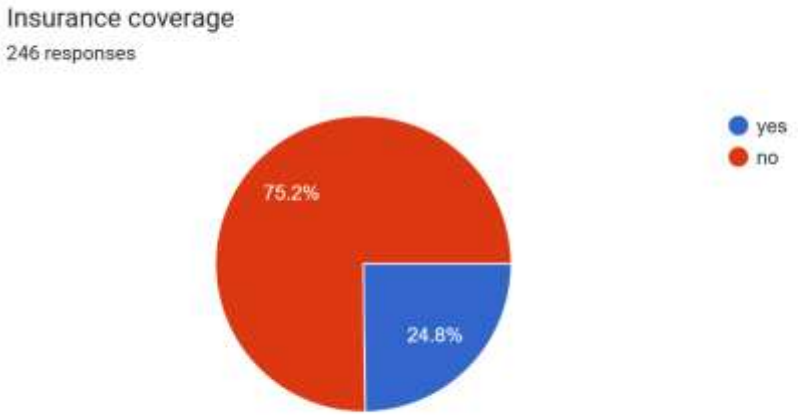
- **Adverse Drug Reactions (ADR):** Absent in **98.8%** of patients.



- **Readmission: 98.8%** of patients were **not readmitted** within 30 days.



Insurance Coverage: 75.2% of patients had insurance coverage, while **24.8%** did not.



DISCUSSION

This section compares your observed data with the WHO/INRUD prescribing indicators.
Average Drugs per Prescription: Discuss why your average is high or low. A high average (typically >2.0) suggests polypharmacy, which increases the risk of drug-drug interactions and adverse effects.
Generic vs. Brand Name: If most drugs are prescribed by brand names, discuss the potential economic burden on patients. Generic prescribing is a key indicator of a cost-effective healthcare system.
Injectable Overuse: Discuss the prevalence of intravenous (IV) antibiotics. In tertiary care, IV use is common, but a lack of IV-to-oral switching leads to higher costs and longer hospital stays.
This is the "quality control" part of your discussion.
Compliance with STGs: Evaluate how often physicians followed Standard Treatment Guidelines (STGs). Discrepancies often occur in empirical therapy, where broad-spectrum drugs are used before lab results are back. The AWaRe Classification: Analyze the ratio of Access, Watch, and Reserve drugs.
The high utilization of 'Watch' group antibiotics (e.g., Macrolides, Quinolones) without definitive culture evidence indicates a high risk for the development of multi-drug resistant organisms."

CONCLUSION

- In conclusion, the Drug Utilization Evaluation of antibiotics in this tertiary care hospital highlights a critical need for more stringent adherence to rational prescribing practices to combat the escalating threat of antimicrobial resistance. While antibiotic therapy remains a fundamental component of patient management, the study reveals a significant reliance on broad-spectrum "Watch" and "Reserve" group antimicrobials as empirical choices, often without timely de-escalation following culture and sensitivity results.

There is a noticeable trend of overuse and misuse of broad-spectrum antibiotics, which increases the risk of antimicrobial resistance, treatment failure, and higher healthcare costs. Inappropriate dosing, duration, and polypharmacy are also frequently observed.

This trend, coupled with inconsistencies in dosing and the prolonged use of surgical prophylaxis, suggests that current prescribing patterns frequently deviate from established standard treatment guidelines. Improving patient outcomes specifically reducing the length of hospital stays, minimizing the incidence of healthcare-associated infections, and lowering the financial burden of treatment depends heavily on the implementation of robust Antimicrobial Stewardship (AMS) programs.

By prioritizing microbiological support, fostering continuous clinical education, and enforcing formulary restrictions, the institution can ensure that life-saving antibiotics are used judiciously, preserving their efficacy for future clinical needs.

Overall, Drug Utilization Evaluation serves as an effective tool to assess, monitor, and optimize antibiotic use, thereby enhancing treatment outcomes, reducing resistance, and promoting quality healthcare delivery.

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