

ANTIMICROBIAL PRESCRIBING PATTERN IN MEDICINE DEPARTMENT OF A TERTIARY CARE HOSPITAL: A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Background: Irrational antimicrobial use is a major contributor to antimicrobial resistance (AMR), a global public health threat. Drug utilization studies are essential to evaluate prescribing practices and promote rational antimicrobial use in hospital settings.

Objectives: To assess antimicrobial prescribing patterns in the Medicine department of a tertiary care hospital, evaluate rationality using WHO prescribing indicators and standard treatment guidelines, determine the proportion of culture-guided prescriptions, and analyze broad- versus narrow-spectrum utilization.

Methods: A prospective observational study was conducted in the Medicine department over six months. A total of 400 prescriptions containing at least one antimicrobial were analyzed. Data were collected using a structured proforma including demographic details, diagnosis, antimicrobial class, route, generic prescribing, culture sensitivity reports, and adherence to essential medicines list. WHO prescribing indicators were applied. Data were analyzed using descriptive statistics.

Results: The majority of patients were aged 46–60 years (31%), with male predominance (59%). Respiratory tract infections were the most common indication (33%). Cephalosporins (31%) were the most frequently prescribed class. Intravenous route was used in 62% of cases. Broad-spectrum antimicrobials constituted 67% of prescriptions. Culture sensitivity-guided therapy was observed in 28% of cases, while 72% were empirical. Generic prescribing was 42%, and 78% of drugs were from the Essential Medicines List. The mean number of antimicrobials per prescription was 1.46.

Conclusion: Antimicrobial prescribing showed a predominance of empirical and broad-spectrum use, with suboptimal culture-guided and generic prescribing. Strengthening antimicrobial stewardship and adherence to standard treatment guidelines is essential to curb AMR.

Keywords: Antimicrobial use, prescribing pattern, WHO indicators, antimicrobial resistance, drug utilization.

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INTRODUCTION

Antimicrobial resistance (AMR) has emerged as one of the most serious global public health threats of the 21st century. The World Health Organization (WHO) has identified AMR as a critical challenge that undermines the effective treatment of infections and increases morbidity, mortality, and healthcare costs¹. The Global Action Plan on Antimicrobial Resistance emphasizes rational antimicrobial use as a cornerstone strategy to contain resistance².

Inappropriate antimicrobial prescribing—including unnecessary use, incorrect dosing, prolonged duration, and excessive use of broad-spectrum agents—is a key driver of AMR³. Studies have demonstrated that a significant proportion of antimicrobials prescribed in hospital settings are either unnecessary or suboptimally used⁴. In low- and middle-income countries, limited microbiological diagnostic support and empirical therapy practices further contribute to irrational use⁵. Drug utilization studies are essential tools for evaluating prescribing practices in healthcare facilities. They provide insight into patterns of antimicrobial use and help identify areas requiring intervention⁶. WHO prescribing indicators offer

standardized measures for assessing rational drug use, including average number of drugs per encounter, percentage prescribed by generic name, and use of essential medicines⁷.

India is among the largest consumers of antibiotics globally, with increasing use of broad-spectrum agents such as third-generation cephalosporins and carbapenems⁸. Surveillance data indicate rising resistance rates across multiple pathogens, largely attributed to inappropriate antimicrobial exposure⁹. Antimicrobial stewardship programs (ASP) have been recommended to optimize therapy, promote culture-guided treatment, and reduce broad-spectrum overuse¹⁰.

Understanding local antimicrobial prescribing trends is crucial for designing effective stewardship interventions. Therefore, the present study was conducted to assess antimicrobial prescribing patterns, evaluate rationality using WHO indicators, and analyze culture-guided and spectrum-based utilization in the Medicine department of a tertiary care hospital.

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of Medicine of a tertiary care teaching hospital over a period of six months. The study aimed to evaluate antimicrobial prescribing practices in routine clinical settings without interfering with physician decision-making.

All adult patients aged 18 years and above who received at least one antimicrobial agent during their hospital stay were included in the study. Prescriptions from intensive care units and other specialty departments were excluded to maintain uniformity of clinical practice patterns within the Medicine department. Incomplete prescriptions lacking essential information were also excluded.

The sample size was calculated using the formula for estimating a proportion in a descriptive study: $n = Z^2pq/d^2$. Assuming an expected proportion (p) of 50% to maximize sample size, with a 95% confidence level (Z = 1.96) and allowable error (d) of 5%, the calculated sample size was 384. To compensate for incomplete data and rounding, a total of 400 prescriptions were included.

Data were collected using a structured predesigned proforma. Information recorded included patient demographics (age and gender), clinical diagnosis, number of antimicrobials prescribed, class of antimicrobial, route of administration, dosage form, duration of therapy, generic or brand prescribing, and whether therapy was empirical or based on culture and sensitivity reports. Antimicrobials were categorized as broad-spectrum or narrow-spectrum according to WHO AWaRe classification¹¹.

The rationality of prescribing was assessed using WHO core prescribing indicators⁷. The percentage of drugs prescribed by generic name and those from the Essential Medicines List were calculated. Data were entered into Microsoft Excel and analyzed using descriptive statistics. Continuous variables were expressed as mean, and categorical variables were expressed as frequency and percentage.

Ethical approval was obtained from the Institutional Ethics Committee prior to study initiation. Patient confidentiality was maintained throughout the study.

RESULTS

Table 1. Demographic Profile of Patients (n = 400)

Variable	Frequency	Percentage (%)
Age Group (years)		
18–30	72	18%
31–45	108	27%
46–60	124	31%
>60	96	24%
Gender		
Male	236	59%
Female	164	41%

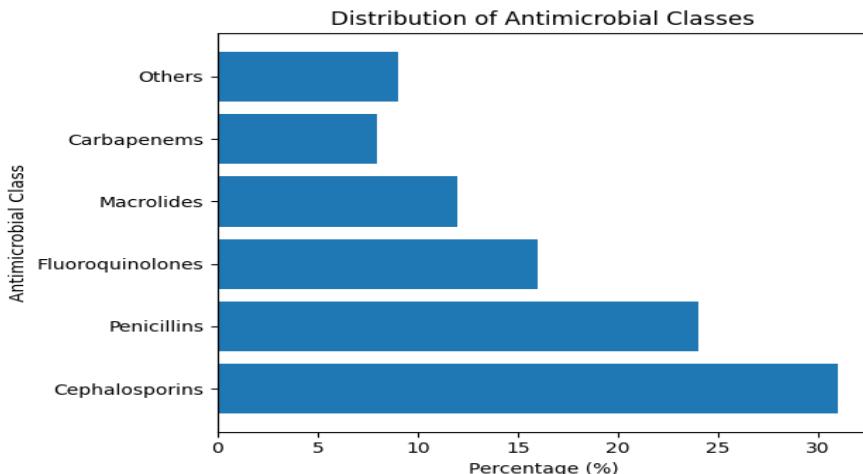
Table 2. Indications for Antimicrobial Prescribing

Diagnosis	Frequency	Percentage (%)
Respiratory tract infections	132	33%
Urinary tract infections	84	21%
Gastrointestinal infections	56	14%
Skin & soft tissue infections	48	12%
Sepsis	36	9%
Others	44	11%

Table 3. Number of Antimicrobials per Prescription

No. of Antimicrobials	Frequency	Percentage (%)
1	252	63%
2	112	28%
≥3	36	9%

Mean antimicrobials per prescription = 1.46

**Chart 1. Class of Antimicrobials Prescribed****Table 4. Route of Administration**

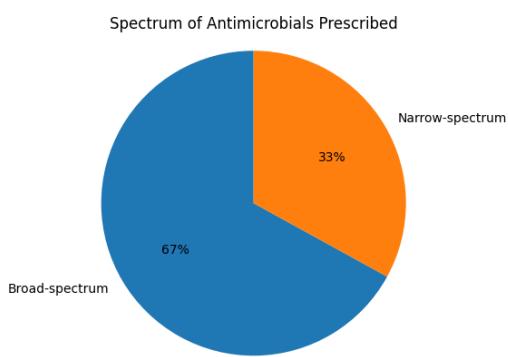
Route	Frequency	Percentage (%)
Intravenous	248	62%
Oral	140	35%
Others	12	3%

Table 5. Generic vs Brand Prescribing

Type	Frequency	Percentage (%)
Generic	168	42%
Brand	232	58%

Table 6. Culture & Sensitivity Based Prescribing

Parameter	Frequency	Percentage (%)
Based on C/S report	112	28%
Empirical therapy	288	72%

**Chart 2. Broad vs Narrow Spectrum Antimicrobials****Table 7. WHO Prescribing Indicators**

Indicator	Value
Average number of drugs per prescription	3.8
Average number of antimicrobials per prescription	1.46
% prescriptions with antimicrobial	100% (study-specific inclusion)
% prescribed by generic name	42%
% from Essential Medicines List	78%

A total of 400 prescriptions containing at least one antimicrobial were analyzed. The majority of patients belonged to the 46–60-year age group (31%), followed by patients aged over 60 years (24%). Males constituted 59% of the study population.

Respiratory tract infections were the most common indication for antimicrobial therapy (33%), followed by urinary tract infections (21%) and gastrointestinal infections (14%). The mean number of antimicrobials per prescription was 1.46. Monotherapy was observed in 63% of cases, dual therapy in 28%, and three or more antimicrobials in 9%.

Cephalosporins were the most frequently prescribed class (31%), followed by penicillins with or without β -lactamase inhibitors (24%) and fluoroquinolones (16%). Broad-spectrum antimicrobials accounted for 67% of prescriptions, while narrow-spectrum agents constituted 33%.

Intravenous administration was used in 62% of cases, reflecting inpatient severity. Only 28% of prescriptions were based on culture and sensitivity reports, whereas 72% were empirical. Generic prescribing was observed in 42% of cases. Approximately 78% of antimicrobials were from the WHO Essential Medicines List.

DISCUSSION

The present study highlights significant trends in antimicrobial prescribing within a tertiary care Medicine department. The predominance of respiratory tract infections aligns with global inpatient epidemiological patterns¹². Similar findings have been reported in hospital-based drug utilization studies where respiratory infections constituted a major indication for antimicrobial therapy¹³.

Cephalosporins emerged as the most commonly prescribed class, consistent with global antibiotic consumption trends showing increased β -lactam use⁸. The overuse of third-generation cephalosporins has been associated with rising resistance among Gram-negative organisms⁹. WHO has emphasized the need to restrict the use of “Watch” category antibiotics to reduce resistance selection pressure¹¹.

A high proportion of empirical therapy (72%) was observed. While empirical therapy is often necessary in acute settings, limited microbiological confirmation may contribute to inappropriate continuation of broad-spectrum agents⁴. Studies indicate that culture-guided therapy significantly improves antimicrobial optimization and reduces resistance development¹⁰.

Broad-spectrum antimicrobials accounted for two-thirds of prescriptions, reflecting global concerns regarding overuse of extended-spectrum agents³. The WHO Global Action Plan recommends strengthening antimicrobial stewardship programs to promote rational prescribing and increase adherence to essential medicines guidelines².

Generic prescribing was suboptimal (42%) compared to WHO recommendations advocating generic prescribing to ensure cost-effectiveness and rational use⁷. Increasing adherence to essential medicines lists and implementing hospital antibiotic policies can significantly enhance prescribing quality⁶.

Overall, the findings underscore the need for institutional antimicrobial stewardship programs, improved microbiological support, and adherence to standard treatment guidelines to mitigate antimicrobial resistance.

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