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RESEARCH ARTICLE

Assessment of Rational Antibiotic use in General Medicine Wards: a Prospective Observational Study

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ABSTRACT

Background: Irrational use of antibiotics is a major contributor to antimicrobial resistance (AMR), increased healthcare costs, and adverse drug reactions. Monitoring antibiotic prescribing patterns is essential for promoting rational drug use.
Objective: To assess the rational use of antibiotics in general medicine wards of a tertiary care hospital.
Methods: This prospective observational study was conducted over 12 months (February 2025 to January 2026) at Bhagwan Mahavir Institute of Medical Sciences, Pawapuri. A total of 190 patients admitted to general medicine wards and receiving antibiotics were included. Data regarding demographics, diagnosis, antibiotic prescriptions, and adherence to standard guidelines were collected. Rationality was assessed using WHO prescribing indicators and standard treatment guidelines. Statistical analysis was performed using SPSS version 25.
Results: Out of 190 patients, 61.6% received rational antibiotic therapy, while 38.4% prescriptions were irrational. The most common irrationalities included inappropriate drug selection (18.4%), incorrect duration (11.6%), and improper dosage (8.4%). Third-generation cephalosporins were the most commonly prescribed antibiotics (42.1%). Culture sensitivity testing was performed in only 36.8% cases. A statistically significant association was found between culture testing and rational prescribing ($p < 0.05$).
Conclusion: A substantial proportion of antibiotic use was irrational. Strengthening antimicrobial stewardship programs and adherence to treatment guidelines are essential to improve rational antibiotic use.
Keywords: Antibiotics, Rational use, Antimicrobial resistance, Prescription pattern, Stewardship
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INTRODUCTION

Antibiotics have revolutionized modern medicine by effectively treating bacterial infections and reducing mortality rates. However, the irrational use of antibiotics has emerged as a global health challenge, contributing significantly to antimicrobial resistance (AMR) [1]. AMR leads to prolonged hospital stays, increased healthcare costs, and higher mortality [2].

The World Health Organization (WHO) defines rational use of medicines as patients receiving medications appropriate to their clinical needs, in doses that meet their requirements, for an adequate duration, and at the lowest cost [3]. Despite clear guidelines, irrational antibiotic use remains prevalent, particularly in developing countries [4].

Common forms of irrational antibiotic use include overprescription, inappropriate drug selection, incorrect dosing, and unnecessary prolonged duration [5,6]. Studies have shown that up to 50% of antibiotic prescriptions are inappropriate [7].

Hospital settings, especially general medicine wards, are key areas where antibiotic misuse can occur due to diagnostic uncertainty and empirical treatment practices [8]. Lack of microbiological confirmation further contributes to inappropriate prescribing [9].

Antimicrobial stewardship programs (ASPs) have been introduced globally to optimize antibiotic use and

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reduce resistance [10]. However, their implementation remains inconsistent in many healthcare settings [11].
In India, the burden of AMR is particularly high due to widespread antibiotic misuse and lack of strict regulatory frameworks [12]. Evaluating prescribing patterns and identifying gaps in rational use are crucial steps toward improving antibiotic stewardship [13].

This study aims to assess the rational use of antibiotics in general medicine wards at a tertiary care hospital and identify factors associated with irrational prescribing.

MATERIALS AND METHODS

Study Design and Setting

This was a prospective observational study conducted in the general medicine wards of Bhagwan Mahavir Institute of Medical Sciences, Pawapuri.

Study Duration

12 months (February 2025 to January 2026).

Sample Size

A total of 190 patients were included in the study.

Inclusion Criteria

- Patients aged ≥18 years
- Patients admitted to general medicine wards
- Patients receiving at least one antibiotic

Exclusion Criteria

- ICU patients
- Patients discharged within 24 hours
- Incomplete medical records

Data Collection

Data were collected using a structured proforma, including:

- Demographic details
- Clinical diagnosis
- Antibiotic prescriptions (drug, dose, route, duration)
- Laboratory investigations

Assessment of Rationality

- Rationality was assessed based on:
- WHO prescribing indicators
- Standard treatment guidelines
- Culture sensitivity reports

Statistical Analysis

Data were analyzed using SPSS version 25. Descriptive statistics were expressed as mean ± standard deviation and percentages. Chi-square test was used for association. A p-value < 0.05 was considered statistically significant.

RESULTS

Table 1: Demographic Characteristics of Patients

Variable	*Frequency (n=190)*	*Percentage (%)*
Male	112	58.9
Female	78	41.1
Mean Age (years)	46.2 ± 15.3	—

Table 2: Distribution of Antibiotic Classes

Antibiotic Class	*Frequency*	*Percentage (%)*
Cephalosporins	80	42.1
Penicillins	35	18.4
Fluoroquinolones	28	14.7
Macrolides	22	11.6
Others	25	13.2

Table 3: Rational vs Irrational Antibiotic Use

Category	*Frequency*	*Percentage (%)*
Rational	117	61.6
Irrational	73	38.4

Table 4: Types of Irrational Prescribing

Type of Irrationality	Frequency	Percentage (%)
Inappropriate drug selection	35	18.4
Incorrect duration	22	11.6
Incorrect dosage	16	8.4

Table 5: Culture Sensitivity Testing

Parameter	*Frequency*	*Percentage (%)*
Performed	70	36.8
Not performed	120	63.2

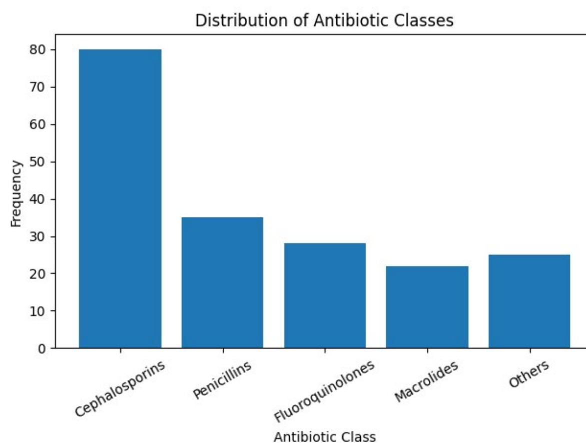

Figure 1: Distribution of Antibiotic Classes

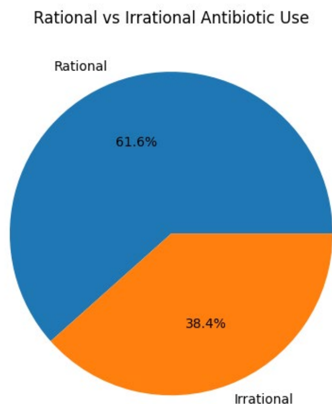

Figure 2: Proportion of Rational and Irrational Antibiotic Use

A total of 190 patients admitted to the general medicine wards and receiving at least one antibiotic were evaluated during the study period.

Demographic Profile

The study population consisted of 112 males (58.9%) and 78 females (41.1%), with a mean age of 46.2 ± 15.3 years. The majority of patients belonged to the 31–60 years age group. The detailed demographic distribution is presented in Table 1.

Pattern of Antibiotic Utilization

Analysis of prescribing trends revealed that cephalosporins were the most frequently used class of antibiotics, accounting for 42.1% of prescriptions. This was followed by penicillins (18.4%), fluoroquinolones (14.7%), macrolides (11.6%), and other classes (13.2%). The distribution of antibiotic classes is summarized in Table 2 and illustrated in Figure 1.

Assessment of Rationality

Out of the total prescriptions analyzed, 117 (61.6%) were found to be rational, whereas 73 (38.4%) were categorized as irrational based on standard treatment guidelines and WHO prescribing indicators. The proportion of rational versus irrational antibiotic use is shown in Table 3 and depicted graphically in Figure 2.

Types of Irrational Prescribing

Among the irrational prescriptions, the most frequent issue was inappropriate selection of antibiotic (18.4%), followed by incorrect duration of therapy (11.6%) and improper dosing (8.4%). These findings are detailed in Table 4.

Culture and Sensitivity Testing

Microbiological culture and sensitivity testing was performed in 70 patients (36.8%), while the remaining 120 patients (63.2%) received empirical therapy without laboratory confirmation. This distribution is presented in Table 5.

Statistical Association

A statistically significant relationship was observed between the use of culture sensitivity testing and rational antibiotic prescribing. Patients whose treatment was guided by culture reports were more likely to receive appropriate antibiotics compared to those treated empirically (Chi-square = 6.85, $p = 0.008$). This indicates that microbiological evidence plays a crucial role in improving prescribing accuracy.

DISCUSSION

This study assessed the rational use of antibiotics in a tertiary care hospital and found that 61.6% of prescriptions were rational, while 38.4% were irrational. These findings are consistent with previous studies reporting substantial levels of inappropriate antibiotic use [14,15].

Cephalosporins were the most commonly prescribed antibiotics, similar to findings from other hospital-based studies [16]. This may be due to their broad-spectrum activity and clinician preference for empirical therapy [17]. However, overuse of broad-spectrum antibiotics contributes to resistance [18].

Inappropriate drug selection was the most common form of irrationality, highlighting the need for adherence to standard treatment guidelines [19]. Incorrect duration and dosing also contributed significantly, indicating gaps in prescribing practices [20].

Culture sensitivity testing was performed in only 36.8% of cases, which is lower compared to recommended standards [21]. The study found a significant association between culture testing and rational prescribing, emphasizing the importance of microbiological confirmation [22].

Antimicrobial stewardship programs have been shown to improve prescribing practices and reduce irrational use [23]. Implementing such programs in tertiary care hospitals can enhance rational antibiotic use [24].

The findings underscore the need for continuous medical education, strict antibiotic policies, and routine prescription audits [25].

CONCLUSION

A considerable proportion of antibiotic prescriptions in general medicine wards were irrational. Strengthening antimicrobial stewardship, promoting guideline-based therapy, and increasing culture sensitivity testing are essential steps to improve rational antibiotic use.

REFERENCES

1. World Health Organization. Antimicrobial resistance. Geneva: WHO; 2020.
2. O'Neill J. Tackling drug-resistant infections globally: Final report and recommendations. London: Review on Antimicrobial Resistance; 2016.
3. World Health Organization. Promoting rational use of medicines: Core components. Geneva: WHO; 2002.
4. Laxminarayan R, Duse A, Wattal C, et al. Antibiotic resistance—the need for global solutions. Lancet. 2013;381(9870):2223–2230.
5. Ventola CL. The antibiotic resistance crisis: Part 1: Causes and threats. P T. 2015;40(4):277–283.
6. Centers for Disease Control and Prevention. Antibiotic use in the United States, 2021 update. Atlanta: CDC; 2021.
7. Fleming-Dutra KE, Hersh AL, Shapiro DJ, et al. Prevalence of inappropriate antibiotic prescriptions among US ambulatory care visits. JAMA. 2016;315(17):1864–1873.
8. Dellit TH, Owens RC, McGowan JE, et al. Infectious Diseases Society of America guidelines for antimicrobial stewardship. Clin Infect Dis. 2007;44(2):159–177.
9. Davey P, Marwick CA, Scott CL, et al. Interventions to improve antibiotic prescribing practices. Cochrane Database Syst Rev. 2017;2:CD003543.
10. Dyar OJ, Huttner B, Schouten J, Pulcini C. What is antimicrobial stewardship? Clin Microbiol Infect. 2017;23(11):793–798.
11. Howard P, Pulcini C, Hara GL, et al. An international cross-sectional survey of antimicrobial stewardship programmes. J Antimicrob Chemother. 2015;70(4):1245–1255.
12. Kotwani A, Wattal C, Joshi PC, Holloway K. Irrational use of antibiotics in India. PLoS One. 2012;7(2):e31043.
13. Sharma M, Eriksson B, Marrone G, et al. Antibiotic prescribing in India: Patterns and determinants. Indian J Pharmacol. 2018;50(1):36–42.
14. Kumar S, Rizvi M, Ahmed M. Assessment of antibiotic prescribing pattern in a tertiary care hospital. J Clin Diagn Res. 2019;13(5):FC01–FC05.
15. Singh AK, Gupta R, Singh S. Evaluation of antibiotic use in medicine wards of a tertiary care hospital. Int J Basic Clin Pharmacol. 2020;9(3):450–456.
16. Patel V, Acharya LD, Rajakannan T. Drug utilization pattern of antibiotics in a tertiary care hospital. J Pharm Pract. 2017;30(2):123–129.
17. Lee CR, Cho IH, Jeong BC, Lee SH. Strategies to minimize antibiotic resistance. Front Microbiol. 2018;9:1057.
18. Holmes AH, Moore LS, Sundsfjord A, et al. Understanding the mechanisms and drivers of antimicrobial resistance. Lancet. 2016;387(10014):176–187.
19. Chandy SJ, Thomas K, Mathai E, et al. Patterns of antibiotic use in Indian hospitals. Indian J Med Res. 2013;137(1):105–113.
20. Huttner B, Goossens H, Verheij T, Harbarth S. Characteristics and outcomes of public campaigns aimed at improving antibiotic use. Lancet Infect Dis. 2013;13(5):436–444.
21. World Health Organization. Global action plan on antimicrobial resistance. Geneva: WHO; 2015.
22. Pulcini C, Binda F, Lamkang AS, et al. Developing core elements for antimicrobial stewardship programmes. Clin Microbiol Infect. 2012;18(12):E1–E10.
23. Barlam TF, Cosgrove SE, Abbo LM, et al. Implementing an antibiotic stewardship program. Clin Infect Dis. 2016;62(10):e51–e77.
24. Schuts EC, Hulscher ME, Mouton JW, et al. Current evidence on hospital antimicrobial stewardship. Lancet Infect Dis. 2016;16(7):847–856.
25. Charani E, Holmes A. Antibiotic stewardship—twenty years in the making. Lancet Infect Dis. 2017;17(2):e49–e56.