International Journal of Basic & Clinical Pharmacology
Sahoo S et al. Int J Basic Clin Pharmacol. 2025 Nov;14(6):919-925
http://www.ijbcp.com
pISSN 2319-2003 | eISSN 2279-0780

DOI: https://dx.doi.org/10.18203/2319-2003.ijbcp20252892

Original Research Article

Evaluation of prescription patterns using World Health Organization prescribing indicators in outpatient department at a tertiary care hospital in Central India

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Received: 03 August 2025
Accepted: 01 September 2025

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ABSTRACT

Background: Rational prescribing entails administration of safe, efficacious, and cost-effective medications. Adherence to standards in medical treatment can enhance quality of life in developing countries. One approach to promote rational use is the evaluation of drug utilization patterns in healthcare facilities. Objective of the study was to evaluate prescribing practices in outpatient department (OPD) of a tertiary care hospital using World Health Organization (WHO) standards.
Methods: Total 2000 randomly selected OPD prescriptions from patients of all ages and genders were collected from 1/09/2024 to 28/02/2025 and analysed for WHO standards and completeness of prescription. Institutional Ethics Committee approval was obtained vide reference no 93/31/08/2024.
Results: Among 6235 prescribed drugs in 2000 prescriptions, the average number of medicines was (3.1±1.49). Adherence to National List of Essential Medicine (NLEM) was high (90.67%), while generic prescribing was suboptimal (52.09%). Antimicrobial use was more (32.8%), injectable use was low (5.32%), brand names were used in 47.9%, and fixed drug combinations (FDCs) in 32.57%. The most frequently prescribed drugs were pantoprazole (54.57%), Diclofenac (38.5%), and Amoxycillin (28.7%). Prescriptions completeness in demographic information (90.67%), diagnosis (48.8%), legible handwriting (59.2%), capital letters (6.8%), abbreviations (100%), vernacular instructions (78.6%), and signature, designation, registration number, and qualification (36.9%).
Conclusions: Prescribing practices deviated from WHO standards, with incomplete documentation of patient-related information. The study identified inappropriate prescribing, including polypharmacy (3.1±1.49), limited generic drug use (52.09%), and high use of NLEM drugs (90.67%). Prescription completeness was low (52.09%). These practices could result in adverse health outcomes and higher costs, indicating the need for continuous education of healthcare professionals.

Keywords: WHO indicators, Rational use, NLEM, OPD

INTRODUCTION

The irrational use of medicines has emerged as a significant global issue and constitutes a serious public health concern. The World Health Organization (WHO) defines rational drug use as the practice whereby a patient receives a suitable medication that aligns with their medical needs, in the appropriate amount, dose, duration, and frequency, and at the lowest possible cost to both the individual and society. The irrational or inappropriate utilization of medications encompasses several practices, including the excessive use of pharmaceuticals such as painkillers, NSAIDs, proton pump inhibitors (PPIs), antimicrobials, and their combinations.[1] It also involves the preference for injectable forms when oral alternatives are available, self-medication, noncompliance with prescribed regimens, dispensing errors due to illegible handwriting, prescribing without adequate usage

instructions, and using unnecessarily expensive medications. Irrational antimicrobial use is rampant in developing and underdeveloped countries due burden of communicable diseases as a result of poor infection control practice, recourse crunch, ignorance and illiteracy.[2] Irrationality leads to adverse drug reactions (ADR), which negatively impact patients by extending the duration of illness, escalating healthcare expenses, and exacerbating poverty.[3,4]

Factors contributing to irrationality may include inadequately trained healthcare staff, lack of effective role models, reliance on symptomatic treatment, unrealistic patient expectations, and the influence of pharmaceutical companies on clinicians through the promotion of unnecessary medications, such as tonics, multivitamins, antioxidants, and unwarranted fixed-dose combinations (FDCs).

Conducting regular prescription audits is essential for analyzing and measuring prescribing patterns using the well-established tool, the "WHO drug use indicator".[5] The WHO advocates complete compliance with its parameters to promote the rational use of medications. Currently, there are limited studies available from Central India. Monitoring prescriptions assists policymakers and researchers in implementing educational interventions for healthcare stakeholders, thereby enhancing medication use, encouraging rational drug use, and improving existing prescribing practices. Therefore, this study aimed to evaluate the current prescribing habits and rational use of medicines by clinicians in a tertiary care health facility in central India.

Objective

The objective of the study was to evaluate prescribing practices in OPD of a tertiary care hospital using WHO standards.

METHODS

The present cross-sectional study was conducted in an OPD setting at a tertiary care teaching hospital in central India, following the acquisition of ethical clearance from the Institutional Ethics Committee, as per reference no. 93 dated 31/08/2024. The study spanned a duration of six months, during which a total of 2000 OPD prescriptions were collected, with informed consent obtained from the patients. Throughout the study, complete confidentiality regarding patient autonomy was maintained. The study included all patients, regardless of age or sex, who received a prescription from the OPD. However, patients with prescriptions for follow-up cases, referral cases, human immune-deficiency virus (HIV), tuberculosis, and those who were seriously ill were excluded from the study. A trained junior resident collected all prescriptions from the OPD by photographing them with a digital camera and subsequently returning the original prescriptions to the patients. A systematic random sampling method was employed to select the final 2000 prescriptions using a checklist.

All prescriptions were analysed for its completeness using the following parameters: general details of patients i.e. name, age, sex, weight and address of patient, OPD registration number, date of consultation; also for other components like brief history of patients, diagnosis (provisional), correct route, dose, duration and frequency of medication with capital letter and legibility of handwriting, no usage of short forms or abbreviations, follow up and advices in vernacular language; and lastly legible signature and registration number of the treating physician.

All prescriptions were assessed using WHO – core prescribing indicators which are: average number of drugs per prescriptions, percentage of drugs prescribed in generic name, percentage of antibiotics prescribed, percentage of injectables prescribed, and percentage of drugs prescribed from NLEM list.[5]

Data were entered into Microsoft Excel spreadsheets, and statistical analysis, including the assessment of statistical significance, was conducted using statistical package for the social sciences (SPSS) version 25. Descriptive statistical analyses, such as percentages and means with standard deviations, were employed to present the data.

RESULTS

A total of 2,000 prescriptions were analyzed, encompassing 6,235 drugs. The evaluation of the WHO core prescribing indicators revealed that the average number of drugs prescribed per prescription was 3.1±1.49. Drugs prescribed using generic names accounted for 3,248 (52.09%), while those from the National List of Essential Medicines (NLEM) constituted 5,653 (90.67%). Antimicrobial drugs were prescribed to only 32.8% (656) of patients, whereas injectable drugs were prescribed to 5.32% (106) of patients (Table 1). Brand names were used in 2,987 (47.9%) cases, and fixed-dose combinations (FDCs) were used in 2,031 (32.57%) cases.

In an analysis of 2000 prescriptions, the distribution between male and female recipients was nearly equal. Examining the demographic data, among patients younger than 10 years, 1.83% were female, while 2.57% were male. Within the 11-30 years age bracket, females comprise approximately 33.23%, compared to 28.74% for males. For individuals over 30 years of age, males constituted 64.19% and females 69.4%. Overall, female patients tended to receive more prescriptions from the OPD than their male counterparts (Figure 1).

Table 1: WHO–core prescribing indicators (n=2000 and total drugs=6235).

S. no.	WHO prescriber indicator	Frequency	Percentage or M±SD	WHO standard (%)
1	Average number of drugs per prescription	6235	3.1±1.49	1.6-1.8 (2)
2	Generic use	3248	52.09	100
3	NLEM	5653	90.67	100
4	Antimicrobial use	656	32.8	20-26.8 (30)
5	Injectable use	106	5.32	13.4-24
6	Brand name use	2987	47.9	
7	FDC use	2031	32.57	

Data expressed as mean±standard deviation and percentages

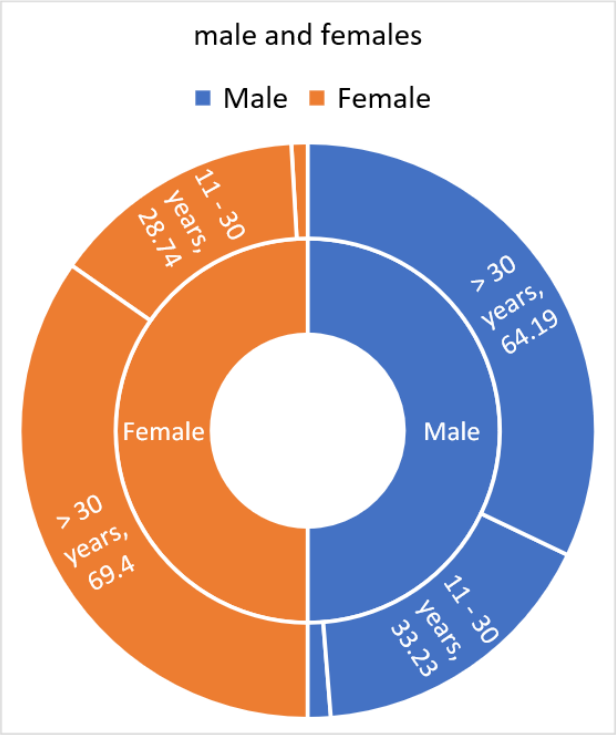

Figure 1: Percentage of male and females receiving prescriptions from OPD (n=2000).

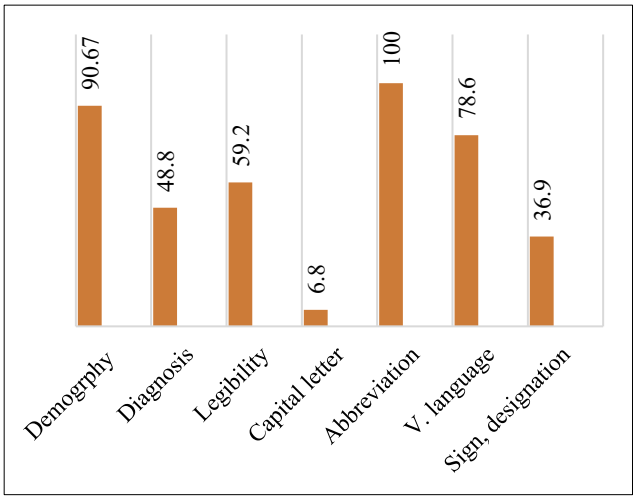

Figure 2: Completeness of prescription in percentage (n=2000).

Figure 2 illustrates the completeness of the prescriptions, revealing approximately 90.67% of prescriptions included demographic information, whereas only 48.8% contained a written diagnosis. Legible handwriting was observed in 59.25% of prescriptions, with only 6.8% written in capital letters. All prescriptions (100%) utilized abbreviations for drug prescriptions. Instructions, follow-up advice, and patient guidance were provided in the vernacular language in 78.6% of the cases. Ultimately, around 36.9% of prescriptions contained both the physician's signature and designation.

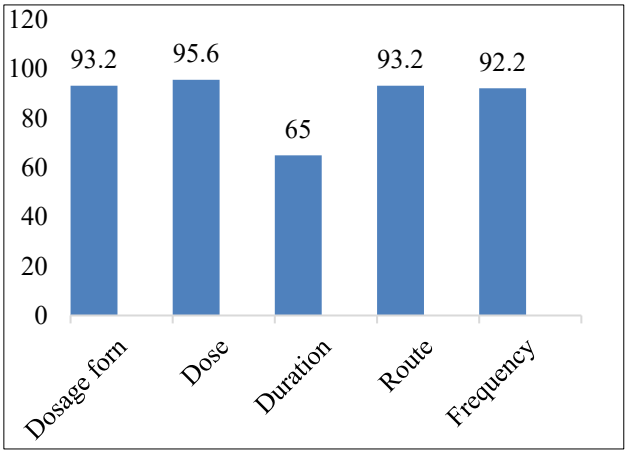

Figure 3: Completeness of drug prescription (n=2000).

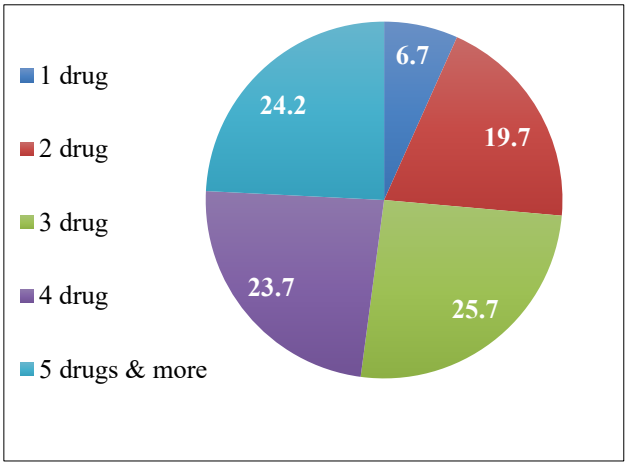

Figure 4: No. of drugs per prescription in percentage (%) (n=2000).

Figures 3 and 4 shows illustrates the completeness of drug prescription and no of drugs per prescription is prescribed. 93.2% of prescription has dosage form and route of administration of drug, 95.6% shows dose, 92.2% and 65% have frequency and duration drug respectively. Out of 2000 prescriptions, single drug in 6.7%, 2 drugs in 19.7%, 3 drugs in 25.7%, 4 drugs in 25.7% and 5 or more than 5 drugs were prescribed in 24.2% of prescriptions.

Table 2 shows most frequently prescribed drugs in the OPD settings. Here most frequently prescribed drugs are Pantoprazole and NSAIDs (Diclofenac) which is 54.57% and 38.4% respectively where as Amoxycillin (28.7%) is the most frequently prescribing antibiotic. Also drugs like Vitamins and minerals (21.8%), Cetirizine (18.2%), Metformin (12.3%), antihypertensive drugs (11%) shows notable usage.

Table 2: Most frequently prescribed drugs in OPD setting.

S. no.	Drug group prescribed (drug name)	Frequency (%)
1	GIT (pantoprazole)	54.57
2	NSAID (diclofenac)	38.4
3	Antibiotic (Amoxycillin)	28.7
4	Vitamin and minerals	21.8
5	Anti-allergics (Cetirizine)	18.2
6	Antidiabetic (Metformin)	12.3
7	Antihypertensive (Amlodipine, Telmisartan)	11
8	Hypolipidemic	11

DISCUSSION

This OPD-based cross-sectional study was conducted over 6 months period at a tertiary care hospital in Central India to evaluate the prescription pattern and rational use of medicines using WHO core prescribing indicators. According to the WHO, there should be 100% adherence to the guidelines which usually lacks among healthcare professionals, leading to medical and economic consequences. This study is expected to highlight the prescribing practices among healthcare professionals, especially doctors, as well as information on the quality of healthcare.

This study examined 2000 OPD prescriptions with a total of 6235 drugs. On average, each prescription contained 3.1 drugs, which is higher than the WHO standard of 1.6 to 1.8. This suggests polypharmacy, which refers to the use of multiple drugs simultaneously. Reasons for this could include multiple health issues, symptomatic treatment, poor diagnostic skills, lack of training, doctors not following proper drug use, and patient requests. Similar findings were reported by Mulkalwar et al, Verma et al, Meena et al, Kanagasabapathy et al, and Singh et al, with averages between 3 and 3.2.[7-9,16,17] Other studies from developing countries, such as Uganda (3.2), Sri Lanka (3.1), and Pakistan (3.04), also show similar results.[10,11,14] Some studies found higher averages, like Jaiswal et al (4.3), and Shivgunde and Kodlikar (3.49).[12,13] Lower averages were found in Central India (2.53) and southern India (2.38).[15,17] These results show that polypharmacy is common in India, which can lead to more side effects, drug interactions, mistakes in medication, and higher costs for patients and the government, thereby affecting healthcare quality. Some developing countries, such as North-East Ethiopia (2.1), Tanzania (1.99), Afghanistan (2.9), and Nepal (2.55), reported lower averages than this study.[19-22]

In this study, 52.09% of the total drugs were prescribed using generic names, which is significantly lower than the WHO recommendation of 100%. Generic drugs are known for their favourable risk-benefit ratio and are prescribed with assured quality. In our context, as the supply is government-regulated, pharmacists dispense only generic drugs even when physicians prescribe brand names. The percentage of generic drug prescriptions in this study (52.09%) was lower than that reported in other studies conducted in Haryana (75%), Puducherry (74.6%), Raipur (66.04%), Nashik (83.98%), and a rural hospital in Delhi (85.8%).[8,9,12,13,18] However, it was higher than the percentages reported in Kerala (45%), Pune (28.72%), and a tertiary care hospital in Central India (15.96%).[6,7,15] In comparison, other countries, such as Uganda (90.48%), Ethiopia (98%), Tanzania (84.4%), and Nepal (57.5%) reported higher compliance with generic prescribing.[10,19,20,22] Conversely, countries such as Sri Lanka (35.5%), Pakistan (37%), and Afghanistan (35.1%) demonstrate poor adherence to the WHO recommendations.[11,14,21] The low compliance with generic prescribing may be attributed to a lack of trust among prescribers and the influence of the pharmaceutical industry, which often promotes branded and novel drugs. This issue can be mitigated through proper education and training regarding the cost-benefit ratio, safety, and efficacy of generic drugs, as well as the implementation of appropriate prescribing policies in the hospital.

This study revealed a slightly higher use of antimicrobials (32.8%) than the WHO standard indicating 20 -26.8%. Studies in other regions of India reported higher use, that is, 60.33% in Nashik, 39.8% in Rural Puducherry, and 52.5% in rural hospitals in Delhi.[13,16,18] Developing countries such as Uganda (66.22), Pakistan (47.05), Ethiopia (43.9), Tanzania (51.9), and Afghanistan (84) reported higher data than the recommended standard which can be an alarming situation worldwide.[10,14,19-21] Other studies have revealed that overuse or irrational use of antimicrobials may contribute to the rapid development of resistance to existing antimicrobials and increased adverse drug reactions, ultimately prolonging hospitalisation and cost. The reason for irrational use could be due to inadequate laboratory facilities, poor knowledge of local antibiogram, and absence of antibiotic stewardship program policies. Therefore, an adequate ASP policy and laboratory facilities may effectively reduce the burden.

The injection encounter observed in this study was 5.32%, aligning with the WHO standard (13.4–24). Other studies from different parts of India and abroad have reported a strong alignment with WHO standards, which explains the representation of data from outpatient departments. Shivgunde and Kodlika,2020 reported a higher prevalence of injectable use.[13] The use of more injectables increases the risk of blood-borne infections and fund crunch. Therefore, strict adherence to standard guidelines is recommended.

This study reported that 90.67% of prescriptions were referred to the national essential medicine list which is close to the WHO-recommended value (100%). Other studies from India reported vast differences in their prescription patterns, ranging from 3.2 to 100.[6-9,12,13,15-18] Other developing countries like Uganda (96.23), Sri Lanka (68.8), Pakistan (70.37), Ethiopia (100), Tanzania (97.6), Afghanistan (67.2), Nepal (65.8) reported variable data.[10,11,14,19-22] Inadequate knowledge of prescribers about essential medicines could lead to irrational prescribing and affect healthcare quality and cost. Sensitisation of doctors about the NLEM, its benefits, and strict implementation of prescribing guidelines may enhance the quality and rational use of drugs.

This study reported that pantoprazole was the most commonly prescribed drug (54.57%) followed by NSAIDs (diclofenac) (38.4), antimicrobials (amoxycillin) (28.7), and vitamins and minerals (21.8%). In addition, anti-allergic drugs (cetirizine) (18.2), anti-diabetic drugs (metformin) (12.3), anti-hypertensives (Amlodipine, Telmisartan), and hypolipidemic drugs (11% each) showed notable usage. In contrast to our findings, Dhanya et al reported higher vitamins and minerals (21.4%), Kabul, Afghanistan (2023) reported higher antimicrobials (25.7%), and higher analgesics (13%) by Sunny et al, as commonly prescribed drugs.[6,21,24]

According to WHO guidelines, a complete prescription should have demographic details of the patient, diagnosis, complete drug details (dose, duration, frequency, and route), and be a legible prescription with no abbreviations, usage of vernacular language for instruction, and signature of the prescriber with registration number. In this study, 90.6% of the participants reported complete demographic details which aligns with the WHO guidelines and studies by Verma et al and Meenakshi et al (100% each).[8,17] The diagnosis was written in 48.4% of prescriptions which is lower than that reported by Mulkalwar et al (57.2), Meenakshi et al (82.7), and Singh et al (64.2).[7,17,18] This may be due to inadequate training and knowledge of prescriber and habit of symptomatic treatment. 59.2% prescriptions were legible which is lesser than Dhanya et al and Verma et al reporting illegibility in 2% and 3.4% of prescriptions.[6,8] In terms of completeness of drug prescribed, our study reported dosage form in 95.6%, duration in 65%, route of drug administration in 93.2%, and frequency in 92.2% of prescriptions, whereas few studies reported lesser data than ours'.[17,18,25] A study from Ethiopia reported similar results, except for the route of drug administration (62.18 %).[24] This study reported that a lesser portion of prescriptions documented the drug names in capital letters (6.8) compared to the study by Vermal et al, who reported 90%.[8] Meenakshi et al reported 17.3% adherence, which is higher than that in our study but not up to the mark of WHO guidelines stating 100% adherence.[17]

Our study found that most prescriptions included two or more drugs, similar to the findings of Dhanya et al and Joshi et al.[6,25] However, a study from Ethiopia reported that only one drug was used in 40.51% of cases.[24] Many prescriptions in our study used brand names and FDCs, as in Joshi et al, but unlike Verma et al, where only 12.2% used FDCs.[8,25] In our study, 78.6% of prescriptions included instructions in the local language. This is higher than that reported by Verma et al (55.5%), but less than that reported by Meenakshi et al (98.2%).[8,17] Only 36.9% of prescriptions in our study included the prescriber's signature and registration numbers. Other studies have reported higher rates, between 79.7% and 97.35%. A study from a rural hospital in Delhi found that 3.3% of prescriptions included the registration number and 65.8% had the prescriber's signature.[18]

Drafting a detailed therapeutic regimen and prescription is crucial for ensuring precise dispensing and minimising the risk of medication errors in the future.

Limitations

The scope of this study was confined to OPD prescriptions, which limits the generalizability of its findings, as inpatient prescriptions are more complex and demand greater adherence to the WHO standards. Furthermore, this study did not evaluate patient care indicators, which could provide valuable insights into patients' understanding of their prescriptions.

CONCLUSION

Prescription audit data from the outpatient department of a tertiary care hospital in Central India identified the suboptimal prescribing habits of prescribers not adhering to the WHO core prescribing indicator guidelines. Instances of polypharmacy, excessive antimicrobial use, and limited utilization of generic medications were observed. The prescribing practices for injectable use and adherence to the NLEM are in accordance with the WHO standards. However, none of the patient-related information was documented completely. This study could serve as a guide for hospital drug policy maintenance and prescribers to promote the rational use of medicines.

Recommendations

Interventions in the form of various trainings and sensitization of prescribers through online ICMR prescribing skill course about rational use of drugs,

frequent audit to understand the trends in prescription and behaviour of prescribers is highly recommended to improve quality of prescribing, healthcare delivery and cost management.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Sahoo S, Dudhgaonkar S, Uike PS. Evaluation of prescription patterns using World Health Organization prescribing indicators in outpatient department at a tertiary care hospital in Central India. Int J Basic Clin Pharmacol 2025;14:919-25.