e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(6); 1895-1903

Original Research Article

Prescription Audit Using World Health Organization Core Prescribing Indicators in A Tertiary Care Teaching Hospital of South India

M V Kiran Kumar[1], K Siva Balanaganjan[2], B V Rao[3], Rajesh Ranjan[4]

[1,2]Assistant Professor, Department of Hospital Administration, Kurnool Medical College & Government General Hospital, Kurnool, Andhra Pradesh, India

[3]Civil Surgeon Hospital Administrator, Government General Hospital, Kurnool, Andhra Pradesh, India

[4]Reader, Department of Medical Care and Hospital Administration, NIHFW, Munirka, New Delhi, India

Received: 20-03-2023 / Revised: 11-04-2023 / Accepted: 05-05-2023

Corresponding author: Dr. B V Rao

Conflict of interest: Nil

Abstract:

Background: Inappropriate prescribing practices can have serious consequences on patient health, including increased morbidity and mortality, adverse drug reactions, and increased healthcare costs. Several studies have evaluated prescribing practices in different healthcare settings worldwide, including in India, where inappropriate prescribing practices are prevalent and contribute to a high incidence of adverse drug reactions and treatment failures. The present study aimed to evaluate the prescribing practices of healthcare professionals in a tertiary care teaching hospital in South India using the WHO core prescribing indicators.

Methods: This was a prospective, observational hospital-based study conducted in both the inpatient wards and outpatient department of various specialties. A total of 659 prescriptions were randomly selected over a two-month period, excluding prescriptions for vaccines and neonates. The audit of the prescription included the completeness and legibility of the prescriptions, as well as core prescribing indicators recommended by the WHO, such as the percentage of drugs prescribed by their generic name, average number of drugs per prescription, percentage of prescriptions containing antimicrobial agents, percentage of injections per prescription, and percentage of drugs prescribed from the Essential Drug List (EDL). Descriptive statistics were used for data analysis. The study was approved by the hospital ethics committee.

Results: In the study, 11.5% of prescriptions were illegible, and 68.6% were legible with ease. The average number of drugs per prescription (2.36±1.3) was higher than the WHO standard of 1.6-1.8, while the percentage of drugs prescribed by generic name (68.5%) fell short of the WHO standard of 100%. Additionally, 38.4% of prescriptions included antibiotics, and 11.2% included injections, both deviating from the WHO standards. However, 80.9% of drugs were prescribed from the essential drug list, which is close to the WHO standard of 100%.

Conclusion: The study findings suggest that the prescribing practices in the tertiary care teaching hospital of South India need improvement with respect to completeness of patient identifier and prescriber details and dosage regimen information.

Keywords: audit, prescription, WHO, indicators, healthcare.

Introduction

Inappropriate prescribing practices can lead to a range of negative outcomes for patients, including increased morbidity and mortality, adverse drug reactions, and increased healthcare costs. The World Health Organization (WHO) has developed core prescribing indicators to evaluate the appropriateness of prescribing practices and improve patient outcomes. Therefore, the evaluation of prescribing practices and adherence to established guidelines is of utmost importance.[1,2]

Several studies have evaluated prescribing practices in different healthcare settings around the world. For instance, a study conducted in Ethiopia found that the average number of medications per prescription was 2.9, and only 29.3% of prescriptions had an appropriate duration of treatment.[3] In another study conducted in Ghana, it was found that 37.4% of prescriptions were inappropriate, with polypharmacy being the most common reason for inappropriate prescribing.[4] India is the first most populous country in the world, with a rapidly growing healthcare industry. However, studies have shown that inappropriate prescribing practices are prevalent in India, leading to a high incidence of adverse drug reactions and treatment failures.[5] In India, several studies have evaluated prescribing practices in various healthcare settings. A study conducted in a tertiary care teaching hospital in South India found that only 29% of prescriptions were compliant with established prescribing guidelines.[6] Another study conducted in a primary healthcare setting in North India found that the average number of medications per prescription was 2.7, and only 26% of prescriptions had an appropriate duration of treatment.[7]

Despite the availability of established prescribing guidelines, inappropriate prescribing practices continue to be prevalent in healthcare settings in India. Therefore, there is a need for regular evaluation and monitoring of prescribing practices to identify areas for improvement and implement interventions to ensure optimal patient outcomes.[8,9]

The present study aimed to evaluate the prescribing practices of healthcare professionals in a tertiary care teaching hospital in South India using the WHO core prescribing indicators. The findings of this study will contribute to the existing literature on prescribing practices in India and provide insights into the prescribing practices of healthcare professionals in the study setting.

Materials and Methods

Study Design: Prospective, observational, hospital-based study.

Study Area: IPD and OPD of various departments.

Study Population: A total of 659 prescriptions from patient of both the sexes of any age group attending both OPD and IPD departments during the period of study of 2 month (August-September 2022) were randomly selected with an average of 10 prescription audited per day. Prescription of patients attending OPD for Tetanus Toxoid (TT) and other vaccines and neonates (≤ 28 days) or with no drugs mentioned were excluded from the study. The sample size was taken as 659 based Ghimire et al., study, which recommends at least 600 prescription encounters to assess drug use pattern in health facilities.[10]

Ethical approval: The study was approved by the hospital ethics committee.

IEC-KMC-GGH No: 335/2023

Data tool and collection: Prescription copies was collected from the various departments, after taking prior permission from the hospital authority, data was

stored, documented and the data scrutiny procedures were adopted as well as were reported to the department of hospital administration for further analysis. The audit of the prescription included the completeness and legibility of the prescriptions along with core prescribing indicators to cover all the aspects involved in the overall appropriateness of prescribing performance of the physicians.

The WHO guidelines and methods were observed to ensure data reliability. The prescriptions reaching the department of hospital administration were analysed for patient identifiers (Hospital Name & Address, Date of Visit, Consulting Unit/Department, Patient Name, Patient Address, Patient Age and Sex, Patient Weight, waiting time); Prescriber identifiers (Initials, Name, Department, Seal, registration number); Diagnosis; Instructions (Over dosing or Under dosing); Follow up advice; antibiotic prescribed; Completeness with dosage regimen (Start Dose Date, Drug Strength, Duration of drug intake, Route of drug administration, Capital letters) and legibility of prescriptions (Illegible, Legibility with difficulty, Legibility with ease). The core prescribing indicators included percentage of drugs prescribed by their generic name, average number of drugs per prescription, percentage of prescriptions containing antimicrobial agents, percentage of injections per prescription and percentage of drugs prescribed from the Essential Drug List (EDL). [11]All the collected was expressed as a percentage and analysed by descriptive statistics.

Results

Table 1 shows the distribution of 659 prescriptions across various departments in the tertiary care teaching hospital. The department with the highest number of prescriptions was General Medicine, accounting for 15.5% of the total prescriptions. This was followed by General Surgery (13.5%), Obstetrics & Gynaecology (13.1%), and Orthopaedics (12.0%). The department with the lowest number of prescriptions was Psychiatry, accounting for only 1.5% of the total prescriptions. Overall, the distribution of prescriptions across departments indicates a diverse patient population seeking medical care in the hospital.

Table 1: Distribution of prescriptions according to the various departments (N=659).

Departments	N	%
General Medicine	102	15.5
General Surgery	89	13.5
Obstetrics & Gynaecology	86	13.1
Orthopaedics	79	12.0
ENT	69	10.5
Pulmonary Medicine	66	10.0
Dermatology	76	11.5
Ophthalmology	23	3.5
Paediatrics	59	9.0
Psychiatry	10	1.5

Table 2. presents the baseline characteristics of the patients whose prescriptions were audited in the study. The mean age of the patients was 42.92±14.3 years, indicating a predominantly middle-aged patient population. In terms of gender, there were slightly more female patients (51.3%) than male patients (48.7%). The average waiting time per patient was 11.23+10.32 minutes, indicating a relatively short waiting time for patients seeking medical

care in the hospital. These baseline characteristics provide important information about the patient population and the healthcare delivery system in the hospital, which can help contextualize the findings of the study.

Table 2: Baseline characteristics of the patients in the prescriptions audited (N=659).

Variables	N	%
Mean Age (in years)	42.92±14.3	
Gender		
Male	321	48.7
Female	338	51.3
Average waiting time/patient (in minutes)	11.23+10.32	

Table 3. shows the completeness of patient identifier information in the prescriptions audited.

The patient identifier information includes the hospital name and address, date of visit, consulting unit/department, patient name, patient address, patient age and sex, and patient weight. The study found that all prescriptions included the hospital name and address, consulting unit/department, patient name, and patient age and sex, indicating a high level of completeness for these variables. However, patient address information was missing in 95.6% of the prescriptions, and patient weight information was missing in 86.5% of the prescriptions. Overall, the study highlights the need for improving the completeness of patient identifier information in prescriptions, particularly with respect to patient address and weight information.

Table 3: Completeness of patient identifier in the prescriptions audited (N=659).

Patient identifier	N	%
Hospital Name & Address	659	100.0
Date of Visit	644	97.7
Consulting Unit/Department	659	100.0
Patient Name	659	100.0
Patient Address	630	95.6
Patient Age & Sex	659	100.0
Patient Weight	89	13.5

Table 4.shows the completeness of prescriber's details in the prescriptions audited. The prescriber details include prescriber identification, diagnosis, instructions, over dosing or under dosing, allergy status, and follow-up advice. The study found that all prescriptions included the name and department of the prescriber, indicating a high level of completeness for this variable.

However, only 87.9% of the prescriptions included prescriber initials, and only 4.1% included a seal and registration number. In terms of diagnosis, only 29.4% of the prescriptions included this information. Instructions, over dosing or under dosing, and allergy status information were completely missing in all prescriptions. Follow-up advice information was present in 31.0% of the prescriptions.

Overall, the study highlights the need for improving the completeness of prescriber details in prescriptions, particularly with respect to diagnosis and follow-up advice information.

Table 4: Completeness of prescriber's details in the prescription audited (N=659).

Indicators	N	%
Prescriber identification		
Initials	579	87.9
Name, Department	659	100.0
Seal, registration number	27	4.1
Diagnosis	194	29.4
Instructions		0
Over dosing or Under dosing	0	0.0
Allergy status	0	0.0
Follow up advice	204	31.0

Table 5. presents the completeness of dosage regimen information in the total drugs prescribed in the study. The dosage regimen information includes start dose date, drug strength, duration of drug intake, route of drug administration, and capital letters. The study found that the start dose date was present in 98.6% of the total drugs prescribed, indicating a high level of completeness for this variable.

However, only 27.0% of the drugs prescribed included drug strength information, while duration of drug intake and route of drug administration information were present in 50.0% and 61.5% of the drugs prescribed, respectively. Capital letters, which are important for avoiding medication errors, were only present in 17.3% of the drugs prescribed.

These findings suggest the need for improving the completeness of dosage regimen information in prescriptions, particularly with respect to drug strength and capital letters information.

Table 5: Completeness with dosage regimen in the total drugs prescribed (N=1557).

Completeness with dosage regimen	N	%
Start Dose Date	1535	98.6
Drug Strength	421	27.0
Duration of drug intake	778	50.0
Route of drug administration	957	61.5
Capital letters	269	17.3

Table 6 presents the legibility grading of the prescriptions audited in the study. The study used three grading categories: illegible, legible with difficulty, and legible with ease. The findings show that out of the 659 prescriptions audited, 11.5% were illegible, 19.9% were legible with difficulty, and 68.6% were legible with ease. The results indicate that the majority of prescriptions were legible with ease, but there is still room for improvement in terms of legibility, particularly for the prescriptions that were legible with difficulty or illegible. The study highlights the need for improving the legibility of prescriptions to minimize the risk of medication errors and improve patient safety.

Table 6: Legibility grading in the prescription audited (N=659).

Legibility grading of the prescriptions sampled	N	%
Illegible	76	11.5
Legibility with difficulty	131	19.9
Legibility with ease	452	68.6

Table 7. compares the distribution of core prescribing indicators in the prescriptions audited in the study versus the WHO standards. The study found that the average number of drugs per prescription was 2.36±1.3, which is higher than the WHO standard of 1.6-1.8. In terms of prescribing by generic name, the study found that 68.5% of drugs were prescribed by generic name, which falls short of the WHO standard of 100%. The study also found that 38.4% of prescriptions included antibiotics, which is higher than the WHO standard of 20.0-26.8%. Additionally, the percentage of prescriptions with an injection prescribed was 11.2%, which is lower than the WHO standard of 13.4-24.1%.

Finally, the study found that 80.9% of drugs were prescribed from the essential drug list, which is close to the WHO standard of 100%. These findings suggest that while some prescribing indicators were in line with the WHO standard, there is still room for improvement in others, such as the average number of drugs per prescription and the percentage of drugs prescribed by generic name.

Table 7: Distribution and comparison of core prescribing indicators in the prescription audited versus WHO standard.

Core prescribing indicators	Total drugs/ Prescriptions	Findings	WHO standard
Average number of drugs per prescription	1557	2.36±1.3	1.6-1.8
% of drugs prescribed by generic name	1066	68.5%	100%
% of prescriptions with an antibiotic prescribed	257	38.4%	20.0-26.8%
% of prescriptions with an injection prescribed	74	11.2%	13.4-24.1%
% of drugs prescribed from essential drug list	1261	80.9%	100%

Discussion

The present study aimed to assess the quality of prescribing practices in a tertiary care teaching hospital of South India using World Health Organization (WHO) core prescribing indicators. The findings show that out of the 659 prescriptions audited, 11.5% were illegible, 19.9% were legible with difficulty, and 68.6% were legible with ease. The legibility rate of prescriptions in our study was found to be lower to the findings of Patil et al., Hemangini et al., and Bekele et al., where more than half of prescriptions were found to be legible.[12,13,14] The study found that the average number of drugs per prescription was 2.36±1.3, which is higher than the WHO standard of 1.6-1.8, which was comparable to the study by Singh et al.[15] Even studies by Kusum et al., Sneha et al, Maryam et al., Igbiks et al., and Mishra et al., all reported that the average number of drugs per encounter higher than the WHO standard of 1.6-1.8 as 3.35, 3.5, 4.02, 3.04, and 4 respectively.[16,17,18,19,20]

In terms of prescribing by generic name, the study found that 68.5% of drugs were prescribed by generic name, which falls short of the WHO standard of 100%.The low percentage of generic medications may suggest the unavailability of medicines, lack of confidence in generic medicines, or patient preference for branded products.[21] The studies by Naveen et al., and Debasis et al., reported that the percentage of medicines prescribed by generic names were 7.98% and 21% respectively.[22,23] In contrast, Anjan et al., and Uday et al., found that medicines prescribed by generic names were 93% and 96.88% respectively, close to the WHO's recommendation of 100%.[24,25] Based on the literature, it can be concluded that the majority of studies found the percentage of generic names to be below 100%.[26]

The study also found that 38.4% of prescriptions included antibiotics, which is higher than the WHO standard of 20.0-26.8%. Similar findings were observed in the study by Patel et al., Maryam et al., Igbiks et al., where the antibiotics were prescribed in the 45%, 39.01%, and 34.4% of prescriptions respectively.[12,18,19] In contrast studies by Sneha et al., and Anjan et al., showed that only 1.5% and 0.4% of prescriptions having antibiotics prescribed.[17,24]The majority of studies reviewed in the literature found that the percentage of antibiotics per prescription was less than 40%, which is consistent with the findings of our study.

Additionally, the percentage of prescriptions with an injection prescribed was 11.2%, which is lower than the WHO standard of 13.4-24.1%. Similarly, studies by Maryam et al., (7.54%) and Naveen et al., (4.8%) showed the percentage of prescriptions with an injection prescribed was lower than the WHO standard.[18,22] The majority of studies reviewed in the literature found that the percentage of injections per prescription was below 20%.[27]

Finally, the study found that 80.9% of drugs were prescribed from the essential drug list, which is close to the WHO standard of 100%, which was comparable to the study by Aravamuthan et al.[28] The WHO recommends that all prescribed medicines should come from the Essential Medicine List, so the ideal value for this indicator is 100%. However, the low percentage of medicines prescribed from this list may be due to a lack of knowledge about its role in cost-effectiveness optimization. The compliance of prescriptions with regulations can be determined by the percentage of generic and Essential Medicine List-prescribed medicines.[29] In comparison to our studya higher of percentage of drugs were prescribed from the essential drug list in the studies by Kusum et al., (100%), Igbiks et al., (94%), Naveen et al., (97.07%), and Anjan et al., (90%),[16,19,22,24] whereas a lower percentage of drugs were prescribed from the essential drug list was observed in the studies by Patil et al., (52.3%), Mishra et al., (53.25%), and Debasis et al., (60.99%).[12,20,23]

The study also assessed the completeness of dosage regimen information in the total drugs prescribed in the study. The study found that the start dose date was present in 98.6% of the total drugs prescribed, indicating a high level of completeness for this variable. However, drug strength information was present in only 27.0% of the drugs prescribed, while duration of drug intake and route of drug administration information were present in 50.0% and 61.5% of the drugs prescribed, respectively. Capital letters, which are important for avoiding medication errors, were only present in 17.3% of the total drugs prescribed.

Conclusion

In conclusion, this study aimed to assess the completeness of prescriptions in a tertiary care teaching hospital in terms of patient and prescriber details, as well as dosage regimen information. The findings reveal that the hospital serves a diverse patient population seeking medical care across various departments, with General Medicine having the highest number of prescriptions. The patient population is predominantly middle-aged and slightly skewed towards female patients. The study highlights the need for improving the completeness of patient identifier information in prescriptions, particularly with respect to patient address and weight information. Additionally, the completeness of prescriber details in prescriptions needs to be improved, particularly with respect to diagnosis and follow-up advice information. The study also underscores the importance of completeness of dosage regimen information in prescriptions to avoid

medication errors. The findings of this study can help healthcare providers and policymakers identify gaps in prescription completeness and develop targeted interventions to improve the quality of healthcare delivery.

References

1. Dhanya TH, Sanalkumar KB, Andrews MA. Prescription auditing based on the World Health Organization (WHO) prescribing indicators in outpatient department of a teaching hospital in Kerala. Asian J Pharm Clin Res. 2021;14(5):147-51.
2. Ahsan M, Shaifali I, Mallick AK, Singh HK, Verma S, Shekhar A. Prescription auditing based on World Health Organization (WHO) prescribing indicators in a teaching hospital in North India. Int J Med Res Rev. 2016;4(10):1847-52.
3. Abebaw WA, Eyasu KH, Kebede M, Tegegn HG. Assessment of medication prescribing pattern in Dessie referral hospital, Dessie, Northeast Ethiopia. Int J Basic ClinPharmacol. 2018;7(5):844-9.
4. Agyepong IA, Lartey M, Fosu G, Asenso-Okyere K. Assessing prescribing practices in public health facilities in Ghana: a cross-sectional study. BMC Public Health. 2012; 12:897.
5. Kumar R, Indira K, Rizvi A, Rizvi T, Kaur N. A study of prescribing practices in a tertiary care hospital in South India. Australas Med J. 2013;6(9):483-90.
6. Gupta N, Sharma D, Garg SK, Bhargava VK. Auditing of prescriptions to study utilization of antimicrobials in a tertiary hospital. Indian J Pharmacol. 1997;29(6):411-5.
7. Singh G, Pai PG, Surulivelrajan M, Singh P, Rasaily R, Kumar N, et al. Evaluation of rationality of drug prescriptions and analysis of influencing factors in tertiary care teaching hospital in northern India. Indian J Pharmacol. 2015;47(5):518-22.
8. Manchanda AK, Sharma A, Kumar R. Study of prescribing practices in the outpatient departments of a tertiary care teaching hospital in South India. J ClinDiagn Res. 2014;8(6):HC01-HC04.
9. Sharma AK, Kotwani A, Upshur REG. Prescribing practices in primary care in India: a cross-sectional study. Indian J Med Ethics. 2016;1(1):6-11.
10. Ghimire S, Nepal S, Bhandari S, Nepal P, Palaian S. A prospective surveillance of drug prescribing and dispensing in a teaching hospital in western Nepal. J Pak Med Assoc 2009; 59:726-31.
11. World Health Organization. How to Investigate Drug Use in Health Facilities: Selected Drug Use Indicator. Geneva: World Health Organization/DAP/93.1; 1993.
12. Patil KR, Mali RS, Dhangar BK, Bafna PS, Gagarani MB, Bari SB. Assessment of prescribing trends and quality of handwritten prescriptions from Rural India. J Pharma Sci Tech. 2015; 5:54-60.
13. Hemangini RA, Manish JB, Narendra PP, Tripathi CB. Prescription audit in outpatient departments of a tertiary care teaching hospital: A cross-sectional study. Eur J Pharm Med Res. 2017; 4:372-9.
14. Bekele NA, Tadesse J. Prescription auditing based on World Health Organization (WHO) prescribing indicators: A case of Dilla University Referral Hospital. J Drug DelivTher. 2018; 8:21-5.
15. Singh T, Banerjee B, Garg S, Sharma S. A prescription audit using the World Health Organization-recommended core drug use indicators in a rural hospital of Delhi. J Educ Health Promot. 2019; 8:37.
16. Kusum K, Prakash K. Study of drug prescribing pattern in a Tertiary Care

Hospital in Jharkhand. Int J Biomed Res. 2017; 8:85-8.
17. Sneha K, Haider S, Kashyap V, Singh SB. A study on pattern of prescription writing practices at Rajendra institute of medical sciences Ranchi. Indian J PrevSoc Med. 2014; 45:100-4.
18. Maryam GF, Shekar HS. Audit of prescriptions in a tertiary care hospital-a retrospective study. World J Pharm Pharm Sci. 2016; 5:886-94.
19. Igbiks T, Joseph OF. Drug prescription pattern in a Nigerian tertiary hospital. Trop J Pharm Res. 2012; 11:146-52.
20. Mishra S, Sharma P. Prescription audit and drug utilization pattern in a tertiary care teaching hospital in Bhopal. Int J Basic Clin Pharmacol. 2016; 5:1845-9.
21. Promoting Rational use of Medicines: Core Components. WHO Policy Perspectives on Medicines. Geneva: World Health Organization; 2002;1-6.
22. Naveen A, Ramesh B, Teki S. Prescription auditing in regard with the prescription patterns in a tertiary care teaching hospital. Asian J Pharm Clin Res. 2018; 11:176-80.
23. Debasis B, Chandra NB, Suman C, Prasanta S. A study of prescription auditing in a tertiary care teaching hospital of Eastern India. J Drug Deliv Ther. 2014; 4:140-9.
24. Anjan A, Arijit G, Rania I, Srijita G, Santosh B, Subhajit P. Assessment of prescribing pattern with World Health Organization prescribing indicators in outpatient departments of a tertiary teaching Hospital in Eastern India: A cross sectional study. Eur J Biomed Pharm Sci. 2017; 4:657-61.
25. Uday RS, Prabhakar S, Ambika A, Roshani S, Bhupendra R, Mishra SK. Pharmacoepidemiology of prescribing drugs in Tertairy Care Hospital in Central India: Rewa, Madhya Pradesh in years 2013-14. Int J Res Pharm Biosci 2014; 1:8-14.
26. Potharaju HR, Kabra SG. Prescription audit of outpatient attendees of secondary level government hospitals in Maharashtra. Indian J Pharmacol. 2011; 43:150-6.
27. Atif M, Sarwar MR, Azeem M, Umer D, Rauf A, Rasool A, et al. Assessment of WHO/INRUD core drug use indicators in two tertiary care hospitals of Bahawalpur, Punjab, Pakistan. J Pharm Policy Pract. 2016; 9:27.
28. Aravamuthan A, Arputhavanan M, Subramaniam K, Udaya Chander JS. Assessment of current prescribing practices using World Health Organization core drug use and complementary indicators in selected rural community pharmacies in Southern India. J Pharm Policy Pract. 2017; 10:1.
29. Ofori-Asenso R. A closer look at the World Health Organization's prescribing indicators. J Pharmacol Pharmacother. 2016; 7:51-4.