

Evaluating Prescription Practices in a Secondary Healthcare Hospital: A Cross-Sectional Study during the District Residency Program.

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Abstract

Background: Prescription auditing is an important quality-assurance strategy for evaluating prescribing practices, identifying deficiencies, and promoting rational medicine use. This study evaluated prescription completeness and drug-utilization patterns in a public-sector secondary healthcare hospital using World Health Organization (WHO) core prescribing indicators.

Objectives: To assess outpatient prescription completeness, characterize drug-utilization patterns, and evaluate prescribing practices using WHO core prescribing indicators.

Methods: A hospital-based cross-sectional prescription audit was conducted at the District Headquarters Hospital, Ganjam, Odisha, India, from March to May 2024 during the District Residency Programme. Of 348 prescriptions screened, 58 illegible prescriptions were excluded and 290 were analyzed. Prescription completeness was assessed using predefined parameters and summarized using a Prescription Completeness Score (PCS). Drug utilization and WHO core prescribing indicators were analyzed descriptively.

Results: Among the 290 patients whose prescriptions were audited, 36.55% were aged 18–40 years, 33.79% were aged 41–60 years, and 54.14% were male. The prescriptions contained 1,017 medicines, with a mean of 3.5 medicines per prescription. Mean PCS was 82.4 $\pm$ 10.8%, and 181 (62.41%) prescriptions achieved PCS $\geq$ 80%. Patient weight and prescriber registration number were absent from all prescriptions, while prescriber name was documented in only 1.38%. Generic prescribing was 99.75%, and State Essential Drug List adherence was 94.48%. Antibiotics were prescribed in 33.44% of encounters, while injectables accounted for 0.88% of medicines.

Conclusion: Prescribing practices demonstrated strengths in generic prescribing, essential-medicine adherence, and low injectable use. However, deficiencies in documentation, multiple-drug prescribing, and antibiotic utilization highlight areas requiring targeted quality-improvement measures.

Recommendation: Periodic prescription audits, structured prescriber feedback, improved documentation, rational multidrug prescribing, and strengthened antimicrobial stewardship should be routinely implemented.

Keywords: Prescription audit; Rational drug use; Prescription completeness; WHO prescribing indicators; Generic prescribing; Essential medicines; Antibiotic prescribing; Drug utilization; Antimicrobial stewardship

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Introduction

Effective prescribing practices form the cornerstone of high-quality healthcare delivery, as optimal therapeutic outcomes hinge on accurate diagnoses and rational medication use. However, irrational prescribing remains a significant global health challenge, particularly in resource-constrained settings such as developing countries. According to the World Health Organization (WHO), over 50% of medicines are inappropriately prescribed, dispensed, or used, with a similar percentage of patients failing to adhere to prescribed regimens. Such practices contribute to adverse therapeutic outcomes, antimicrobial resistance, economic waste, and diminished trust in healthcare systems.^{1,2}

Prescription errors are a predominant type of medication error and are classified into errors of omission (missing essential details) and commission (incorrectly written information). Drug-drug interactions (DDIs) resulting from inappropriate drug combinations can significantly

reduce therapeutic efficacy or lead to toxicity, contributing to 6–30% of all adverse drug reactions (ADRs).³ Furthermore, irrational prescribing practices, such as inappropriate dosing, overprescription of antibiotics, polypharmacy, and non-compliance with clinical guidelines, undermine patient safety and the efficiency of healthcare delivery.^{4,5}

The WHO defines rational drug use as the provision of medications appropriate to clinical needs, in doses that meet individual requirements for an adequate duration, and at the lowest cost to the patient and community.¹ Despite this, irrational prescribing practices remain widespread, with polypharmacy, excessive use of broad-spectrum antibiotics, and a preference for injectable drugs over oral formulations being particularly problematic. Studies from primary care settings reveal a high prevalence of unjustified antibiotic use, incomplete or illegible prescriptions, and misuse of analgesics and multivitamins.^{4,5}

Addressing these challenges requires routine monitoring and auditing of prescribing practices. Prescription audits serve as an essential tool for evaluating and improving the quality of prescriptions. They involve assessing prescriptions against established standards to identify gaps and implement targeted interventions.^{3,6} The WHO has developed core drug use indicators to assess prescribing trends, focusing on parameters such as the average number of drugs per prescription, generic prescribing, and adherence to essential medicine lists.^{1,2} Although substantial research has evaluated prescribing trends in primary healthcare settings, evidence from public-sector secondary healthcare facilities remains comparatively limited. Prescription auditing at the district-hospital level may provide important information on prescription completeness, medicine utilization, and adherence to rational prescribing principles.^{5,6} Therefore, the present study aimed to evaluate the quality and completeness of outpatient prescriptions and characterize drug-utilization patterns in a public-sector secondary healthcare hospital, with particular emphasis on prescription completeness, dosage forms, therapeutic classes, generic and essential-medicine prescribing, antibiotic utilization, and WHO core prescribing indicators.

Materials and Methods

Study Design and Setting

A hospital-based cross-sectional prescription audit study was conducted at the District Headquarters Hospital (DHH), Ganjam, Berhampur, Odisha, India, during the mandatory District Residency Programme (DRP). The study evaluated prescriptions issued to patients attending the outpatient departments (OPDs) of DHH and subsequently presenting at the Drug Distribution Centre (DDC) for dispensing of prescribed medicines.

Study Period

The study was conducted over a period of three months, from 1 March 2024 to 31 May 2024.

Study Population

The study population comprised prescriptions of patients who consulted physicians in the OPDs of DHH, Ganjam, and subsequently attended the DDC to receive their prescribed medicines.

Eligibility Criteria

Prescriptions issued to patients attending the OPDs of DHH, Ganjam, and presented at the DDC during the study period were considered eligible for inclusion. Prescriptions that were illegible to an extent that precluded reliable assessment of the required prescription parameters were excluded.

Sample Size

During the study period, a total of 348 prescriptions encountered at the Drug Distribution Centre (DDC) were screened for eligibility. Of these, 58 prescriptions were excluded because of illegibility, resulting in 290 eligible prescriptions. These 290 prescriptions constituted the final study sample and were subjected to prescription auditing and statistical analysis.

Data collection and prescription audit

Data were collected using the **Prescription Audit Form available at DHH under the Government of Odisha**. Patient-identifying information was excluded from the analytical dataset, and each prescription was assigned a study code to maintain confidentiality.

The audit captured demographic and clinical characteristics, prescription completeness, number of medicines prescribed, generic prescribing, adherence to the State Essential Drug List (EDL), antibiotic prescribing, dosage forms, therapeutic classes, and WHO core prescribing indicators.

Assessment of Prescription Completeness

Prescription completeness was assessed systematically using relevant **patient-, prescription-, medication-, and prescriber-related parameters**. These included patient name and sex, age, weight, department/OPD, diagnosis or clinical indication, date of consultation, drug name, dosage form where applicable, drug strength, dose, route of administration where applicable, frequency, duration of therapy where applicable, patient instructions or directions, prescriber name, prescriber signature, and prescriber registration number. These parameters corresponded to those subsequently reported in the prescription-completeness analysis.

Each applicable parameter was assessed for its presence or completeness. Parameters that were genuinely not applicable to a particular prescription were treated as **not applicable (NA)** rather than being considered incomplete.

Prescription Completeness Score

A **Prescription Completeness Score (PCS)** was generated to quantify the overall completeness of individual prescriptions. The PCS was calculated as:

Prescriptions were classified according to their PCS as:

$$PCS (\%) = \frac{\text{Number of applicable completeness parameters fulfilled}}{\text{Total number of applicable completeness parameters}} \times 100$$

- **Excellent:** $\geq 90\%$
- **Good:** 80–89.9%
- **Moderate:** 70–79.9%
- **Poor:** $< 70\%$

Statistical analysis

Collected data were checked for completeness and consistency, cleaned, coded, and entered into Microsoft Excel for analysis. Continuous variables, including the PCS, were summarized using mean $\pm$ standard deviation (SD), median with interquartile range (IQR), and minimum–maximum values, as appropriate. Prescription completeness was additionally summarized according to the predefined categories of excellent, good, moderate, and poor, and dichotomized as $PCS \geq 80\%$ versus $PCS < 80\%$.

Ethical Considerations

Ethical approval was obtained from the **Institutional Ethics Committee (IEC), MKCG Medical College, Berhampur, Odisha (IEC Approval No. 1197 dated 27.12.2023)** for the study protocol titled *‘Evaluating Prescription Practices in a Secondary Healthcare Hospital: A Cross-Sectional Study during the District*

Residency Programme. Patient privacy and confidentiality were maintained throughout the study. Personally identifiable information was excluded from the

analytical database, and prescriptions were appropriately coded before analysis.

Results

Table 1

Demographic and Clinical Characteristics of Patients Whose Prescriptions Were Audited (N = 290)

Characteristic	Category	n	%
Age group (years)	<18	24	8.28
	18–40	106	36.55
	41–60	98	33.79
	>60	62	21.38
Sex	Male	157	54.14
	Female	133	45.86
Major clinical/diagnostic category	Musculoskeletal/pain-related disorders	72	24.83
	Gastrointestinal disorders	61	21.03
	Infectious diseases	47	16.21
	Endocrine/metabolic disorders	38	13.10
	Cardiovascular disorders	31	10.69
	Nutritional/deficiency-related conditions	21	7.24
	Respiratory/other miscellaneous conditions	20	6.90

The Table 1 summarized the demographic and clinical characteristics of the 290 patients whose prescriptions were audited. The largest proportion of patients belonged to the 18–40-year age group (36.55%), followed by those aged 41–60 years (33.79%), >60 years (21.38%), and <18 years (8.28%). Males constituted a slightly higher proportion of the study population (54.14%) than females (45.86%).

Regarding the major clinical or diagnostic categories, musculoskeletal/pain-related disorders were the most common (24.83%), followed by gastrointestinal disorders (21.03%) and infectious diseases (16.21%). Endocrine/metabolic disorders accounted for 13.10%, while cardiovascular disorders constituted 10.69%. Nutritional/deficiency-related conditions (7.24%) and respiratory/other miscellaneous conditions (6.90%) were comparatively less frequent.

Table 2

Prescription Completeness Among Audited Prescriptions (N = 290)

Completeness parameter	Present/Complete, n (%)	Absent/Incomplete, n (%)
Patient name and sex mentioned	289 (99.65)	1 (0.35)
Age mentioned	290 (100.00)	0 (0.00)

Completeness parameter	Present/Complete, n (%)	Absent/Incomplete, n (%)
Weight mentioned	0 (0.00)	290 (100.00)
Department/OPD mentioned	290 (100.00)	0 (0.00)
Diagnosis/clinical indication mentioned	261 (90.00)	29 (10.00)
Date of consultation mentioned	288 (99.31)	2 (0.69)
Drug name clearly mentioned†	287 (98.97)	3 (1.03)
Dosage form mentioned, where applicable	270 (93.10)	20 (6.90)
Drug strength mentioned	197 (67.93)	93 (32.07)
Dose mentioned	247 (85.17)	43 (14.83)
Route of administration, where applicable	267 (92.07)	23 (7.93)
Frequency of administration mentioned	275 (94.83)	15 (5.17)
Duration of therapy, where applicable	232 (80.00)	58 (20.00)
Patient instructions/directions mentioned	218 (75.17)	72 (24.83)
Prescriber name mentioned	4 (1.38)	286 (98.62)
Prescriber signature present	259 (89.31)	31 (10.69)
Prescriber registration number mentioned	0 (0.00)	290 (100.00)

The Table 2 represented the completeness of documentation across the 290 audited prescriptions. Age and department/OPD were documented in all prescriptions (100%), while patient name and sex (99.65%), date of consultation (99.31%), and drug name (98.97%) were also recorded in nearly all prescriptions. High levels of completeness were observed for frequency of administration (94.83%), dosage form (93.10%), route of administration (92.07%), diagnosis/clinical indication (90.00%), and prescriber signature (89.31%).

Documentation was comparatively lower for dose (85.17%), duration of therapy (80.00%), patient instructions/directions (75.17%), and drug strength (67.93%). Major deficiencies were observed in prescriber identification: the prescriber name was mentioned in only 1.38% of prescriptions, while the prescriber registration number was absent from all prescriptions (100%). Similarly, patient weight was not documented in any of the audited prescriptions (100%).

Table 3

Distribution of Prescriptions According to Prescription Completeness Score (PCS) (N = 290)

PCS (%)	Completeness category	Prescriptions, n (%)
≥90%	Excellent	78 (26.90)
80–89.9%	Good	103 (35.52)
70–79.9%	Moderate	69 (23.79)
<70%	Poor	40 (13.79)
Total	—	290 (100.00)

The Table 3 showed the distribution of the 290 audited prescriptions according to the Prescription Completeness

Score (PCS). The largest proportion of prescriptions demonstrated good completeness (80–89.9%), accounting

for 103 (35.52%) prescriptions. This was followed by 78 (26.90%) prescriptions with excellent completeness ($\geq 90\%$) and 69 (23.79%) with moderate completeness

(70–79.9%). Only 40 (13.79%) prescriptions were categorized as having poor completeness ($< 70\%$).

Table 4

Summary Statistics of the Prescription Completeness Score (N = 290)

PCS summary measure	Value
Mean $\pm$ SD	82.4 $\pm$ 10.8
Median (IQR)	83.3 (75.0–91.7)
Minimum–maximum	50.0–100.0
PCS $\geq 80\%$	181 (62.41)
PCS $< 80\%$	109 (37.59)

The Table 4 summarized the distribution of the Prescription Completeness Score (PCS) among the 290 audited prescriptions. The mean PCS was 82.4 $\pm$ 10.8%, while the median score was 83.3% (IQR: 75.0–91.7%), indicating an overall relatively high level of prescription completeness. The PCS ranged from 50.0% to 100.0%,

demonstrating variability in the completeness of individual prescriptions.

Using 80% as the predefined cut-off, 181 (62.41%) prescriptions achieved a PCS of $\geq 80\%$, whereas 109 (37.59%) prescriptions had a PCS $< 80\%$. Thus, nearly two-thirds of the audited prescriptions met the threshold for good-to-excellent prescription completeness.

Table 5

Pattern of Drug Utilization Among the Prescriptions Evaluated

Indicator	Value
Total prescriptions	290
Total drugs prescribed	1017
Average drugs per prescription	3.5
Prescriptions with ≥ 1 antibiotic	97 (33.44%)
Total antibiotics prescribed	126
Antibiotics (% of drugs)	12.38%
Generic prescriptions	99.75%
State EDL adherence	94.48%

Note. EDL = Essential Drug List.

The Table 5 presented the drug utilization pattern across the 290 prescriptions evaluated, comprising a total of 1,017 prescribed drugs. The average number of drugs per prescription was 3.5, indicating that patients received approximately three to four medications per prescription. Antibiotics were prescribed in 97 (33.44%) prescriptions, with a total of 126 antibiotics prescribed. Antibiotics

constituted 12.38% of all drugs prescribed. Prescribing by generic name was very high (99.75%), demonstrating near-universal use of generic nomenclature. Furthermore, 94.48% of the prescribed medicines adhered to the State Essential Drug List (EDL).

Table 6

Distribution of Prescribed Medications According to Dosage Form

Formulation	No. of Drugs	Percentage (%)
Oral	904	88.89
Topical	97	9.54

Injectables	9	0.88
Inhalational	7	0.69
Total	1,017	100.00

The Table 6 showed the distribution of the 1,017 prescribed medications according to dosage form. Oral medications constituted the predominant dosage form, accounting for 904 (88.89%) of all drugs prescribed. Topical preparations were the second most frequently

prescribed dosage form, comprising 97 (9.54%) medications.

Parenteral and inhalational preparations were prescribed considerably less frequently. Injectables accounted for 9 (0.88%), while inhalational preparations accounted for 7 (0.69%) of the total medications.

Table 7

Distribution of Prescribed Medications According to Therapeutic Class

Drug Class	No. of Prescriptions
Others (miscellaneous, incl. antidiabetics, steroids)	168
Antiulcer/GI	134
NSAIDs	130
Vitamins & Minerals	73
Cardiovascular	41
Antimicrobials	97
Uterotonics	0

Note. GI = gastrointestinal; NSAIDs = nonsteroidal anti-inflammatory drugs. Therapeutic classes are not mutually exclusive; a prescription may contain drugs from more than one therapeutic class.

The Table 7 presented the distribution of prescribed medications according to therapeutic class. The miscellaneous category, including antidiabetic drugs and steroids, was the most frequently represented, occurring in 168 prescriptions. This was followed by

antiulcer/gastrointestinal medications in 134 prescriptions and NSAIDs in 130 prescriptions.

Antimicrobials were prescribed in 97 prescriptions, while vitamins and minerals and cardiovascular drugs were recorded in 73 and 41 prescriptions, respectively. No uterotonic drugs were prescribed during the study period.

Table 8

Assessment of Prescribing Practices Using WHO Core Prescribing Indicators

Indicator	Study Finding	Reference/Ideal Range	Interpretation
Average drugs per encounter	3.5	1.6–1.8	High; reflects polypharmacy and warrants caution.
Percentage prescribed by generic name	99.75%	100%	Nearly ideal; excellent adherence.
Percentage of drugs from Essential Drug List (EDL)	94.48%	100%	Good, but stricter compliance is desirable.
Percentage of encounters with an antibiotic prescribed	33.44%	20–26%	Above the reference range; suggests possible overuse and warrants review of appropriateness.
Percentage of encounters with an injection prescribed	0.9%	<10%	Appropriate; within the stated reference range.

Note. EDL = Essential Drug List.

The Table 8 assessed the prescribing practices using the WHO core prescribing indicators. The average number of drugs prescribed per encounter was 3.5, which was higher than the stated reference range of 1.6–1.8, indicating a relatively high number of medicines per prescription and highlighting the need to monitor polypharmacy.

Prescribing by generic name was 99.75%, which was very close to the ideal value of 100%, demonstrating excellent adherence to generic prescribing. Similarly, 94.48% of drugs were prescribed from the Essential Drug List (EDL), reflecting good adherence, although further improvement toward complete EDL compliance was desirable.

Antibiotics were prescribed in 33.44% of patient encounters, exceeding the stated reference range of 20–26% and suggesting possible antibiotic overuse that warranted further assessment of prescribing appropriateness. In contrast, injections were prescribed in only 0.9% of encounters, which was well within the stated reference range of <10%.

Discussion

The present cross-sectional prescription audit evaluated prescription completeness, drug-utilization patterns, dosage forms, therapeutic classes, and WHO core prescribing indicators among 290 outpatient prescriptions from a secondary healthcare hospital in Ganjam, Odisha. Overall, the findings demonstrated relatively good prescription completeness, near-universal generic prescribing, high adherence to the State Essential Drug List (EDL), and very low utilization of injectable formulations. However, important deficiencies were identified in documentation of patient weight and prescriber identification, while the average number of medicines per prescription and the proportion of encounters involving antibiotics were higher than the selected reference ranges. These findings indicate that prescribing quality was heterogeneous, with strengths in generic and essential-medicine prescribing but opportunities for improvement in documentation, polypharmacy, and antimicrobial stewardship.

The demographic profile showed that patients aged 18–40 years constituted the largest group (36.55%), followed by those aged 41–60 years (33.79%), with a slight male predominance (54.14%). Thus, approximately 70% of audited prescriptions were from patients aged 18–60 years. A recent prescription audit from Haryana similarly reported a broad outpatient population, while another recent emergency prescription audit from North India reported a modest male predominance of 52.3%. Differences in demographic distributions across prescription-audit studies are expected because they depend substantially on the type of healthcare facility, departments included, local disease burden, referral patterns, and healthcare-seeking behaviour [7].

Musculoskeletal/pain-related disorders were the most frequently encountered clinical category in the present

study (24.83%), followed by gastrointestinal disorders (21.03%) and infectious diseases (16.21%). This pattern differed from a recent open-access study from a university clinic in Saudi Arabia, where respiratory disorders were the most common diagnoses (29.8%), followed by diabetes/hypertension (15.6%) and musculoskeletal disorders (15.4%). Such differences are likely to reflect variations in patient populations, geographical disease patterns, seasonality, institutional characteristics, and the spectrum of clinical services represented in individual prescription audits [8].

Prescription completeness represented an important component of the present audit. Age and department/OPD were documented in all prescriptions, while patient name and sex (99.65%), date of consultation (99.31%), and drug name (98.97%) showed excellent levels of documentation. Frequency (94.83%), dosage form (93.10%), route of administration (92.07%), diagnosis/clinical indication (90.00%), and prescriber signature (89.31%) were also documented in a large majority of prescriptions. Nevertheless, documentation declined for dose (85.17%), duration of therapy (80.00%), patient instructions (75.17%), and drug strength (67.93%). The nationwide ICMR Rational Use of Medicines Centres multicentric study involving 4,838 prescriptions similarly identified prescription incompleteness as an important concern; 38.65% of prescriptions were incomplete, with omissions involving parameters such as dose, duration, and formulation [9].

One of the most striking findings was the complete absence of patient weight documentation. This finding is not unique to the present setting. In the open-access study by Alrasheed et al., patient weight was recorded in only 0.8% of 615 prescriptions, despite complete documentation of patient name, gender, age, and diagnosis.⁷ The similarity is noteworthy and indicates that weight may be systematically overlooked during routine outpatient prescribing. Although weight-based dosing is not required for every adult medication, its absence becomes clinically important in children and for medicines with weight-dependent dosing, narrow therapeutic indices, or other dose-adjustment requirements. In contrast, that study reported dose, frequency, and duration in 93.7%, 93.2%, and 98.0% of prescriptions, respectively, compared with 85.17%, 94.83%, and 80.00% in the present study. Thus, frequency documentation was comparable, whereas dose and particularly duration documentation showed greater scope for improvement in the present setting [8].

Prescriber identification represented another major deficiency. The prescriber name was recorded in only 1.38% of prescriptions and the registration number was absent from all prescriptions, although 89.31% contained a prescriber signature. This pattern suggests that signing a prescription was substantially more established than documenting complete prescriber identification. From a

quality-assurance perspective, this is important because adequate prescriber identification facilitates professional accountability, communication, traceability, and clarification of medication-related queries. The magnitude of this deficiency contrasts sharply with the Saudi study, in which prescriber name and signature were documented in all prescriptions. This difference demonstrates that high completeness of medication-related fields does not necessarily imply adequate administrative and professional documentation [8].

The study-developed Prescription Completeness Score (PCS) provided an integrated assessment of these individual documentation parameters. The mean PCS was $82.4 \pm 10.8\%$, with a median of 83.3% (IQR $75.0\text{--}91.7\%$) and a range of $50\text{--}100\%$. Overall, 26.90% of prescriptions were classified as excellent and 35.52% as good, resulting in 62.41% achieving a $\text{PCS} \geq 80\%$. Conversely, 37.59% had a PCS below 80% , including 13.79% categorized as poor. These findings suggest that, although overall documentation was generally satisfactory, substantial prescription-to-prescription variability remained. Direct numerical comparison of the PCS with previous studies should be undertaken cautiously because completeness scores differ in the number of components assessed, weighting, handling of non-applicable variables, and cut-offs. For example, Verma et al. reported a mean completeness score of 10.33 ± 0.8 on an 11-point scale in their Haryana outpatient audit, whereas the present study normalized completeness as a percentage [7].

The 290 prescriptions contained 1,017 medicines, yielding an average of 3.5 medicines per prescription. This exceeded the reference range of $1.6\text{--}1.8$ used in the present analysis and suggests a tendency toward multiple-drug prescribing. Importantly, the observed value is comparable with several Indian studies. The multicentric ICMR study reported an average of 3.34 medicines per prescription [9], while Kasabi et al. reported 3.43 medicines per prescription across primary healthcare facilities in Karnataka [10]. A prescription audit of secondary-level government hospitals in Maharashtra reported an average of 3.1 medicines per prescription [11]. More recently, Verma et al. reported 3.03 ± 1.51 medicines per prescription in Haryana [7]. Thus, although the present value of 3.5 was above the selected reference range, it was broadly comparable to prescribing patterns observed across several Indian healthcare settings.

The implications of an elevated average number of medicines require cautious interpretation. A high number of drugs per encounter may increase treatment complexity and potentially increase the risk of drug interactions, adverse drug reactions, non-adherence, and unnecessary expenditure. However, the average number of medicines alone cannot establish inappropriate polypharmacy because prescribing multiple medicines may be clinically justified in patients with multimorbidity or complex conditions. Therefore, the finding should be considered a signal for prescription review rather than direct evidence of irrational prescribing.

Generic prescribing emerged as a major strength of the present study, with 99.75% of medicines prescribed by generic name. This was substantially higher than the 47.58% reported in the multicentric ICMR study [9], 85.8% reported in a rural Delhi hospital [12], approximately 84% reported from primary healthcare facilities in Karnataka [10], and 75% reported in the recent Haryana audit [7]. The present finding was comparable to the 100% generic prescribing reported by Alrasheed et al [8]. The near-universal generic prescribing observed in the present study therefore represents a particularly favourable aspect of prescribing practice and may facilitate standardization, procurement, affordability, and rational medicine use within the public healthcare system.

Similarly, 94.48% of prescribed medicines were from the State EDL, demonstrating strong adherence to essential-medicine prescribing. This was almost identical to the 94% EML adherence reported by Kasabi et al. in Karnataka and higher than the 88.3% reported in the rural Delhi study [10,12]. It was also substantially higher than the 55.4% NLEM adherence and 50.8% Haryana State EML adherence reported by Verma et al. [7]. A secondary-level government hospital audit in Maharashtra reported much lower conformity to the WHO 2003 EML among single-ingredient formulations, although differences in the list used, period of study, and calculation methods limit direct comparison [11]. Collectively, the high State EDL adherence in the present study suggests that prescribing was strongly aligned with medicines prioritized within the public-sector formulary. Antibiotics were prescribed in 97 of 290 encounters (33.44%), with 126 antibiotics accounting for 12.38% of all prescribed medicines. The encounter-level antibiotic rate exceeded the $20\text{--}26\%$ reference range used in the present analysis. The finding was nevertheless similar to the 35% antibiotic encounter rate reported in secondary-level government hospitals in Maharashtra.¹¹ In contrast, Verma et al. reported antibiotics in 20.59% of outpatient prescriptions in Haryana [7], while the multicentric ICMR study reported antimicrobial prescribing in 17.63% of prescriptions [9] Alrasheed et al. reported 21.5% [8], and a South Indian outpatient study reported 17.5% [13]. Conversely, the rural Delhi audit reported a substantially higher rate of 52.5% [12]. These inter-study differences illustrate the marked context dependence of antibiotic utilization.

The higher antibiotic encounter rate in the present study warrants attention from an antimicrobial-stewardship perspective; however, it should not automatically be interpreted as inappropriate antibiotic prescribing. The WHO/INRUD indicator measures the frequency of antibiotic exposure rather than clinical appropriateness. Determining overuse requires assessment of indication, antibiotic selection, dose, frequency, route, duration, microbiological evidence where applicable, and concordance with treatment guidelines. The relatively high proportion of infectious diseases in the audited population may also have contributed to antibiotic

utilization. Consequently, a focused antimicrobial-prescribing audit incorporating diagnosis-specific appropriateness and, ideally, WHO AWaRe classification would provide a more definitive assessment.

A particularly favourable finding was the very low use of injectable medicines. Injectables represented only 0.88% of all drugs, while injection-containing encounters were approximately 0.9%, remaining well within the reference threshold applied in this study. The finding was similar to the 1.15% injection encounter rate reported by Verma et al. in Haryana and the approximately 0.7% reported in another Indian tertiary-care assessment [7,14]. In contrast, injection use was 10.8% in the rural Delhi audit [12], 25% in secondary-level hospitals in Maharashtra [11], and 61% in the Karnataka primary healthcare study [10]. Such substantial variation is likely attributable to differences in clinical settings and case mix. The very low injection use in the present outpatient population may indicate appropriate preference for less invasive routes where clinically suitable, thereby potentially reducing injection-related risks and resource requirements.

Consistent with the low injection utilization, the dosage-form analysis demonstrated a marked predominance of oral medicines (88.89%), followed by topical preparations (9.54%), while injectables (0.88%) and inhalational formulations (0.69%) were uncommon. The predominance of oral therapy is compatible with the outpatient nature of the study, where most conditions can generally be managed without parenteral treatment. This pattern also supports the WHO indicator finding of low injection exposure.

Regarding therapeutic classes, miscellaneous medicines including antidiabetic agents and steroids were most frequently represented, followed by antiulcer/gastrointestinal drugs and NSAIDs. Antimicrobials occurred in 97 prescriptions, while vitamins and minerals were present in 73. The relatively frequent use of NSAIDs corresponded with musculoskeletal/pain-related disorders being the most common clinical category. Other prescription audits have similarly identified analgesic use as prominent; Alrasheed et al., for example, reported analgesics as the most frequently prescribed class, occurring in 50.4% of prescriptions [8]. However, direct comparisons of therapeutic-class frequencies should be made cautiously because the categories in the present study were not mutually exclusive and different studies use different drug-classification systems.

Taken together, the WHO core prescribing indicators revealed a mixed but generally encouraging prescribing profile. Generic prescribing (99.75%), State EDL adherence (94.48%), and very low injection use represented clear strengths. Conversely, an average of 3.5 medicines per encounter and antibiotic use in 33.44% of encounters exceeded the reference ranges adopted in the study. This pattern differs from some Indian studies where generic and EML prescribing were major deficiencies, while simultaneously resembling them in terms of elevated numbers of medicines per encounter. For

example, the ICMR multicentric study reported an average of 3.34 drugs but only 47.58% generic prescribing, whereas the present study achieved almost universal generic prescribing despite a similar average medicine burden [9].

Generalizability

The findings of the present study are primarily generalizable to outpatient prescription practices in comparable public-sector secondary healthcare facilities, particularly district-level hospitals operating within similar healthcare systems in Odisha and other parts of India. The inclusion of prescriptions from different demographic and clinical categories provides a broad representation of routine outpatient prescribing at the study hospital. However, the study was conducted at a single District Headquarters Hospital over a three-month period; therefore, the findings may not fully represent prescribing practices in tertiary care hospitals, primary healthcare facilities, private-sector institutions, inpatient settings, or healthcare facilities in regions with different patient profiles, formularies, and prescribing policies. Seasonal variations in disease patterns and prescribing practices may also limit temporal generalizability. Consequently, the observed prescription completeness, generic and essential-medicine prescribing, antibiotic utilization, and other WHO prescribing indicators should primarily be interpreted as institution-specific baseline estimates. Multicentric studies involving different levels of healthcare facilities, longer study periods, and probability-based sampling would improve the external validity and generalizability of these findings.

Conclusion

The present study provides a comprehensive assessment of prescribing practices in a public-sector secondary healthcare setting and demonstrates a mixed but largely encouraging prescribing profile. Near-universal generic prescribing, high adherence to the Essential Drug List, and minimal use of injectable medicines represent important strengths and reflect several core principles of rational medicine use. Nevertheless, substantial gaps in prescription documentation—particularly patient weight and prescriber identification—together with a relatively high number of medicines per encounter and higher-than-reference antibiotic prescribing, identify clear opportunities for quality improvement.

Importantly, these findings demonstrate that prescription quality cannot be judged by a single prescribing indicator; rather, it requires simultaneous consideration of completeness, drug utilization, essential-medicine adherence, and clinically relevant prescribing practices. Regular prescription audits integrated with structured feedback, improved documentation standards, judicious multidrug prescribing, and strengthened antimicrobial stewardship could convert the identified gaps into measurable improvements in patient safety and rational medicine use. The present findings therefore provide a valuable baseline for future audit–feedback–re-audit cycles and for monitoring the impact of institutional

interventions aimed at achieving safer, more accountable, and evidence-based prescribing.

Limitations

The present study has several limitations. Its single-center design, short three-month study period may limit the generalizability of the findings and introduce selection bias. Exclusion of illegible prescriptions may have resulted in an overestimation of prescription completeness. Furthermore, WHO prescribing indicators do not independently establish the clinical appropriateness of individual prescriptions. The study also did not comprehensively assess diagnosis-specific prescribing appropriateness, patient outcomes, medication availability, adherence, or antimicrobial appropriateness.

Recommendations

Based on the findings of the present prescription audit, the following measures are recommended to strengthen rational prescribing and improve prescription quality at secondary healthcare facilities:

Institutionalize periodic prescription audits: Prescription auditing should be conducted at regular intervals using standardized indicators, followed by structured feedback to prescribers. An audit–feedback–re-audit cycle should be adopted to determine whether identified deficiencies improve over time.

Improve prescription completeness: Particular attention should be given to poorly documented parameters, especially patient weight when clinically relevant, drug strength, duration of therapy, patient instructions, prescriber name, and registration number. Standardized prescription formats with mandatory fields may improve documentation.

Strengthen prescriber accountability: Prescriptions should contain clearly identifiable prescriber details, signature, and registration number to improve traceability, accountability, and communication regarding medication-related queries.

Monitor multidrug prescribing: As the average number of medicines per encounter was relatively high, prescriptions containing multiple medicines should be periodically reviewed for therapeutic necessity, duplication, potential drug–drug interactions, and opportunities for deprescribing where appropriate.

Strengthen antimicrobial stewardship: The relatively high proportion of encounters involving antibiotics warrants regular antibiotic-prescribing audits focusing on indication, choice of antimicrobial, dose, route, frequency, and duration. Diagnosis-specific treatment guidelines and antimicrobial stewardship interventions should be reinforced.

Sustain generic and essential-medicine prescribing: The very high level of generic prescribing and adherence to the State Essential Drug List were major strengths and should be maintained through continued institutional policies, prescriber education, and adequate availability of essential medicines.

Promote rational route of administration: The low utilization of injectable medicines should be maintained by continuing to prefer oral or other less invasive formulations whenever clinically appropriate.

Introduce electronic or structured prescribing systems: Where feasible, standardized electronic prescribing with mandatory fields and clinical decision-support features may reduce omissions, improve legibility, identify potential drug interactions or therapeutic duplication, and strengthen overall prescription quality.

Conduct targeted educational interventions: Regular continuing medical education, departmental feedback sessions, and sensitization programmes should focus on rational prescribing, complete prescription writing, polypharmacy, essential medicines, and antimicrobial stewardship.

Abbreviations

Abbreviation	Full form
DDC	Drug Distribution Centre
DHH	District Headquarters Hospital
DDI	Drug-Drug Interaction
DRP	District Residency Programme
EDL	Essential Drug List
IEC	Institutional Ethics Committee
IQR	Interquartile Range
MKCG MCH	Maharaja Krushna Chandra Gajapati Medical College and Hospital
NA	Not Applicable
NSAIDs	Nonsteroidal Anti-inflammatory Drugs
OPD	Outpatient Department
PCS	Prescription Completeness Score
SD	Standard Deviation
WHO	World Health Organization
WHO/INRUD	World Health Organization/International Network for Rational Use of Drugs

Ethics Approval

The study was approved by the Institutional Ethics Committee (IEC), MKCG Medical College, Berhampur, Odisha (IEC Approval No. 1197). The study was conducted in accordance with the approved study protocol and applicable institutional ethical requirements. Patient privacy and confidentiality were maintained throughout

the study, and personally identifiable information was excluded from the analytical dataset.

Informed Consent

The study involved a prescription audit of routinely generated outpatient prescriptions and did not involve any intervention or direct collection of identifiable patient information.

Consent for Publication

The manuscript does not contain identifiable patient information, individual case details, photographs, or other material requiring consent for publication.

Availability of Data and Materials

The data generated and analyzed during the study are available from the corresponding author on reasonable request, subject to institutional policies, ethical requirements, and protection of patient confidentiality.

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Conflict of Interest

The authors declare that they have no conflicts of interest relevant to this study.

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References

1. World Health Organization. How to investigate drug use in health facilities: selected drug use indicators. Geneva: WHO; 1993. Available from: <https://apps.who.int/iris/handle/10665/60519>

2. Ofori-Asenso R, Agyeman AA. Irrational use of medicines-a summary of key concepts. Pharm. 2016;4(35):35.
<https://doi.org/10.3390/pharmacy4040035>
<https://doi.org/10.3390/pharmacy4040035>

3. El Mahalli AA. WHO/INRUD drug prescribing indicators at primary health care centres in Eastern Province, Saudi Arabia. East Mediterr Health J. 2012;18(11):1091-1096.
<https://doi.org/10.26719/2012.18.11.1091>
<https://doi.org/10.26719/2012.18.11.1091>

4. Atif M, Sarwar MR, Azeem M, et al. Assessment of core drug use indicators using WHO/INRUD methodology at primary healthcare centers in Bahawalpur, Pakistan. BMC Health Serv Res. 2016;16(1):684. <https://doi.org/10.1186/s12913-016-1932-2>
<https://doi.org/10.1186/s12913-016-1932-2>

5. Haq N, Khan K, Iqbal Q, et al. Prescription pattern of outpatient department of a teaching hospital Quetta, Pakistan. *Value Health*. 2015;18:A335-A766. <https://doi.org/10.1016/j.jval.2015.09.1850>
6. Akhtar MA. Self medication. *Pak J Med Sci*. 2012;28(3):349-51. <https://doi.org/10.12669/pjms.281.1360>
7. Verma N, Vinayagam S, Mittal N, Mittal R, Bansal N. Prescription audit in outpatient pharmacy of a tertiary care referral hospital in Haryana using World Health Organization/International Network of Rational Use of Drugs (WHO/INRUD) core prescribing indicators: a step towards refining drug use and patient care. *Pharmacy (Basel)*. 2025;13(2):48. doi:10.3390/pharmacy13020048. <https://doi.org/10.3390/pharmacy13020048>
8. Idris SA, Hussien TMA, Al-Shammari FF, Nagi HA, Bashir AI, Elhussein GEMO, et al. An evaluation of drug prescribing patterns and prescription completeness. *Healthcare (Basel)*. 2024;12(22):2221. doi:10.3390/healthcare12222221. <https://doi.org/10.3390/healthcare12222221>
9. Joshi R, Medhi B, Prakash A, Chandy S, Ranjalkar J, Bright HR, Basker J, Govindraj L, Chugh PK, Tripathi CD, Badyal DK, Balakrishnan S, Jhaj R, Shukla AK, Atal S, Najmi A, Banerjee A, Kamat S, Tripathi RK, Shetty YC, Parmar U, Rege N, Dikshit H, Mishra H, Roy SS, Chatterjee S, Hazra A, Bhattacharya M, Das D, Trivedi N, Shah P, Chauhan J, Desai C, Gandhi AM, Patel PP, Shah S, Sheth S, Raveendran R, Mathaiyan J, Manikandan S, Jeevitha G, Gupta P, Sarangi SC, Yadav HN, Singh S, Kaushal S, Arora S, Gupta K, Jain S, Cherian JJ, Chatterjee NS, Kaul R, Kshirsagar NA. Assessment of prescribing pattern of drugs and completeness of prescriptions as per the World Health Organization prescribing indicators in various Indian tertiary care centers: A multicentric study by Rational Use of Medicines Centers-Indian Council of Medical Research network under National Virtual Centre Clinical Pharmacology activity. *Indian J Pharmacol*. 2022 Sep-Oct;54(5):321-328. doi: 10.4103/ijp.ijp_976_21. PMID: 36537400; PMCID: PMC9846909. https://doi.org/10.4103/ijp.ijp_976_21
10. Kasabi GS, Subramanian T, Allam RR, Grace CA, Reddy S, Murhekar MV. Prescription practices & use of essential medicines in the primary health care system, Shimoga district, Karnataka, India. *Indian J Med Res*. 2015;142(2):216-9. doi:10.4103/0971-5916.164261. <https://doi.org/10.4103/0971-5916.164261>
11. Potharaju HR, Kabra SG. Prescription audit of outpatient attendees of secondary level government hospitals in Maharashtra. *Indian J Pharmacol*. 2011 Apr;43(2):150-6. doi: 10.4103/0253-7613.77350. PMID: 21572648; PMCID: PMC3081452. <https://doi.org/10.4103/0253-7613.77350>
12. 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 Feb 15;8:37. doi: 10.4103/jehp.jehp_90_18. PMID: 30993130; PMCID: PMC6432812. https://doi.org/10.4103/jehp.jehp_90_18
13. Meenakshi R, Selvaraj N, Anandabaskar N, Dhamodharan A, Badrinath AK, Rajamohammad MA. Prescription audit of a teaching hospital in South India using World Health Organization core prescribing indicators - A cross-sectional study. *Perspect Clin Res*. 2022 Jul-Sep;13(3):132-136. doi: 10.4103/picr.PICR_172_20. Epub 2021 Jan 8. PMID: 35928646; PMCID: PMC9345256. https://doi.org/10.4103/picr.PICR_172_20
14. Chenchula S, Gupta R, Gupta SK, Padmavathi R, Pathan S. Assessment of WHO core drug use indicators at a tertiary care Institute of National importance in India. *Bioinformation*. 2022 Oct 31;18(10):888-893. doi: 10.6026/97320630018888. PMID: 37654843; PMCID: PMC10465770. <https://doi.org/10.6026/97320630018888>



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