

Original article

Assessment of Prescribing Pattern among Patients Getting Discharged From A Tertiary Care Hospital

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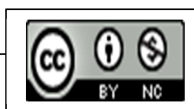
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Abstract

Background: Hospital discharge prescriptions serve as critical documents ensuring continuity of care and patient safety. The quality and completeness of these prescriptions significantly impact rational drug use and patient outcomes.

Objective: To assess the prescribing patterns and completeness of discharge prescriptions in a tertiary care hospital based on World Health Organization prescribing indicators.

Methods: This retrospective observational study at SAIMS, Indore, over 12 months (June 2024–May 2025), evaluated 1012 discharge prescriptions using a WHO-based proforma. We assessed drug prescription patterns among patients discharged from a tertiary care hospital based on WHO indicators.

Results: 1012 discharge prescriptions were analysed. The mean age was 42.45 ± 18.64 years, and 54.7% were male. Oncology patients made up 40.9%. In total, 6122 drugs were prescribed, averaging 6.04 per prescription. Polytherapy was predominant (97%), and 93.09% of drugs were brand name. Fixed-dose combinations were present in 37.7% of prescriptions. 60% of drugs were not in the hospital formulary, and 40.29% were not on the National List of Essential Medicines. Vitamins/iron (23.1%), antimicrobials (10.38%), and injectables (3.93%) were the most commonly prescribed therapeutic categories.

Prescription completeness analysis revealed that only 18% were complete per WHO indicators. Missing elements included instructions (69.9%), duration (24%), and follow-up details (14.5%). Orthopaedics had the highest rate of completeness (53.7%), while oncology showed the lowest (10.9%). Prescribing fewer FDCs, lower use of injectables, and higher prescribing of vitamins and antimicrobials were significantly associated with completeness.

Conclusion: Polytherapy, brand-name prescribing, and FDC use were common, with many drugs outside the formulary and NLEM. Prescription completeness was poor, with only 18% fulfilling WHO indicators due to missing instructions and duration details. Oncology showed the lowest completeness. Stricter prescription audits, adherence to essential medicine lists, and improved documentation are needed to promote rational drug use.

Keywords - Prescribing Pattern, WHO Prescribing Indicators, Discharge Summary, Rational Drug Use

1. Introduction

A prescription is a legal written documentation of communication between a licensed healthcare professional – physician, dentist, or qualified practitioner and a patient who is visiting a clinic. A prescription bridges the diagnosis and pharmacotherapy. The Prescription consists of Prescriber information, Date, Patient information, Superscription, Inscription, Subscription, Signature, Follow-up date, and Follow-up instructions.^(1,2)

Why do we need Prescription – it's important to have legal documentation for many reasons such as to ensure the safe use of medications, Legal requirements for medications like Schedule H, H1, and X drugs that cannot be sold over the counter, supports Rational Drug Use, Protects patient safety, Prevents self-medication and abuse and Supports Insurance and Support medico-legal documentation.⁽³⁾

There are different types of medication order writing like Manual (Handwritten) prescriptions, electronic prescriptions (e-prescriptions), Telemedicine-Based Prescriptions, and Verbal prescriptions. ⁽⁴⁾ In medication order or Prescription writing, there are some points doctors should keep in mind like using generic names of medication, avoid abbreviations, using metric units, write legibly to avoid pharmacist errors, including diagnosis, mention of dose, dosage form, route, frequency, duration, Avoid Vague instructions, check for interactions/allergies. The method of writing a prescription must always uphold Clarity, Completeness, Legal Validity, and Rationality.

There are 2 types of Prescriptions are Rational Prescription and Irrational Prescription. ⁽⁴⁾

A Rational prescription is one that ensures appropriate medication is prescribed to “the right patient, with the right drug, in the right dose via the right route for the right duration, at the lowest cost”. A rational prescription is an essential skill improved by physicians and it not only shows physician knowledge but also their attitude toward appropriate drug prescribing. ⁽⁵⁾

There are WHO’s core principles of Rational use of drugs which every physician should keep in mind. They are correct indication, Appropriate drug selection based on efficacy, safety, suitability, and cost (ESSC – Efficacy, Safety, Suitability, and Cost criteria), Correct dose, frequency, and duration, Monitoring for adverse effects and drug interactions, Alignment with national guidelines and essential medicine lists (e.g., NLEM – National List of Essential Medicines). ^(1,4,6)

An irrational prescription fails to follow scientific, evidence-based or patient-specific considerations and leads to ineffective therapy, increased risk of adverse drug reactions (ADRs), higher cost, and drug resistance. There are different types of irrational prescribing like a wrong drug for the indication, wrong dose or duration, polypharmacy without the need for many drugs, drug-drug interaction risk, expensive brands, Duplicate therapy, and Fixed Dose Combinations (irrational) not Approved by Central Drugs Standard Control Organization (CDSCO). ^(1,7)

A Complete prescription is a written order that contains all the essential elements required for the accurate dispensing and appropriate use of a medication, including patient information, drug details, dosage instructions, and prescriber credentials, ensuring safe, rational, and legal therapy. ⁽¹⁾

There is a WHO checklist for a complete prescription for audit that is Patient name, age, weight, Date of prescription, Generic drug name, Dose, frequency, route, and duration, Dosage form (e.g., tablet, injection), Total quantity to dispense, Clear instructions to the patient, Prescriber name, qualification, and registration number, Signature of prescriber, Indication or diagnosis (recommended), Refill info (if applicable). ⁽⁸⁾

A Hospital discharge prescription summary serves as the primary documents communicating a patient’s care plan to the post-hospital care team. ⁽¹⁾

In this study, we assessed the prescription pattern of drugs among patients getting discharged from a tertiary care hospital on indicators like the number of Prescribed Drugs, Number of prescriptions with Monotherapy or Polytherapy, Number of prescriptions with Brand Names, Number of Fixed Dose combination (FDC), Number of drugs not from the hospital formulary, number of drugs not from National List of Essential Medicines (NLEM), number of antimicrobials, Number if injectables, number of Iron/Vitamins containing drugs. In this study, we assessed the completion of discharge prescription by checking mentioning of Dose, Frequency, Duration, Formulation, Follow-up visit, and Instructions.

2 Materials and Methods

2.1 Study Design, Setting, and Duration

A retrospective, cross-sectional, observational study was conducted to evaluate the prescribing patterns of discharge prescriptions among patients discharged from a tertiary care hospital. The study was carried out at Sri Aurobindo Medical College and Postgraduate Institute (SAMC & PGI), a tertiary care teaching hospital located in Indore, Madhya Pradesh, India. The study spanned a period of 12 months, from 1st June 2024 to 30th May 2025, following approval from the Institutional Ethics Committee (IEC No.: RC/IEC/SAIMS/214/23).

2.2 Sample Size

The Sample Size was **1012 discharge prescriptions** were included during the study period. The sample size was calculated using the following formula for estimating a single proportion:

$$n = \frac{Z_{1-\alpha/2}^2 P (1 - P)}{l^2}$$

Where:

- $Z_{\alpha} = 1.96$ at 5% level of significance
- $P = 61.34\%$ (proportion of complete prescriptions based on previous data)
- $l = 3\%$ (absolute precision)
- Resulting in $n = 1012$

2.3 Selection criteria

Inclusion Criteria

- Discharge prescriptions of patients of all ages of any gender from the different departments of the hospital.
- Only those records containing complete discharge sheets were included.

Exclusion Criteria

- Patient records without discharge summaries.
- Illegible or incomplete prescriptions that lacked key demographic or clinical data.

2.4 Data Collection Tool and Method

Data were collected retrospectively using a semi-structured proforma that was developed based on the World Health Organization (WHO) core prescribing indicators and a completeness checklist. The proforma encompassed three key domains. The first domain captured socio-demographic details of the patients, including their name, age, gender, diagnosis at discharge, and duration of hospital stay. The second domain focused on drug prescribing pattern variables, as outlined in the WHO prescribing indicators. These included the total number of drugs per prescription, categorization into monotherapy versus polytherapy, drugs prescribed by generic name, use of fixed-dose combinations (FDCs), administration of antimicrobial agents and injectable formulations, prescription of vitamins, minerals, or iron supplements, and identification of drugs not listed in the hospital formulary or the National List of Essential Medicines (NLEM), 2022. The third domain evaluated the completeness of each discharge prescription according to WHO standards, assessing the presence of essential prescription components such as dose, dosage form, route and frequency of administration, duration of therapy, and follow-up advice including date and specific instructions.

2.5 Statistical analysis

All collected data were entered into Microsoft Excel (Microsoft 365) for further processing. Prior to analysis, data cleaning and validation procedures were undertaken to ensure consistency, accuracy, and completeness. The data were then analysed and presented in the form of frequency tables. Descriptive statistics were calculated, with mean and standard deviation (SD) used for quantitative variables, while frequency and percentage were applied to qualitative or categorical variables. To visually represent qualitative or demographic data, pie charts and bar diagrams were employed. The Chi-square test was applied to assess associations or comparisons between qualitative variables. A p-value of less than 0.05 was considered statistically significant, whereas a p-value greater than 0.05 indicated a statistically insignificant result.

Results

A total of 1012 prescription were analysed during the study. Among them, 54.7% were male ($n = 554$) and 45.3 % were female (Table 1). With an mean age of 42.45 with Standard deviation of 18.64 (Table 2).

Table 1 - Gender Distribution of Discharged Patients

Gender	Number (n)	Percentage (%)
Male	554	54.7
Female	458	45.3

Table 2 - Mean Age of Patients

	Mean	SD
Age	42.45	18.64

Department-wise prescription were analysed, in which maximum percentage was 40.9% prescription from department of oncology and minimum percentage was 2.8% from department of ENT and Ophthalmology each. Table 3 described department-wise distribution of analysed discharge prescriptions.

Table 3 - Department-wise Distribution of Analysed Discharge Prescriptions

Department	Number (n)	Percentage (%)
General Medicine	224	22.1
General Surgery	148	14.6
OBS GYN	42	4.2
Paediatrics	61	6.0
ENT	28	2.8
Ophthalmology	28	2.8
Orthopaedics	67	6.6
Oncology	414	40.9

In 1012 prescription, total number of 6122 Drugs were prescribed. In this study, 97% were polytherapy (n=982) and 3% were monotherapy (n=30). Furthermore, in 93.09 % of the prescriptions, have drugs prescribed by brand names. Moreover 37.7% were prescription with FDCs drugs. 60% drugs prescribed where not from the hospital formulary and 40.29% drugs were not from National List of Essential Medicines (NLEM). In this result, number of prescription with antimicrobials, injections and vitamins/Iron were 636 (10.38%), 241(3.93%), 1409 (23.1%) respectively. Table 4 depict Overview of Drug Prescribing Patterns in Discharge Prescriptions.

Table 4 - Overview of Drug Prescribing Patterns in Discharge Prescriptions (n = 1012)

	Number (n)	Percentage (%)
Total number of prescriptions collected	1012	-
Total number of drugs prescribed	6122	-
Number of prescriptions with monotherapy	30	3.0
Number of prescriptions with polytherapy	982	97.0
Number of prescriptions with brand names	5699	93.09
Number of prescriptions with FDCs	2308	37.70
Number of prescriptions with drugs not from the hospital formulary	3675	60.0
Number of prescriptions with drugs not from NLEM	2467	40.29
Number of prescriptions with antimicrobials	636	10.38
Number of prescriptions with injectables	241	3.93
Number of prescriptions with Vitamins/iron	1409	23.1

In result, we found that on an average about six drugs (6.04) were prescribed to patients. The average number of drugs with brand names was 5.63. In the average number of FDCs was 2.28. Furthermore in the result, we found that average number of drugs per prescription not from the hospital formulary was 3.63 and not from NLEM

were about 2.43. Moreover the number of the antimicrobial drugs was 0.62 and injections were 0.23 per prescriptions. It has been found that less than 25% prescription contained vitamins/iron with an average number of 0.45 per prescription in Table 5.

Table 5 - Mean Values of Prescribing Indicators Per Prescription

Parameters	Average
Average number of prescribed drugs	6.04
Average number of drugs with brand names per prescription	5.63
Average number of FDCs per prescription	2.28
Average number of drugs per prescription not from the hospital formulary	3.63
Average number of drugs per prescription not from NLEM	2.43
Average number of antimicrobials per prescription	0.62
Average Number of injectables per prescription	0.23
Average number of iron/Vitamins containing drugs per prescription	1.39

Third Parameter which was completeness, we found that 82% (n=830) of the Total Prescription (n=1012) were incomplete. The Parameters used to check the completeness by World Health Organization indicators were dose, frequency, duration, formulation, follow-up date and instructions. The percentage of prescriptions which were incomplete due to dose not mentioned were 9.3% (n=94), Frequency not mentioned were about 10.7%, duration not mentioned were 24% (n=243). In contrast, formulation not mentioned were low to 0.3% (n=3). Moreover follow-up date and instructions not mentioned were 14.5% (n= 147) and 69.9% (n= 707) respectively (Table 6).

Table 6 - Completeness of Discharge Prescriptions Based on WHO Indicators

Parameters	Number (n)	Percentage (%)
Complete prescriptions	182	18.0
Incomplete prescriptions	830	82.0
Dose not mentioned	94	9.3
Frequency not mentioned	108	10.7
Duration not mentioned	243	24.0
Formulation not mentioned	3	0.3
Follow-up visit not mentioned	147	14.5
Instructions not mentioned	707	69.9

Department wise completeness of prescriptions was also done to understand the number of complete and incomplete prescription done by each department, 45 complete and 369 incomplete prescription were from Oncology and 4 complete and 24 incomplete prescription were from ophthalmology. There was a significant difference found for completeness of prescription among the departments. Table 7 describes the department wise completeness of prescriptions.

Table 7 – Department-Wise Completeness of Prescriptions

			Complete	Incomplete		
Department	General Medicine	Count	29	194	94.06	0.01*
		% within department	12.9%	86.6%		
	General Surgery	Count	31	117		
		% within department	20.9%	79.1%		
	OBS GYN	Count	8	34		
		% within department	19.0%	81.0%		
	Paediatrics	Count	21	40		
		% within department	34.4%	65.6%		
	ENT	Count	8	20		
		% within department	28.6%	71.4%		
	Ophthalmology	Count	4	24		
		% within department	14.3%	85.7%		
	Orthopaedics	Count	36	31		
		% within department	53.7%	46.3%		
	Oncology	Count	45	369		
		% within department	10.9%	89.1%		

We have compared the number of complete and incomplete prescription on the basis of WHO Drug Prescribing Patterns. Table 8 depict the comparison of prescription completeness by Prescribing Indicators Per Prescription .

Table 8 - Comparison of Prescription Completeness with Drug Use Parameters

	Completeness	N	Mean	SD		
Brand	Complete	182	5.54	2.25	0.57	.563
	Incomplete	829	5.65	2.23		
FDC	Complete	182	2.58	1.61	2.72	0.01*
	Incomplete	828	2.28	1.68		
Formulary	Complete	182	3.60	2.04	0.18	0.85
	Incomplete	829	3.63	1.99		
NLEM	Complete	182	2.58	1.89	1.17	0.23
	Incomplete	829	2.40	1.80		
Antimicrobial	Complete	182	0.75	0.86	2.34	0.01*
	Incomplete	829	0.60	0.76		
Injections	Complete	182	0.04	0.21	4.80	0.01*
	Incomplete	829	0.27	0.62		
Vitamins	Complete	182	1.89	1.45	5.31	0.01*
	Incomplete	829	1.28	1.37		

We have done the department wise analyses of mention of dose, Frequency, Duration, formulation, follow-up and Instructions. Table 9 depict the department wise analysis done to know the reason for not completing the prescriptions. This table analysis is done by dose, frequency and duration mentioned.

Table 9 - Department-Wise Analysis of Dose, Frequency, and Duration Mentioned

		Dose		Frequency		Duration	
		Yes	No	Yes	No	Yes	No
General Medicine	Count	194	30	198	26	166	58
	% within department	86.6%	13.4%	88.4%	11.6%	74.1%	25.9%
General Surgery	Count	135	13	142	6	98	50
	% within department	91.2%	8.8%	95.9%	4.1%	66.2%	33.8%
OBS GYN	Count	36	6	38	4	36	6
	% within department	85.7%	14.3%	90.5%	9.5%	85.7%	14.3%
Paediatrics	Count	61	0	55	6	51	10
	% within department	100.0%	0.0%	90.2%	9.8%	83.6%	16.4%
ENT	Count	28	0	28	0	19	9
	% within department	100.0%	0.0%	100.0%	0.0%	67.9%	32.1%
Ophthalmology	Count	25	3	27	1	7	21
	% within department	89.3%	10.7%	96.4%	3.6%	25.0%	75.0%
Orthopaedics	Count	62	5	64	3	56	11
	% within department	92.5%	7.5%	95.5%	4.5%	83.6%	16.4%
Oncology	Count	377	37	352	62	336	78
	% within department	91.1%	8.9%	85.0%	15.0%	81.2%	18.8%

Table 10 depict the department wise analysis done to know the reason for not completing the prescriptions. This table analysis is done by formulation, Follow-up and Instruction mentioned.

Table 10 - Department-Wise Analysis of Formulation, Follow-Up, and Instructions Mentioned

		Formulation		Follow up		Instructions	
		Yes	No	Yes	No	Yes	No
General Medicine	Count	224	0	165	59	54	170
	% within department	100.0%	0.0%	73.7%	26.3%	24.1%	75.9%
General Surgery	Count	148	0	125	23	53	95
	% within department	100.0%	0.0%	84.5%	15.5%	35.8%	64.2%
OBS GYN	Count	42	0	29	13	18	24
	% within department	100.0%	0.0%	69.0%	31.0%	42.9%	57.1%
Paediatrics	Count	61	0	55	6	27	34
	% within department	100.0%	0.0%	90.2%	9.8%	44.3%	55.7%
ENT	Count	28	0	23	5	10	18
	% within department	100.0%	0.0%	82.1%	17.9%	35.7%	64.3%

Ophthalmology	Count	26	2	23	5	20	8
	% within department	92.9%	7.1%	82.1%	17.9%	71.4%	28.6%
Orthopaedics	Count	67	0	51	16	55	12
	% within department	100.0%	0.0%	76.1%	23.9%	82.1%	17.9%
Oncology	Count	413	1	394	20	68	346
	% within department	99.8%	0.2%	95.2%	4.8%	16.4%	83.6%

Discussion

This study evaluated discharge prescribing patterns and prescription completeness in a tertiary care hospital using World Health Organization (WHO) core prescribing indicators. The analysis of 1012 discharge prescriptions revealed a high average number of drugs per prescription (6.04), which indicates a significant degree of polypharmacy.

The WHO recommends that the average number of drugs per prescription should ideally be between 1.6 and 1.8, in order to promote rational prescribing and avoid unnecessary polypharmacy. Our results are substantially above this range, suggesting a widespread practice of prescribing multiple drugs at the time of discharge. Comparable studies conducted in India have also reported high levels of polypharmacy in tertiary care hospitals. Joshi et al. (2022) in a multicentric study across Indian tertiary care centres found an average of 5.9 drugs per prescription, while Bachewar et al. (2017) reported 5.4 drugs per prescription in medicine wards. Similarly, Ragam et al. (2017) and Atal et al. (2021) reported averages above 5 drugs per encounter. The high values in our study can partly be explained by the patient population characteristics, as 40.9% of prescriptions were from the oncology department.^(4,6,8)

Oncology patients typically require multi-drug regimens including chemotherapy agents, supportive medications, and treatment for comorbid conditions, thereby increasing the overall drug count. However, this does not fully justify the extent of polypharmacy observed, suggesting a need for rationalization of prescribing practices. Brand name prescribing was another prominent finding, with 93.09% of drugs prescribed by brand rather than generic names.

This is much higher than the WHO recommendation of 100% generic prescribing and similar to other Indian studies that report over 90% brand name prescribing (Ragam et al., 2017; Atal et al., 2021). The preference for brand prescribing may stem from physician perception of superior quality, patient familiarity, or influence from pharmaceutical marketing. However, this practice increases treatment costs, reduces patient affordability, and limits the flexibility of pharmacists to dispense cost-effective alternatives. Promoting generic prescribing through policy enforcement, training, and electronic prescription systems is essential to address this issue. Fixed-dose combinations (FDCs) were present in 37.7% of prescriptions. While some FDCs improve patient compliance and therapeutic outcomes, WHO and CDSCO caution against irrational combinations that lack evidence-based justification.

Our findings are similar to those of Bachewar et al. (2017), who reported 34% FDC use in tertiary care. High use of FDCs may reflect prescriber preference for convenience or availability in the market, but it raises concerns about safety, cost, and rationality.

This calls for stricter regulation of FDCs and better prescriber awareness about rational prescribing.^(5,7,9,10)

The study also highlighted suboptimal adherence to institutional and national guidelines, with 60% of prescribed drugs not from the hospital formulary and 40.29% not included in the National List of Essential Medicines (NLEM). These figures are in line with the findings of Joshi et al. (2022), who reported low adherence to NLEM across multiple Indian centres. Prescribing outside formulary and NLEM may be justified in certain cases where newer or specialized drugs are required, particularly in oncology, but the overall high percentage indicates a disconnect between national policy and hospital practice.

Strengthening formulary-based prescribing and periodic audits can help ensure rationality and cost-effectiveness. Analysis of therapeutic categories revealed that vitamins and iron supplements (23.1%) and antimicrobials (10.38%) were frequently prescribed. Similar patterns have been observed in studies by Atal et al. (2021), where

micronutrient supplementation and antimicrobial prescribing were common. While supplementation may be warranted in select patients, its widespread use without clear documentation of deficiency may reflect irrational practice. Antimicrobial prescribing at discharge was within a moderate range but still highlights the need for strong antimicrobial stewardship programs to avoid inappropriate use and resistance development. One of the most significant findings was the poor completeness of prescriptions. Only 18% of discharge prescriptions met WHO standards for completeness, which is much lower than the 61.3% completeness reported by Joshi et al. (2022). Incomplete prescriptions increase the risk of medication errors, poor patient adherence, and adverse outcomes.

The most common deficiencies in our study were omission of instructions (69.9%), duration of therapy (24%), and follow-up details (14.5%). Similar gaps have been documented by Ge et al. (2022) in oncology discharge summaries, suggesting that complexity of care and time pressures may contribute to poor documentation. Department-wise analysis revealed significant differences in prescription completeness. Orthopaedics had the highest completeness rate (53.7%), while oncology had the lowest (10.9%).

This mirrors the findings of Ge et al. (2022), who observed poor documentation in oncology settings due to complex treatment protocols and heavy workloads. Completeness was significantly associated with simpler prescribing regimens, including fewer FDCs and injectables. This suggests that reducing prescription complexity could improve documentation quality and patient safety. Our findings highlight several areas for intervention. First, prescriber education programs should emphasize rational drug use, generic prescribing, and adherence to NLEM. Second, implementing electronic prescribing systems with built-in decision support and mandatory fields could improve completeness and reduce errors. Third, regular prescription audits with feedback, as demonstrated by Atal et al. (2021), have been shown to improve prescribing practices and should be institutionalized. Lastly, formulary enforcement and antimicrobial stewardship programs must be strengthened to align hospital practice with national guidelines. In conclusion, this study demonstrates high polypharmacy, extensive brand name prescribing, frequent FDC use, and poor prescription completeness in a tertiary care hospital. These findings are consistent with previous Indian studies and highlight systemic gaps in rational drug use and documentation. Addressing these issues requires multifaceted interventions including prescriber training, technology adoption, policy enforcement, and regular audits. Such measures are essential to ensure safe, effective, and cost-conscious prescribing, particularly at the critical juncture of hospital discharge where continuity of care is paramount.

Conclusion

The present analysis of 1012 discharge prescriptions highlights significant gaps in rational prescribing and documentation practices. While polytherapy and brand-name prescribing were overwhelmingly common, nearly two-fifths of the prescribed medicines were not part of the NLEM, and more than half were absent from the hospital formulary, raising concerns about cost-effectiveness and standardization. The high prevalence of FDCs and injectables further underscores the need for stringent prescription audits.

Importantly, prescription completeness was markedly suboptimal, with only 18% meeting WHO standards, largely due to missing instructions, duration, and follow-up details. Departmental variations, particularly the low completeness in oncology compared to orthopaedics, indicate specialty-specific gaps that require targeted interventions. The statistical associations between completeness and prescribing patterns suggest that rational use of vitamins and antimicrobials, alongside judicious reduction of FDCs and injectables, may improve overall quality.

Overall, the findings emphasize an urgent need to strengthen prescription monitoring, reinforce adherence to essential medicines lists, and implement structured training programs to enhance prescription completeness and promote rational drug use in tertiary care settings.

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