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Original Article

Improving Medication Error Reporting through Clinical Audit and Targeted Interventions in a Tertiary Care Hospital

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ABSTRACT

Aim: Medication errors are a major threat to patient safety, with underreporting driven by fear, stigma, and lack of awareness. This study aimed to improve the culture of medication error reporting in a tertiary care hospital by implementing targeted interventions through clinical audit. **Materials and Methods:** A prospective observational audit was conducted across two 3-month cycles (March-May and June-August 2023). Errors were classified by NCC MERP guidelines and collected via clinical pharmacologist rounds and voluntary reports. A Medication Safety Committee analyzed Cycle 1 errors and implemented interventions, including staff training, chart reviews, and a comprehensive reporting form before Cycle 2. **Results:** Reported errors increased from 17 in Cycle 1 to 56 in Cycle 2, indicating improved staff engagement. Transcription errors dropped post-intervention, while administration, documentation, and prescribing errors rose, reflecting broader awareness. Statistical analysis revealed a significant difference in error type distribution ($\chi^2 = 11.95$, $p = 0.036$). **Conclusion:** Interventions fostered a positive shift toward open reporting and enhanced patient safety. Sustaining this improvement requires longer audit durations, broader interdisciplinary involvement, and digital tools to minimize the burden of reporting.

Keywords: Medication Errors, Patient Safety, Clinical Audit, Medication Safety, Error reporting.

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INTRODUCTION

Medication errors pose a significant global challenge within healthcare systems, presenting substantial risks to patient safety and incurring considerable healthcare costs (To Err Is Human, 2000). As a critical component of patient care, medications, while offering therapeutic benefits, inherently carry the risk of adverse events if not managed meticulously (Howard *et al*., 2022). Underreporting of medication errors, often driven by fear of punitive measures and professional stigma, significantly impedes the identification of root causes and the implementation of effective preventive strategies (Ambwani *et al*., 2019; Brabcová *et al*., 2023).

Clinical audit, a systematic and critical review of healthcare delivery against established standards, serves as an essential mechanism for enhancing patient care and ensuring continuous quality improvement (Burgess, 2011). This structured approach enables healthcare teams to identify discrepancies, implement interventions, and monitor their effectiveness, thereby fostering a culture of safety (Arunachalam *et al*., 2022). The National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) defines medication error as "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient, or consumer" (*National Coordinating Council for Medication Error Reporting and Prevention. What is a Medication Error?* n.d.). These errors can be categorized by the stage of occurrence, including prescription, indent, dispensing, transcription, administration, and documentation errors, encompassing the entire healthcare team's involvement (R. E. Ferner & Aronson, 2006; Van Den Bemt *et al*., 2000). Medication error can also be classified based on severity, including no error, error no harm, error harm, and error death (Schneider & Hartwig, 1994).

This study aimed to determine the incidence of medication errors within a tertiary care hospital setting and to identify opportunities for improving patient care by devising effective measures. The primary objective was to improve the reporting culture of medication errors through systematic intervention and evaluation, ultimately enhancing patient safety and quality of care.

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MATERIALS AND METHODS

This prospective observational study was conducted at Kailash Hospital, Greater Noida, across two consecutive cycles:

- **Cycle 1:** March-May 2023.
- **Cycle 2:** June-August 2023.

Each cycle spanned three months and focused exclusively on inpatient departments to maintain uniformity in clinical exposure and monitoring. Outpatients were excluded from the analysis.

Ethical Approval

The study received approval from the Institutional Ethics Committee (Approval No: KHHI/IEC/2023/11). Since the audit involved no direct patient interaction and included retrospective chart reviews and incident documentation, a waiver of informed consent was granted.

Establishment of Oversight Committee

A dedicated Medication Safety Committee was formed, comprising representatives from:

- Clinical Pharmacology.
- Nursing Services.
- Pharmacy Department.
- Hospital Operations.

This interdisciplinary team held clearly assigned roles in data collection, root cause analysis, staff sensitization, and implementation of targeted interventions.

Classification of Medication Errors: Medication errors were classified based on their types, encompassing:

- **Prescription error:** Errors during prescription writing.
- **Indent error:** Errors during drug requisition from the pharmacy.
- **Dispensing error:** Errors in drug dispensing to the patient.
- **Transcription error:** Errors by nursing staff when transcribing doctor orders.
- **Administration error:** Errors by nursing staff during drug administration (e.g., incorrect dose, route, or formulation).
- **Documentation error:** Errors made during medication documentation.

Severity of impact

- No error.
- Error with no harm.
- Error causing harm.
- Error death.

These classifications were aligned with the NCC MERP guidelines for consistency and comparability.

Data Collection

Data was primarily collected by the clinical pharmacologist during daily rounds through medication chart audits and supplemented by voluntary reports from hospital staff. The inclusion criterion was limited to patients admitted to the inpatient department, while outpatient department patients were excluded. Medication charts were randomly selected and analyzed by the clinical pharmacologist.

Standardized Reporting and Analysis

All reported medication errors were documented in a standardized format and submitted to the quality department monthly. Data were systematically arranged in an Excel sheet for comprehensive analysis. The number of errors for each category (prescribing, dispensing, administration, documentation, and indent errors) was individually tallied and then aggregated for a total count. Descriptive statistics were used to assess error types and frequencies. Chi-square tests evaluated statistical significance across cycles and months (p-value < 0.05 considered significant).

Interventions Implemented

Following the first audit cycle, the Medication Safety Committee conducted a detailed root cause analysis based on the identified error types. The root causes for transcription errors were identified as poor adherence to doctor's orders, lack of drug knowledge, forgetfulness, lack of time, and distractions. To address these issues and improve reporting, the following specific interventions were implemented:

- **On-site training:** Practical training sessions for staff.
- **Induction training:** Comprehensive training for new staff members.
- **Regular monitoring:** Consistent oversight of medication administration processes.
- **Clinical pharmacologist review:** The clinical pharmacologist conducted medication chart reviews.
- **Enhanced reporting form:** A new, extensive medication error reporting form was introduced to standardize and facilitate future reporting.
- **Encouragement of voluntary reporting:** Nursing staff were actively encouraged to report any medication errors encountered voluntarily.

The post-intervention data were subsequently collected, analyzed, and presented to the committee for evaluation. The entire audit process is schematically presented in Figure 1.

RESULTS

The first audit cycle (March 2023 to May 2023) yielded a total of 17 medication errors, the mean age of patients was 36.75, and the gender ratio was male (10), female (7). The highest number of errors reported was transcription errors (n = 8), followed by administration errors (n = 6) and documentation errors (n = 3). Details are depicted in Table 1.

Following the implementation of interventions, the second audit cycle (June 2023 to August 2023) demonstrated a considerable increase in reported errors, totaling 56. The mean age was 49.87 years, with a male (30) to female (26) ratio. The number of transcription errors was 4, administration errors were 15, documentation errors were 10, and indent errors was found to be 3. A comprehensive view of the results is depicted in Table 2.

A comparative analysis of medication errors reported in Cycle 1 and Cycle 2 is visually represented in Figure 2.

Table 3 illustrates the distribution of medication errors by type and month across two audit cycles (March-August 2023). A statistically significant increase in transcription errors was observed between the cycles (χ^2 = 11.95, p = 0.036), suggesting a process-level vulnerability.

Monthly trends further indicated a consistent increase in total error volume from June to August 2023, with errors rising from 11 to 25. While this upward trend approached statistical significance (χ^2 = 5.39, p = 0.067), the error distribution during the first cycle (March to May 2023) remained statistically non-significant (χ^2 = 1.53, p = 0.47).

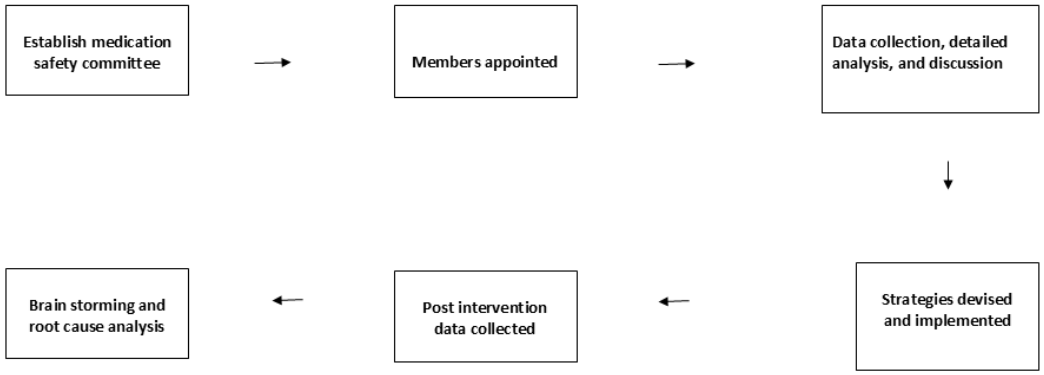

Figure 1: Process flow of clinical audit.

Table 1: Results of the study (1st cycle).

Demography details				
Mean Age (years)	36.75			
Gender	Male	10	Female	7
Number of errors reported (1st cycle)				
Months	March'23	April'23	May'23	
Number of errors reported	08	04	05	
Types of error reported (1st cycle)				
Sl. No.	**Parameters**		**Number of errors reported**	**Percentage**
1.	Transcription error		08	47.06%
2.	Administration error		06	35.29%
3.	Documentation error		03	17.65%
4.	Indent error		0	0.00%
5.	Dispensing error		0	0.00%
6.	Prescribing error		0	0.00%
Total			17	

Table 2: Results of the study (2nd cycle).

Demography details				
Mean Age (years)	49.87			
Gender	Male	30	Female	26
Number of errors reported (2nd cycle)				
Months	June'23	July'23	August'23	
Number of errors reported	11	20	25	
Types of error reported (2nd cycle)				
Sl. No.	**Parameters**		**Number of errors reported**	**Percentage**
1.	Transcription error		09	16.07%
2.	Administration error		16	28.57%
3.	Documentation error		10	17.86%
4.	Indent error		08	14.29%
5.	Dispensing error		03	5.36%
6.	Prescribing error		10	17.86%
Total			56	

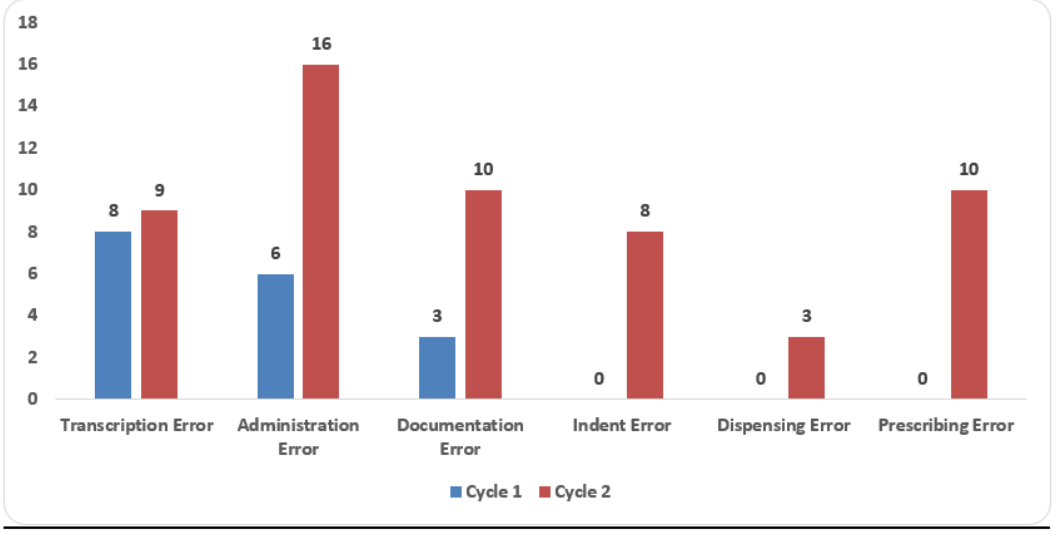

Figure 2: Medication errors reported in cycle 1 and cycle 2.

Root causes related to medication errors reported during this study are shown in Figure 3.

DISCUSSION

Any member of the healthcare team can cause medication errors (Benjamin, 2003). There is an urgent need to shift the perspective on error reporting from being punitive to being recognized as essential for patient safety (R. Ferner & Aronson, 2000). At every step of the process, each member of the healthcare team needs to be aware of their role and try to fulfill it to the best of their ability (Parthasarathi *et al.*, 2021). Voluntary reporting was minimal during the first cycle, with staff citing fear of consequences, lack of awareness, and shame, findings consistent with previous literature (Aljabari & Kadhim, 2021; Brabcová *et al.*, 2023; Parthasarathi *et al.*, 2021; Seta *et al.*, 2020; Witt *et al.*, 2024; Yousef *et al.*, 2021).

Underreporting of medication errors is a challenge faced by healthcare facilities, even those where reporting is mandatory (Aljabari & Kadhim, 2021). In a study of error reporting barriers, it was found that nearly 40% of healthcare professionals would not report medication errors voluntarily and are influenced by workplace/environmental barriers in reporting such events (Witt *et al.*, 2024). Shame and fear associated with reporting medication errors are deeply rooted in the hospital setting.

No indent error reported in the first cycle of clinical audit shows a common fear of patients developing ill feelings towards the nursing

staff in reporting medication errors (Yousef *et al.*, 2021). Fear of legal liabilities and punitive actions from hospital management might also stop nurses from reporting errors (Brabcová *et al.*, 2023). In case a medication error occurs, reporting and solving it within the shortest period of time should be the priority. This facilitates accurate record-keeping to prevent recurrence of such incidents (Aseeri *et al.*, 2020; Yousef *et al.*, 2021). They help identify process vulnerabilities in the medication workflow and help in taking steps, training, and classes to fill those loopholes.

The number of errors reported increased in the second cycle of the audit, indicating the effectiveness of continuous education and

Table 3: **Cycle-wise and Monthly Distribution of Medication Errors and Chi-Square Results.**

Analysis	Category/ Month	1st Cycle Errors	2nd Cycle Errors	Chi-Square Statistics	*p*-Value *= $p < 0.05$ statistically significant
Types of Errors Distribution	Transcription error	8	9	11.95	0.036*
	Administration error	6	16		
	Documentation error	3	10		
	Indent error	0	8		
	Dispensing error	0	3		
	Prescribing error	0	10		
Errors by Month (1st Cycle)	March'23	8	-	1.53	0.47
	April'23	4	-		
	May'23	5	-		
Errors by Month (2nd Cycle)	June'23	-	11	5.39	0.067
	July'23	-	20		
	August'23	-	25		

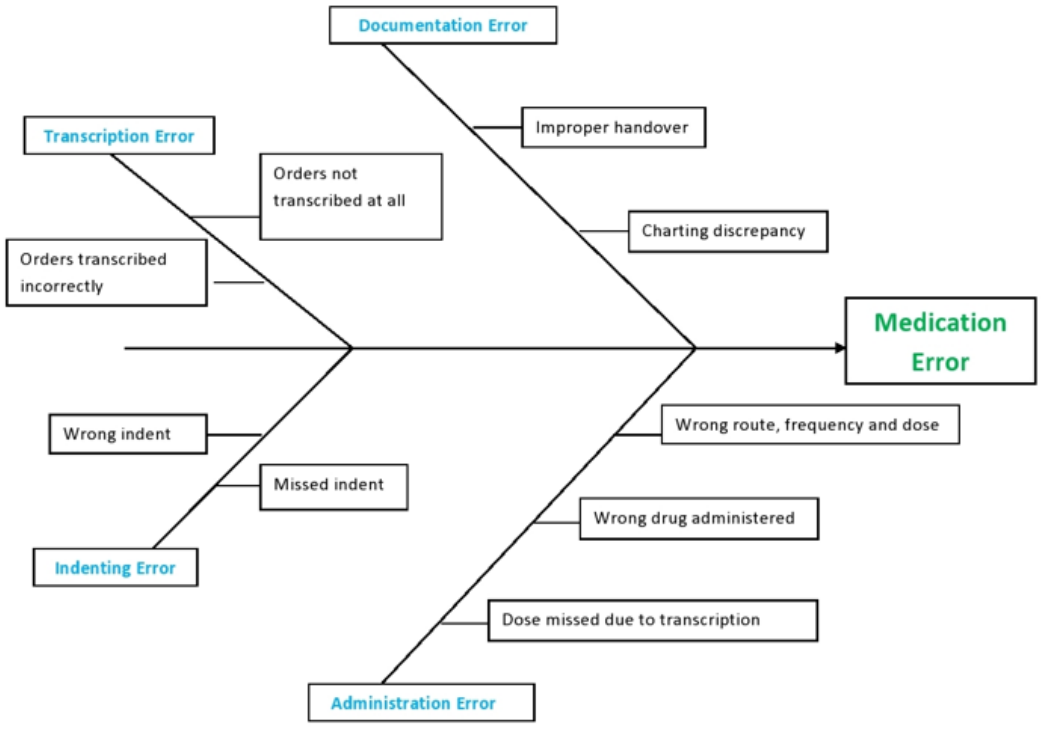

Figure 3: Fishbone diagram of root causes related to medication errors.

on-site training for the staff. This also shows a positive attitude shift towards reporting medication errors by the staff. Sustaining this shift in error reporting is a long process, which can only be ensured with systematic inputs from the healthcare team and cross-checking at every stage of the treatment. These findings are similarly reported in other studies when multiple interventions are done (Gleeson *et al.,* 2020; Ramírez *et al*., 2018).

The audit revealed a statistically significant increase in transcription errors across the two audit cycles, suggesting a potential lapse in documentation workflows or increased complexity in medication charting. Still, the observed trend warrants attention, particularly in light of rising overall error frequencies. This audit reinforces the critical role of proactive, system-level interventions in transforming the culture of medication error reporting within tertiary care settings. By introducing a multipronged strategy such as combining structured education, active surveillance, and simplified reporting tools, the study not only increased incident disclosures but also initiated a paradigm shift from punitive reaction to constructive prevention.

CONCLUSION

This clinical audit effectively demonstrated a significant and positive shift in healthcare staff's attitude towards reporting medication errors, evidenced by a substantial increase in reported incidents from 17 in the first cycle to 56 in the second cycle and a statistically significant difference in the distribution of error types between the two cycles. This improvement underscores the critical role of continuous medical education and practical training in fostering a non-punitive environment conducive to open reporting. The study highlights that proactive strategies, including on-site training, induction programs, regular monitoring, and the implementation of a comprehensive new reporting form, are instrumental in fostering a culture of medication error reporting.

While the audit achieved its objective of improving reporting, limitations, such as the study's limited duration, the two three-month cycles, restrict longitudinal insights into behavioral change and the sustainability of interventions. A longer follow-up period would better capture variations in reporting culture and process adaptation over time. Additionally, scalability was constrained by resource limitations: the Medication Safety Committee included a small, discipline-specific team, and training efforts were predominantly focused on nursing staff. Future studies should consider a longer duration, expand the committee to include representatives from all healthcare disciplines, provide induction training at more frequent intervals, explore reducing reporting paperwork, and transition towards digital reporting systems to further optimize medication error reporting and ultimately enhance patient safety outcomes. Sustaining this positive shift requires ongoing systematic inputs from the entire healthcare team and rigorous cross-checking at every stage of patient treatment.

ABBREVIATIONS

NCC MERP: National Coordinating Council for Medication Error Reporting and Prevention.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ETHICAL APPROVAL

The study was carried out after taking permission from the Institutional Ethics Committee.

SUMMARY

Medication errors are often a serious concern in patient safety. It has a stigma associated with its reporting by the healthcare staff. This is a major obstacle in improving medication safety, enhancing patient care, patient outcomes, and quality improvement. Strategies such as on-site training, induction training, regular monitoring, and a new reporting form were implemented in this study. This resulted in a remarkable improvement in the reporting culture of medication errors by the healthcare professionals. This highlights the need for continuous education and a non-punitive environment to foster better medication error reporting and ultimately enhance patient care.

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