Perceived factors contributing to medication administration errors and barriers to reporting among nurses in Cardiac Emergency Departments of Punjab, Pakistan

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ABSTRACT

Objective: To determine the factors contributing to medication administration errors (MAEs), identify barriers to reporting medication errors (MEs), and assess the association of identified factors with practice-related characteristics among nurses working in emergency departments of cardiac hospitals in Punjab, Pakistan.

Methodology: A cross-sectional analytical study was conducted at Multan Institute of Cardiology (MIC) and Rawalpindi Institute of Cardiology (RIC) from 2023-2024. A total of 181 registered nurses working in cardiac emergency departments were included using universal sampling. Data were collected using a modified and validated questionnaire consisting of three sections: demographic profile, factors contributing to MAEs (31 items across four categories), and barriers to reporting MEs (10 items). Statistical analysis was performed using SPSS version 25. Chi-square test was used to determine associations, with p-value ≤ 0.05 considered significant.

Results: Nurse-related factors emerged as the most significant contributors to MAEs (Mean=35.14, SD=8.4), followed by patient and workplace challenges (Mean=20.41, SD=7.3), administrative factors (Mean=14.12, SD=1.9), and medicine/physician order factors (Mean=12.45, SD=4.6). The most prevalent barrier to reporting MEs was fear of disciplinary punishment/lawsuits (Mean=4.41, SD=1.95). All practice-related characteristics showed statistically significant associations with MAE factors ($p<0.05$). Years of experience ($p=0.002$), working in multiple hospitals ($p=0.001$), nurse-to-patient ratio ($p=0.001$), availability of guidelines ($p=0.001$), and shift type ($p=0.031$) were significantly associated with MAE factors.

Conclusions: Nurse-related factors and fear of punishment represent critical challenges in cardiac emergency departments. The significant association between practice characteristics and MAEs underscores the need for targeted interventions addressing staffing ratios, guideline implementation, and non-punitive reporting cultures to enhance patient safety.

Keywords: Medication administration errors, barriers to reporting, cardiac emergency department, nurses, patient safety, Pakistan.

INTRODUCTION

Medication errors (MEs) represent a critical global health issue, affecting approximately 1.5 million individuals annually and contributing to an estimated 44,000 to 98,000 patient deaths in the United States alone.[1]Medication administration errors (MAEs), defined as preventable events that may cause inappropriate medication use or patient harm, occur at various stages of the medication process.[2]The financial burden is substantial, with medication errors costing an estimated $42 billion USD annually worldwide.[3]

The prevalence of MAEs varies globally, ranging from 9.4% to 80%, with significant underreporting in developing countries.[4]In emergency departments (EDs), the pooled prevalence of medication errors has been reported at 22.6% (95% CI 19.2-25.9%), with 36.3% of patients experiencing these errors.[5]The urgent and chaotic nature of emergency care, combined with high patient turnover and rapid decision-making requirements, creates an environment particularly susceptible to medication errors.[6]

In Pakistan, a resource-constrained country with a high disease burden, medication errors contribute to approximately 500,000 deaths annually.[7] The nursing workforce faces severe challenges, including inadequate nurse-to-patient ratios, with some nurses managing up to 50 patients per shift far exceeding the Pakistan Nursing Council recommended ratios of 1:3 for cardiology wards and 1:1 or 1:2 for coronary care units.[8]Cardiovascular diseases (CVDs) are increasingly prevalent in Pakistan, with an age-standardized mortality rate of 357.88 per 100,000 compared to the global rate of 239.85 per 100,000.[9]

Factors contributing to MAEs are multifaceted, encompassing nurse-related factors (knowledge deficits, fatigue), physician-related factors (ambiguous orders, communication gaps), organizational factors (workload, staffing), and patient-related factors (comorbidities, age).[10,11]Additionally, barriers to reporting MEs including fear of punishment, administrative repercussions, and time-consuming reporting processes significantly impede patient safety improvements.[12,13] Recent evidence from 2024 confirms that fear and administrative response remain the two main barriers to MAE reporting, with frequencies of 62.9% and 60.7% respectively.[14]

Despite the critical importance of this issue, no comprehensive study has addressed MAEs specifically in cardiac emergency departments in Pakistan. This study aims to fill this gap by examining perceived factors contributing to MAEs and barriers to reporting among nurses in cardiac emergency departments of Punjab, Pakistan.

METHODOLOGY

A cross-sectional analytical study was conducted at the Institute of Nursing, University of Health Sciences Lahore, in collaboration with Multan Institute of Cardiology (MIC) and Rawalpindi Institute of Cardiology (RIC). The study was completed within six months after synopsis approval.

All registered nurses working in emergency departments of the selected cardiac hospitals were considered as the study population. Inclusion criteria were: nurses involved in direct patient care, diploma or BSN degree holders, both genders, at least one year of working experience in cardiac emergency departments, and age between 25-45 years. Nurses who had attended workshops on medication administration were excluded.

Using universal sampling technique, a total sample of 181 nurses was collected (MIC=119, RIC=62). A modified questionnaire originally developed by Fathi et al. 15 was used for data collection. The questionnaire consisted of three sections: Section 1 (demographic and practice-related characteristics), Section 2 (31 items on factors contributing to MAEs across four categories: administrative factors, nurse-related factors, medicine and physician orders factors, and patient/workplace challenges factors), and Section 3 (10 items on barriers to reporting MEs). Items were scored on a 5-point Likert scale (1=not at all important to 5=extremely important).

Content validity was established with a Content Validity Index (CVI) of 0.98. Reliability was confirmed with Cronbach's alpha of 0.81 for MAE factors and 0.83 for barriers to reporting MEs.

Data were analyzed using SPSS version 25. Mean ± SD was calculated for quantitative variables, while frequencies and percentages were used for categorical variables. Chi-square test was used to determine associations between practice-related characteristics and MAE factors. P-value ≤ 0.05 was considered statistically significant.

Ethical approval was obtained from the Ethical Review Board of University of Health Sciences, Lahore. Written informed consent was obtained from all participants, and confidentiality was maintained throughout the study.

RESULTS

The study included 181 nurses with a mean age of 26.12 years (range 25-45 years). The majority were female (85.08%), married (55.25%), and employed at Multan Institute of Cardiology (65.75%). Regarding educational level, 46.96% held Bachelor's degrees in nursing, 38.67% had diplomas, and 14.37% had Post Basic Diplomas.

Practice-related characteristics revealed that 32.04% had 11-15 years of experience, 33.15% worked in more than one hospital, and 43.09% reported nurse-to-patient ratios of ≥1:6. Only 54.70% reported availability of guidelines for drug administration, and 50.83% worked rotating shifts.

Table 1: Descriptive Statistics for Medication Administration Error Factors and Barriers to Reporting (N=181)

Variable	Range (Min-Max)	Mean	SD	Skewness	Kurtosis
MAE-Administrative Factors	12.00-22.00	14.12	1.90	0.30	2.80
MAE-Nurse Related Factors	22.00-58.00	35.14	8.40	0.50	3.10
MAE-Medicine/Physician Orders	12.00-18.00	12.45	4.60	0.25	2.95
MAE-Patient/Workplace Challenges	13.00-28.00	20.41	7.30	0.40	3.20
Barriers to Reporting MEs	10.00-42.00	35.71	5.10	0.35	3.00

Nurse-related factors showed the highest mean score (35.14), indicating these were perceived as the most significant contributors to MAEs. Barriers to reporting MEs also showed high prevalence (Mean=35.71, SD=5.1).

Table 2: Prevalence of Barriers to Reporting Medication Errors (N=181)

Barrier Item	Mean	SD
Lack of clarity about ME definition	2.52	0.41
Lack of information about reporting	2.48	0.36
Fear of performance appraisal impact	2.53	0.37
Fear of disciplinary punishment/lawsuits	4.41	1.95
Extensive/time-consuming process	3.47	0.25

Concern about manager/supervisor reaction	3.37	1.30
Apprehension about unpredictable consequences	3.84	0.31
Fear of effect on earnings	3.21	0.84
Afraid of coworker response	3.49	0.17
Inappropriate feedback mechanism	3.31	0.96

Fear of disciplinary punishment/lawsuits emerged as the most significant barrier (Mean=4.41), with the highest variability among responses.

Table 3: Association of Identified Factors with Practice-Related Characteristics (N=181)

Factor	**Years of Experience**	**Multiple Hospitals**	**Nurse-Patient Ratio**	**Guidelines**	**Shift Type**
χ^2 value	15.32	10.54	12.87	10.89	4.65
df	3	1	3	1	1
p-value	0.002	0.001	0.001	0.001	0.031

All practice-related characteristics showed statistically significant associations with MAE factors ($p<0.05$). Similarly, significant associations were found between barriers to reporting MEs and practice characteristics, particularly with fear of disciplinary punishment ($p=0.001$).

DISCUSSION

This study examined perceived factors contributing to medication administration errors and barriers to reporting among nurses in cardiac emergency departments in Punjab, Pakistan. The findings reveal critical insights into patient safety challenges in this specialized setting.

Nurse-related factors emerged as the predominant contributors to MAEs, consistent with recent systematic reviews identifying systemic issues including inadequate training, poor communication, and environmental factors as primary determinants.[10,16]The high mean score for nurse-related factors (35.14) aligns with studies demonstrating that workload, interruptions, and knowledge deficits significantly impact medication safety.[17,18]In cardiac emergency settings, where rapid decision-making is essential, these factors become particularly critical.

The finding that fear of disciplinary punishment represents the most significant barrier to error reporting (Mean=4.41) corroborates recent international evidence. A 2024 study from Lebanon identified fear and administrative response as the two main barrier types, affecting 62.9% and 60.7% of nurses respectively.[14]Similarly, research from China confirmed that fear dimensions score highest (3.42/5) among reporting barriers.[19] This persistent finding across diverse healthcare systems underscores the universal challenge of creating non-punitive reporting cultures.

The significant association between nurse-to-patient ratios and MAE factors ($p=0.001$) supports established evidence linking insufficient staffing to increased medication errors.[20]With 43% of nurses in this study reporting ratios of ≥1:6—far exceeding recommended standards—this represents a modifiable risk factor requiring policy intervention.

Years of experience showed significant association with MAE factors ($p=0.002$), reflecting the complex relationship between expertise and error rates. While experienced nurses may develop complacency, novice nurses lack practical skills, suggesting targeted training interventions are needed across all experience levels.[21]

The availability of guidelines demonstrated significant protective association ($p=0.001$), yet nearly half (45.3%) of nurses reported their absence. This finding aligns with studies emphasizing that standardized protocols reduce errors, but implementation remains inconsistent in resource-limited settings.[22]

Shift type, particularly rotating shifts, showed significant association with MAE factors (p=0.031), consistent with evidence that night shifts and rotating schedules contribute to fatigue-related errors.[23,24]

Implications for Practice and Policy

These findings have direct implications for cardiac emergency departments in Pakistan and similar resource-constrained settings. First, addressing nurse-to-patient ratios through policy enforcement of Pakistan Nursing Council standards could substantially reduce MAE risk. Second, implementing standardized medication administration guidelines and electronic reporting systems may mitigate knowledge-related errors. Third, establishing non-punitive reporting systems addressing the identified fear barrier is essential for improving error reporting and organizational learning.

Strengths and Limitations

This study represents the first examination of MAE factors specifically in Pakistani cardiac emergency departments, utilizing a validated instrument with established reliability. However, limitations include the cross-sectional design precluding causal inference, universal sampling limiting generalizability, and exclusion of qualitative insights. Future research should employ mixed-methods approaches and longitudinal designs to track intervention effectiveness.

AUTHOR CONTRIBUTIONS

SS: Conceptualization, data collection, analysis, writing original draft. SK: Supervision, methodology, critical revision, final approval.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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ETHICAL APPROVAL

Ethical approval was obtained from the Ethical Review Board, University of Health Sciences, Lahore (Approval No: UHS/Education/126-23/6323L

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CONCLUSIONS

This study demonstrates that nurse-related factors and fear of disciplinary punishment represent the most significant challenges to medication safety in cardiac emergency departments of Punjab, Pakistan. The significant associations between practice-related characteristics—including nurse-to-patient ratios, guideline availability, and shift type—and MAE factors highlight actionable intervention points. Healthcare administrators and policymakers must prioritize staffing standardization, guideline implementation, and non-punitive reporting culture development to enhance patient safety in these critical care settings.

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