

Assessment of Nurses' Awareness, Attitudes, and Performance Regarding Medication Errors: A Cross-Sectional Study at Aliabad Teaching Hospital, Kabul

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Abstract

errors represent a significant threat to patient safety worldwide, particularly in developing countries where healthcare systems face resource limitations and high workload pressures. Nurses, as primary administrators of medications, play a critical role in ensuring safe practices. This study aimed to assess the awareness, attitudes, and performance of nurses regarding medication errors at Aliabad Teaching Hospital in Kabul, to identify key factors contributing to errors, and to inform strategies for improving patient safety. Method: A descriptive cross-sectional study was conducted among 118 nurses using structured questionnaires. Data on demographic characteristics, awareness of medication errors, knowledge of the five rights of medication administration, attitudes toward error reporting, and performance in clinical practice were collected and analyzed using frequency and percentage distributions. Findings revealed that 54.2% of nurses demonstrated good awareness, while 34.7% exhibited positive attitudes, and 44.1% maintained good performance in medication administration. Common errors included wrong medication and dosage, with the administration phase being most error-prone. Factors such as high workload, fear of punishment, and inadequate institutional support were identified as barriers to safe practice. Despite satisfactory knowledge levels, gaps in attitude and performance persist, highlighting the need for continuous training, supportive reporting culture, workload management, and systematic supervision to enhance medication safety.

Keywords: *Medication errors, nurses, awareness, attitude, patient safety*

INTRODUCTION

Medication errors remain one of the most critical challenges in healthcare systems worldwide, posing significant threats to patient safety and quality of care. Nurses, who are often at the frontline of medication administration, play a pivotal role in ensuring that patients receive safe and accurate treatment. Despite their crucial responsibilities, nurses are frequently confronted with factors that increase the risk of medication errors, including high workload, inadequate staffing, limited resources, and insufficient training (Afaya et al., 2021; Gilavand et al., 2023; Maruf et al., 2022). These errors, which can occur at various stages such as prescribing, preparing, administering, or documenting medications, may result in delayed recovery, adverse health outcomes, or even patient mortality (Kwiecień-Jaguś et al., 2025; Shastay et al., 2025).

Recent studies highlight that the prevalence of medication errors is a global concern. For example, investigations in Pakistan and Iran reported that nurses frequently encounter barriers such as fear of punishment, lack of supportive reporting systems, and cultural blame that discourage the disclosure of medication mistakes (Fatima et al., 2024; Gilavand et al., 2023; Seed et al., 2024; Sharbaafchi et al., 2019). Similarly, research in Saudi Arabia indicates that even nursing students experience difficulties in reporting errors due to perceived negative consequences and limited knowledge of patient safety culture (Alrasheeday et al., 2024; Schroers et al., 2022). This aligns with findings from other regions where individual factors such as younger age and limited work experience have been strongly associated with higher rates of medication errors (Khan et al., 2024; Stolic et al., 2022). In addition to individual-level factors, organizational and systemic influences significantly contribute to the occurrence of errors. A systematic review of interventions in pediatric and neonatal care emphasized that structured nursing strategies, effective training, and workload reduction are essential to minimizing medication-related risks (Maruf et al., 2022). Moreover, evidence from intensive care units and operating rooms demonstrates that the complexity of

healthcare environments amplifies the likelihood of mistakes, reinforcing the need for standardized protocols and continuous professional development (Kwiecień-Jaguś et al., 2025). Educational reforms also play a vital role in reducing errors. Studies recommend simulation-based learning, updated teaching strategies, and competency-based assessments to enhance nurses' skills and confidence in safe medication practices (Shahzeydi et al., 2024; Stolic et al., 2022). Importantly, cultivating a non-punitive culture of error reporting has been identified as a cornerstone for patient safety, enabling healthcare institutions to learn from mistakes and implement preventive measures (Afaya et al., 2021; Seed et al., 2024). Given these challenges, it becomes essential to evaluate nurses' knowledge, attitudes, and practices regarding medication errors, as well as to identify the key barriers to effective reporting. Such assessments provide evidence-based insights that can inform policy development, staff training, and the creation of supportive environments. Ultimately, addressing these factors can improve patient outcomes, reduce preventable harm, and strengthen the overall quality of healthcare delivery.

Research Objectives

Main Objective

- To evaluate medication errors and their underlying causes among nursing personnel at Aliabad Teaching Hospital in the year 1404 Hijri.

Specific Objectives

1. To identify the types and frequency of medication errors occurring among nurses.
2. To analyze individual and systemic factors contributing to the occurrence of medication errors.
3. To examine the barriers that hinder effective reporting of medication errors.
4. To propose practical strategies aimed at reducing medication errors and improving patient safety.

Research Questions

Main Research Question

- What is the prevalence and underlying causes of medication errors among nursing personnel at Aliabad Teaching Hospital in the year 1404 Hijri?

Sub-Research Questions

1. What are the most common types and frequency of medication errors among nurses?
2. What individual and systemic factors contribute to the occurrence of medication errors?
3. What challenges do nurses face in reporting medication errors?
4. What practical strategies can be implemented to reduce medication errors and enhance patient safety?

LITERATURE REVIEW

Medication errors remain a critical challenge in healthcare systems globally, posing significant risks to patient safety and increasing healthcare costs. Nursing personnel are often at the frontline of medication administration, making them pivotal in the prevention and management of these errors. Studies indicate that medication errors can occur at any stage of the medication process, including prescribing, dispensing, preparation, and administration, with administration errors being the most frequent (Afaya et al., 2021; Kwiecień-Jaguś et al., 2025). Afaya et al. (2021) highlighted that barriers to reporting medication errors, such as fear of punitive action and lack of awareness, exacerbate the prevalence of these errors. Research from diverse healthcare settings emphasizes that both individual and systemic factors contribute to medication errors. Individual factors include inadequate knowledge, fatigue, stress, and insufficient experience among nurses (Khan et al., 2024; Kwiecień-Jaguś et al., 2025). For instance, Gilavand et al. (2023) observed a direct correlation between shift work, especially night shifts, and increased medication errors, attributing this to fatigue and disrupted circadian rhythms among nursing staff. Similarly, Schroers et al. (2022) reported that undergraduate nursing students, often with limited clinical exposure, demonstrated higher rates of medication administration errors, underlining the importance of effective education and training. Systemic and organizational factors also play a substantial role. Inefficient communication, lack of standardized protocols, understaffing, and the absence of supportive reporting mechanisms have been consistently associated with medication errors (Alrasheeday et al., 2024; Kwiecień-Jaguś et al., 2025). Alrasheeday et al. (2024) noted that nursing students' perceptions of patient safety culture significantly influenced their willingness to report errors. The study suggested that implementing non-punitive reporting systems and cultivating a culture of safety are critical interventions to reduce medication errors.

Moreover, several studies underscore the importance of continuous professional development and targeted interventions to mitigate errors. Maruf et al. (2022) conducted a systematic review showing that structured training programs, simulation-based education, and reinforcement of clinical guidelines significantly decreased medication errors in pediatric and neonatal care. Similarly, Stolic et al. (2022) emphasized the role of integrative review findings in shaping educational strategies to enhance nurses' competencies in medication safety. Despite improvements in knowledge and training, evidence suggests that underreporting remains a significant barrier, often due to fear of blame or lack of institutional support (Seed et al., 2024; Shastay et al., 2025). Therefore, interventions that combine education, organizational support, and systematic monitoring are essential for improving patient safety outcomes. Overall, the literature indicates that a multifactorial approach addressing both individual competencies and systemic factors is critical to reducing medication errors and promoting safe nursing practices (Fatima et al., 2024; Sharbaafchi et al., 2019).

METHOD

Study Design

This study employed a descriptive cross-sectional design to assess medication errors among nursing personnel at Aliabad Teaching Hospital, Kabul. The study focused on evaluating the prevalence, types, and contributing factors of medication errors, as well as the barriers to reporting such errors. Data were collected using a structured questionnaire designed to capture both individual and systemic factors associated with these errors.

Study Population and Sample

The target population included all registered nurses actively employed at Aliabad Teaching Hospital. Due to the practical constraints of availability and access, convenience sampling was utilized. A total of 125 questionnaires were distributed among nurses, with 118 completed and returned, yielding an effective response rate sufficient for analysis.

Data Collection Method

Data were collected using a structured questionnaire, which consisted of four main sections: (i) demographic characteristics of nurses, (ii) types and frequency of medication errors, (iii) individual and systemic factors influencing error occurrence, and (iv) barriers to reporting errors. The questionnaire was designed to ensure clarity, comprehensiveness, and ease of response.

Sampling Method

A convenience sampling approach was chosen due to limited access to some nurses, time constraints, and practical considerations associated with the study setting. This method allowed researchers to include available participants who met the inclusion criteria.

Study Setting and Duration

The study was conducted at Aliabad Teaching Hospital, Kabul, during the year 1404 H.S. This hospital provides both educational and clinical services to the public, making it an ideal setting to examine nursing practices and medication error occurrences.

Inclusion and Exclusion Criteria

Inclusion Criteria

- Nurses currently employed at Aliabad Teaching Hospital.
- Nurses who provided informed consent to participate in the study.

Exclusion Criteria:

- Trainee nurses, interns, or nurses absent during data collection.
- Nurses who declined to participate.

Operational Definition

A **medication error** is defined as any action during prescribing, preparation, or administration of a drug that results in a deviation from the prescribed dose, type, timing, or method, or results in the wrong drug being given to

a patient. Both intentional and unintentional errors are included, and responses were assessed using the structured questionnaire.

Data Analysis

Collected data were entered and analyzed using SPSS software. Descriptive statistics, including frequencies and percentages, were used to summarize demographic data, prevalence, and types of medication errors. Relationships between demographic factors, systemic conditions, and error occurrence were also examined.

Ethical Considerations

The study adhered to all ethical guidelines for research. Participation was entirely voluntary, and participants could withdraw at any time without consequences. Data were kept confidential, and individual identities were anonymized. The primary goal of the research was to enhance patient safety and improve nursing practices without causing any harm to participants.

RESULTS AND DISCUSSION

This study was conducted at Aliabad Teaching Hospital in Kabul. The target population comprised 160 nursing staff members of the hospital. Using a convenient sampling method, 125 questionnaires were distributed among the nurses. Out of the distributed questionnaires, 118 were returned fully completed and deemed suitable for analysis, while 7 incomplete questionnaires were excluded due to missing information. Consequently, the final sample size was 118 participants, representing 100% of the analyzed data. With the kind cooperation of the nursing management and staff at Aliabad Teaching Hospital, the questionnaires were carefully completed, and the accuracy of the collected data is ensured.

Table 1: Demographic Characteristics of Participating Nurses

Demographic Variable	Category	Frequency (n)	Percentage (%)
Age (Years)	20–29	85	77
	30–39	23	19.5
	40–49	4	3.4
	50–59	6	5.1
Gender	Male	94	80
	Female	24	20
Workplace/Department	General Surgery	26	22
	Operating Room	1	0.8
	Other Units	91	77.2
Education Level	Diploma	39	33
	Bachelor	78	66.1
	Master	1	0.8
	Doctorate	0	0
Work Experience (Years)	<2	47	39.8
	2–5	46	39
	5–10	15	12.7
	10–15	10	8.5

Table 1 presents the demographic profile of the 118 nurses who participated in this study. The participants' ages ranged from 20 to 59 years, with the majority (77%) falling within the 20–29-year category, indicating a predominantly young workforce. Nurses aged 30–39 comprised 19.5%, while only 3.4% and 5.1% were in the 40–49 and 50–59 age groups, respectively. Gender distribution showed that males represented 80% (94 nurses) of the sample, while females accounted for 20% (24 nurses). Regarding workplace distribution, the highest proportion of nurses worked in the General Surgery department (22%), whereas the Operating Room had the lowest representation at 0.8%, with the remainder spread across other hospital units. Educational qualifications revealed that most nurses held a Bachelor's degree (66.1%), followed by Diploma holders (33%), a single Master's degree (0.8%), and no participants with Doctorate-level education. Work experience varied, with 39.8% having less than two years, 39% with two to five years, 12.7% with five to ten years, and 8.5% with ten to fifteen years. These demographic

characteristics provide context for interpreting awareness, attitude, and performance results in relation to medication errors, highlighting that the workforce is young, largely male, and predominantly bachelor-educated with limited long-term experience.

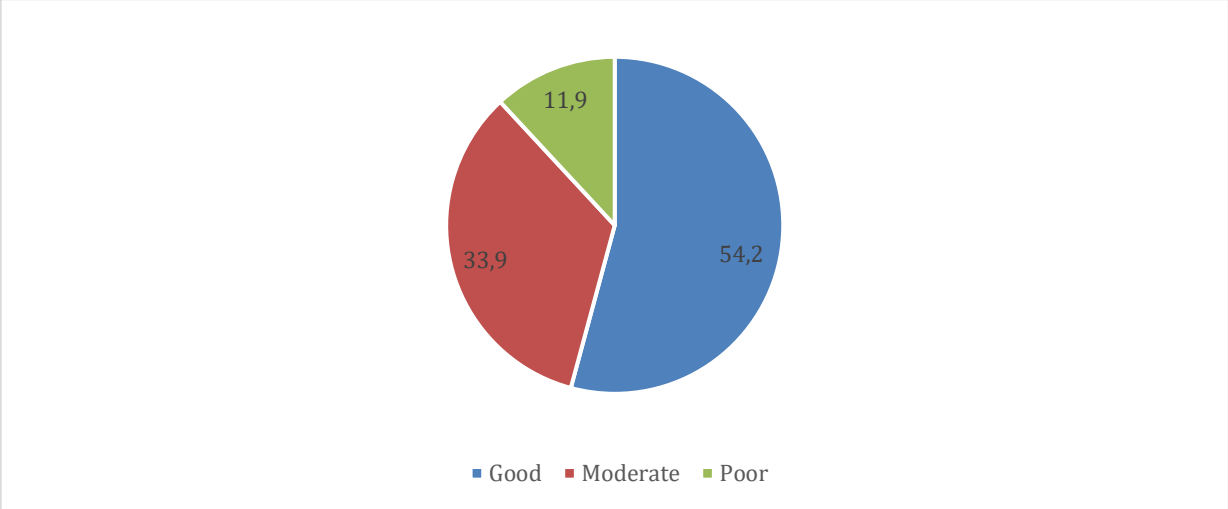


Figure 1: Awareness of Medication Errors

Figure 1 illustrates the level of awareness regarding medication errors among the 118 nurses at Ali-Abad Teaching Hospital. The majority of nurses, 64 participants (54.2%), demonstrated good awareness, reflecting a solid understanding of medication error concepts. Forty nurses (33.9%) showed moderate awareness, indicating a need for further education and reinforcement of safety protocols. Fourteen nurses (11.9%) exhibited poor awareness, highlighting gaps that could increase the risk of errors during medication administration. These findings suggest that while a substantial portion of the nursing staff possesses adequate theoretical knowledge, targeted interventions such as workshops, continuous training, and educational programs are necessary to improve awareness in those with moderate or poor understanding. This awareness is crucial, as it forms the foundation for safe medication practices and reduces the likelihood of errors that can compromise patient safety.

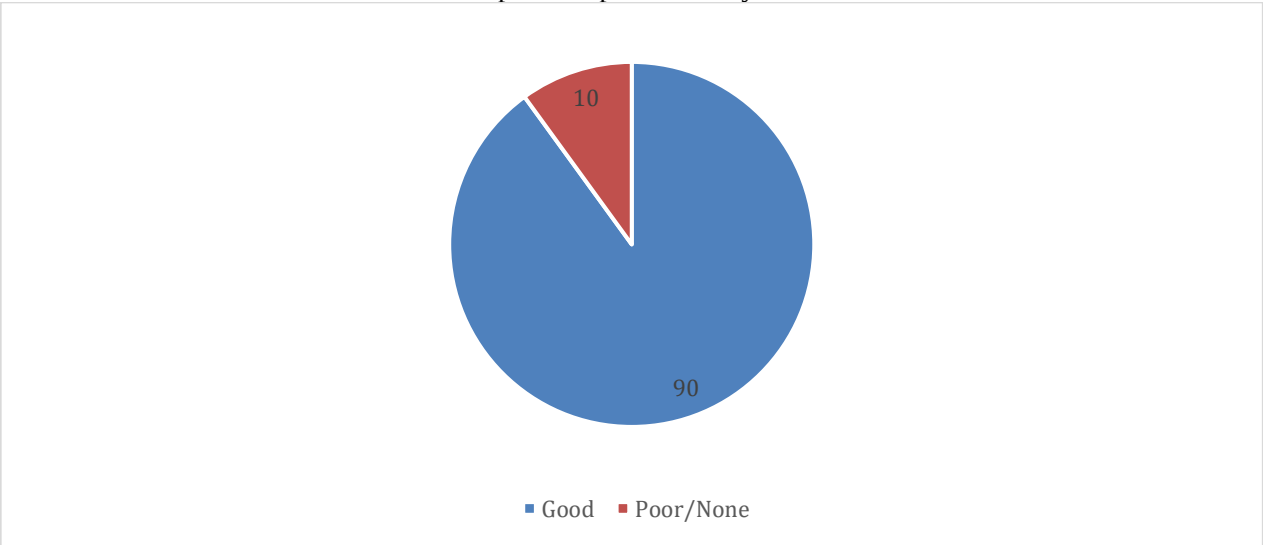


Figure 2: Awareness of the Five Rights of Medication Administration

Figure 2 presents nurses’ awareness of the “Five Rights” of medication administration, a fundamental guideline for preventing errors. Out of 118 participants, 106 nurses (90%) reported good awareness of these principles, demonstrating that most staff understand the critical steps of verifying the right patient, drug, dose, route, and timing before administration. However, 12 nurses (10%) showed poor or no awareness, which could lead to lapses in practice and increase the risk of adverse patient outcomes. This data indicates a generally high level of knowledge among the nursing staff, reflecting the effectiveness of prior education and training programs.

Nonetheless, maintaining continuous educational reinforcement is necessary to ensure consistent adherence to these principles, particularly for new or less experienced nurses, as even minor lapses can have serious implications for patient safety.

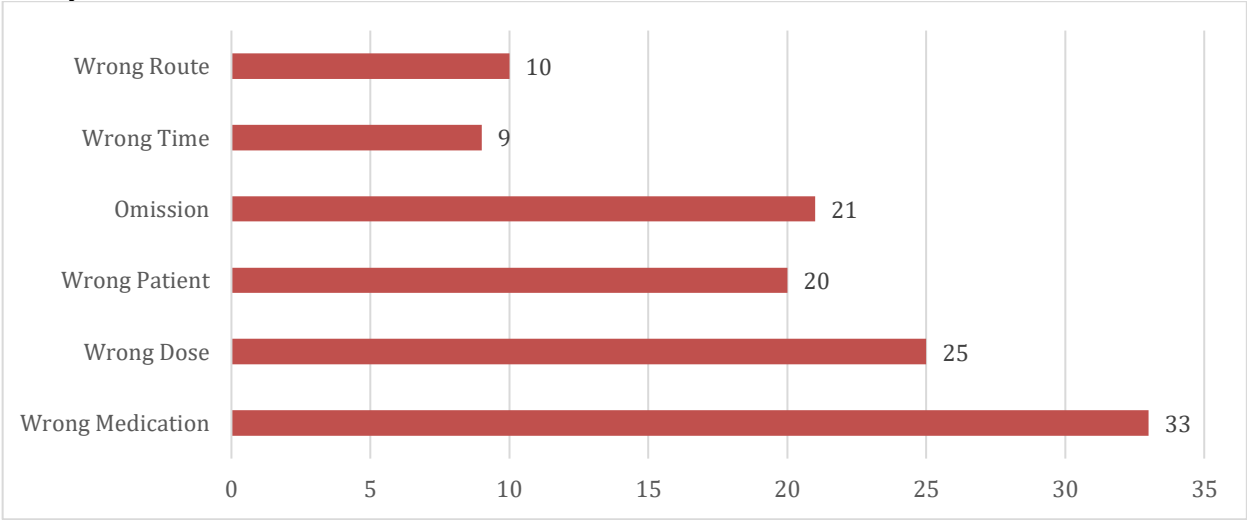


Figure 3: Most Common Types of Medication Errors

Figure 3 categorizes the frequency and types of medication errors reported by nurses. The most common error was the administration of the wrong medication, with 33 cases (25.4%), followed by wrong dose errors (25 cases, 21.2%). Errors related to wrong patients (20 cases, 16.9%), omission (21 cases, 17.8%), wrong time (9 cases, 7.6%), and wrong route (10 cases, 8.5%) were also documented. These results suggest that errors occur at multiple stages of medication handling and are often related to human factors, workload, or lack of adherence to guidelines. Identifying these patterns is essential for designing targeted interventions, such as double-checking systems, structured training, and monitoring procedures, to reduce error occurrence and improve patient safety outcomes in hospital settings.

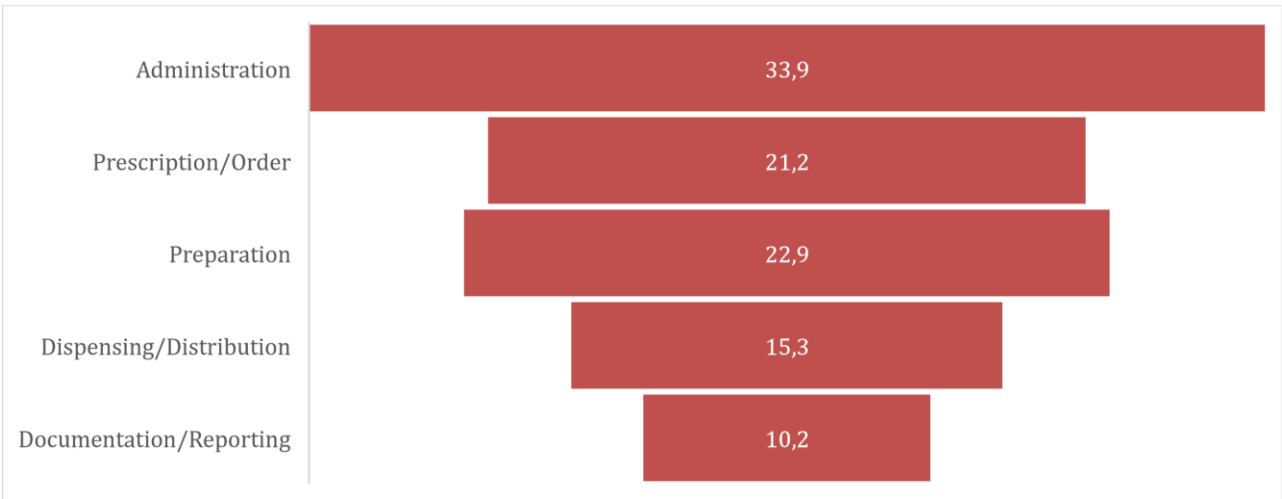


Figure 4: Awareness of Stages Where Errors Occur

Figure 4 presents nurses' awareness regarding the stages during which medication errors are most likely to occur. The highest reported stage was administration, with 40 nurses (33.9%) identifying it as the most error-prone phase. Preparation (27 nurses, 22.9%), prescription/order (25 nurses, 21.2%), dispensing/distribution (18 nurses, 15.3%), and documentation/reporting (12 nurses, 10.2%) followed in decreasing frequency. These results highlight that while nurses are generally aware of where errors can occur, there is variability in perception of risk across different stages. Administration is clearly the most critical phase requiring attention, suggesting the need for stricter adherence to protocols, continuous monitoring, and supervision during this stage. By identifying these error-prone

stages, hospital management can prioritize interventions such as workflow optimization, staff training, and error-reporting mechanisms. This targeted approach enhances overall patient safety by addressing the most vulnerable points in the medication process.

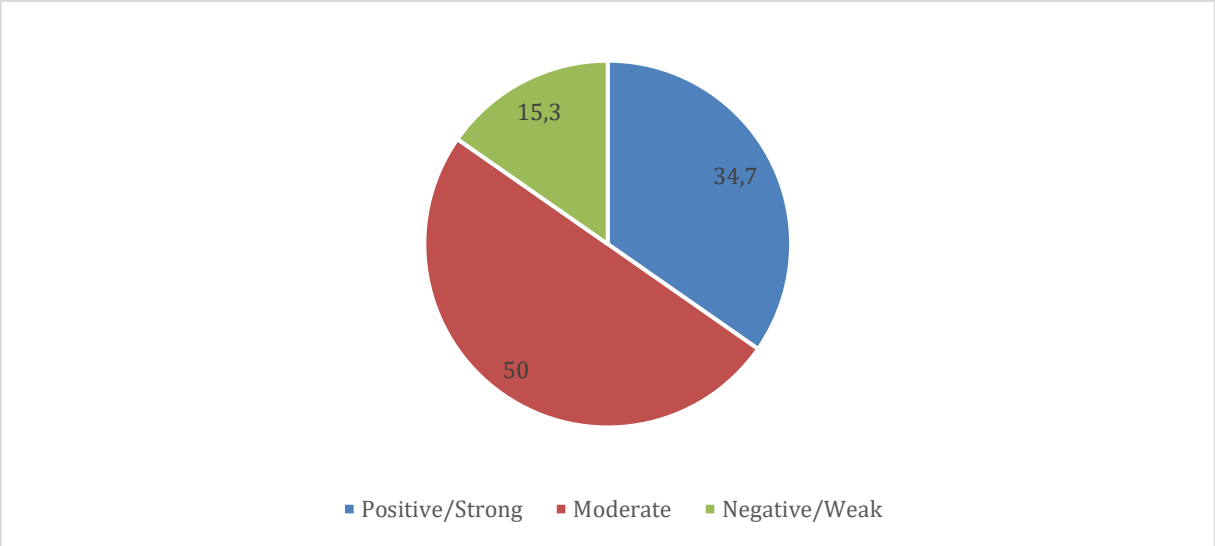


Figure 5: Attitudes Towards Medication Errors

Figure 5 reflects nurses’ attitudes regarding medication errors. A total of 41 nurses (34.7%) exhibited positive or strong attitudes, indicating proactive engagement in preventing and reporting errors. Fifty-nine nurses (50%) demonstrated moderate attitudes, suggesting some awareness but potentially inconsistent behavior regarding error prevention. Eighteen nurses (15.3%) exhibited negative or weak attitudes, reflecting reluctance to report errors or insufficient appreciation of their impact. Attitude is critical as it directly influences compliance with safety protocols and error reporting. Moderate and negative attitudes may be shaped by fear of punishment, inadequate support systems, or lack of confidence in error management. This data underscores the need for hospital administration to foster a supportive environment that encourages open communication, reinforces positive attitudes, and motivates nurses to adopt a proactive approach toward error prevention. Addressing attitudinal barriers is key to cultivating a culture of safety and accountability in healthcare settings.

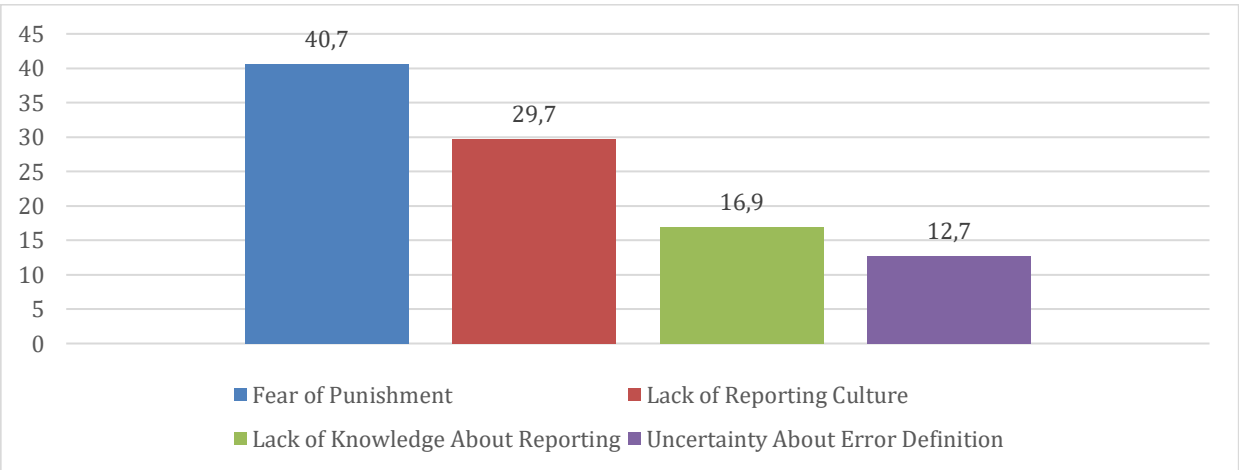


Figure 6: Barriers to Reporting Errors

Figure 6 identifies key barriers preventing nurses from reporting medication errors. Fear of punishment was the most cited barrier, reported by 48 nurses (40.7%), followed by lack of a reporting culture (35 nurses, 29.7%), insufficient knowledge about reporting procedures (20 nurses, 16.9%), and uncertainty about error definitions (15 nurses, 12.7%). These barriers suggest that underreporting may be prevalent, limiting the hospital’s ability to track errors and implement corrective measures. Fear of punitive action is particularly significant, highlighting the

importance of establishing a non-punitive, blame-free reporting system. Additionally, continuous training on error identification, reporting protocols, and definitions can empower nurses to participate fully in safety programs. Addressing these barriers not only improves error reporting rates but also strengthens overall patient safety, as accurate reporting is essential for understanding trends, implementing preventive strategies, and fostering a culture of transparency and accountability.

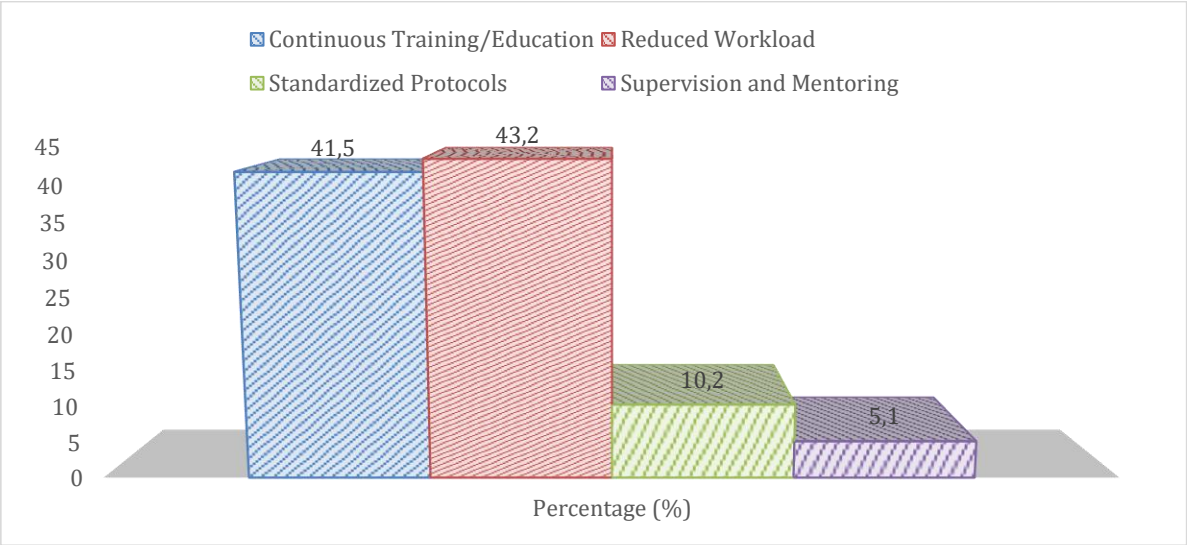


Figure 7: Strategies to Reduce Medication Errors

Figure 7 summarizes strategies recommended by nurses for reducing medication errors. Reduced workload was identified by 51 nurses (43.2%) as the most effective strategy, while 49 nurses (41.5%) emphasized continuous training and education. Standardized protocols (12 nurses, 10.2%) and supervision/mentoring (6 nurses, 5.1%) were also mentioned. These strategies highlight that both organizational and individual interventions are critical. Reducing workload can minimize fatigue and oversight, whereas ongoing training reinforces knowledge of medication principles and error-prevention practices. Standardized protocols ensure consistency, and mentoring enhances practical skills. Together, these approaches support a multi-faceted intervention strategy that addresses human, procedural, and systemic factors. Hospitals can use this evidence to prioritize interventions that are most feasible and impactful, thereby improving medication safety, patient outcomes, and staff confidence in managing high-risk tasks.

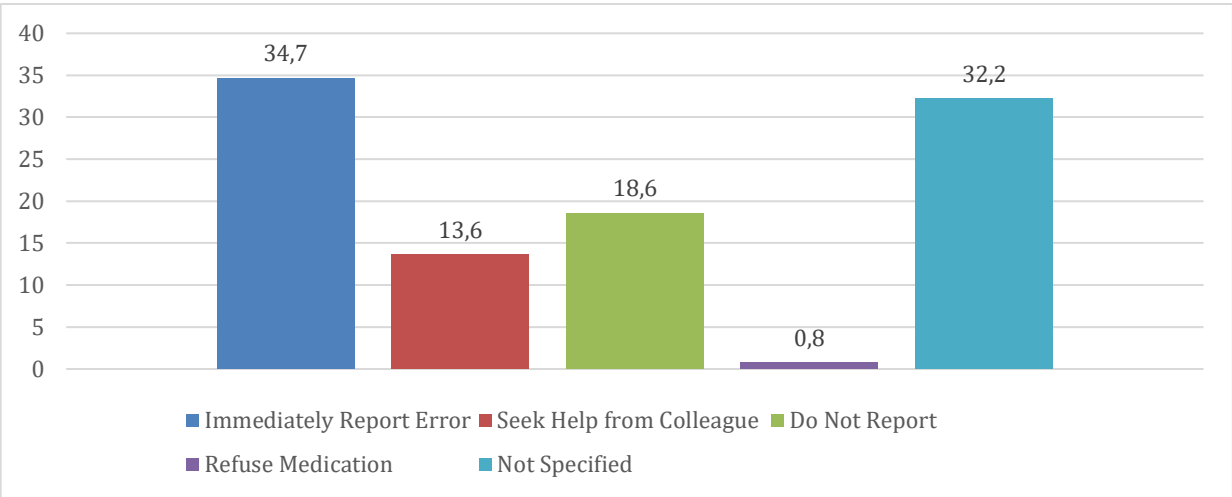


Figure 7: Actions Taken After Medication Errors

Figure 7 shows the actions nurses take after encountering medication errors. Forty-one nurses (34.7%) reported immediately reporting the error, 16 nurses (13.6%) sought help from colleagues, 22 nurses (18.6%) did not

report the error, 1 nurse (0.8%) refused the medication, and 38 nurses (32.2%) did not specify their actions. The distribution indicates variability in response, reflecting differences in knowledge, confidence, and perceived risk. Immediate reporting is the most desirable action, enabling timely interventions and prevention of adverse outcomes. However, the significant proportion of nurses who did not report or failed to specify actions indicates ongoing challenges in error management. Hospitals should promote structured reporting systems, foster a supportive reporting culture, and reinforce education to ensure consistent, appropriate responses to medication errors, ultimately improving patient safety and accountability among nursing staff.

Table 2: Overall Awareness, Attitude, and Performance Summary

Aspect	Good	Moderate	Poor
Awareness of Medication Errors	64 (54.2%)	40 (33.9%)	14 (11.9%)
Attitude Towards Medication Errors	41 (34.7%)	59 (50%)	18 (15.3%)
Performance in Medication Administration	52 (44.1%)	45 (38.1%)	21 (17.8%)

Table 2 provides a consolidated summary of nurses’ awareness, attitude, and performance regarding medication errors. For awareness, 64 nurses (54.2%) demonstrated good knowledge, 40 (33.9%) moderate, and 14 (11.9%) poor. Regarding attitude, 41 nurses (34.7%) were positive, 59 (50%) moderate, and 18 (15.3%) negatives. Performance in medication administration showed 52 nurses (44.1%) with good practices, 45 (38.1%) moderate, and 21 (17.8%) poor. This overall assessment reveals that while a majority possess adequate awareness and demonstrate acceptable attitudes, performance lags behind awareness levels, suggesting that knowledge alone does not guarantee proper practice. Contributing factors may include workload, system constraints, or insufficient supervision. The table underscores the need for integrated interventions targeting knowledge reinforcement, behavioral motivation, and environmental adjustments to enhance overall performance in medication administration and reduce errors.

DISCUSSION

The findings of this study reveal the prevailing awareness, attitudes, and practices of nurses regarding medication errors at Aliabad Teaching Hospital. Results showed that more than half of the nurses (54.2%) demonstrated good awareness of medication errors, while 33.9% had moderate and 11.9% had poor awareness. These findings are consistent with prior research, which indicates that nurses generally possess a foundational understanding of medication safety, yet notable gaps remain that require ongoing educational reinforcement (Afaya et al., 2021; Fatima et al., 2024; Khan et al., 2024). Although most participants were knowledgeable about the “five rights” of medication administration, approximately 10% lacked sufficient knowledge, highlighting the need for structured and continuous training programs (Alrasheeday et al., 2024; Shahzeydi et al., 2024). With regard to error types, wrong medication (25.4%) and wrong dose (21.2%) emerged as the most common, aligning with literature that identifies administration-related errors as the most prevalent in clinical practice (Gilavand et al., 2023; Maruf et al., 2022). Nurses also identified the administration stage as the most error-prone (33.9%), which corresponds with other studies reporting this phase as particularly vulnerable to mistakes (Sharbaafchi et al., 2019; Seed et al., 2024). These findings emphasize the need for targeted interventions during the administration phase, including adherence to standardized protocols, double-checking procedures, and supervisory monitoring (Maruf et al., 2022; Schroers et al., 2022).

Attitudes toward error reporting were mixed. While 34.7% of participants demonstrated a positive attitude, half (50%) were moderate, and 15.3% reflected negative attitudes. Fear of punishment and a lack of supportive reporting culture were prominent barriers, which is in line with previous research highlighting how punitive environments discourage nurses from reporting medication errors (Afaya et al., 2021; Alrasheeday et al., 2024; Shastay et al., 2025). Suggested strategies to reduce errors included continuous training (41.5%) and workload reduction (43.2%), reinforcing global recommendations that emphasize the importance of ongoing education and manageable workloads for promoting patient safety (Fatima et al., 2024; Maruf et al., 2022). In terms of practice, 44.1% of nurses demonstrated good adherence to medication administration principles, but more than half performed at moderate or poor levels. This discrepancy between awareness and practice suggests that knowledge alone is insufficient without systemic support. External factors such as high patient loads, inadequate staffing, and limited institutional infrastructure significantly influence the ability of nurses to translate theoretical awareness into safe practice (Sharbaafchi et al., 2019; Gilavand et al., 2023; Stolic et al., 2022).

Overall, the study underscores that while theoretical knowledge among nurses is relatively strong, actual performance and attitudes toward reporting are shaped by organizational, cultural, and workload-related challenges. Implementing structured educational interventions, fostering a non-punitive reporting culture, and addressing systemic barriers such as understaffing and workload are vital steps to strengthen safe medication practices and enhance patient safety outcomes (Afaya et al., 2021; Alrasheeday et al., 2024; Fatima et al., 2024; Gilavand et al., 2023; Khan et al., 2024; Maruf et al., 2022; Schroers et al., 2022; Seed et al., 2024; Shahzeydi et al., 2024; Sharbaafchi et al., 2019; Shastay et al., 2025; Stolic et al., 2022).

CONCLUSION

The present study provides a comprehensive examination of nurses' awareness, attitudes, and practices concerning medication errors at Aliabad Teaching Hospital. Findings indicate that while a majority of nurses demonstrated a good level of theoretical knowledge regarding medication errors and the five rights of medication administration, gaps still exist in awareness and practical application. Specifically, errors such as administering the wrong medication or incorrect dosage were most prevalent, and the administration phase was identified as the most error-prone stage. The study also highlighted significant attitudinal barriers to effective error reporting. Although many nurses recognized the importance of reporting medication errors, a considerable proportion exhibited moderate or negative attitudes due to fear of punishment, lack of supportive culture, and uncertainty regarding error definitions. This demonstrates that awareness alone is insufficient to ensure safe medication practices; a supportive institutional environment and managerial interventions are equally essential.

Regarding performance, while a subset of nurses adhered consistently to the principles of safe medication administration, over half displayed moderate or poor performance levels. This discrepancy underscores the influence of systemic factors such as workload, supervision, and organizational culture on practical implementation. Overall, the study confirms that although knowledge levels among nurses are relatively satisfactory, persistent gaps in attitude and performance contribute to the continued occurrence of medication errors. Strengthening the alignment between theoretical awareness and practical execution is critical for enhancing patient safety. The findings suggest that improvements in education, reporting culture, workload management, and institutional support are necessary to reduce medication errors and improve healthcare quality.

Recommendations

1. Implement regular and structured **continuing education programs** focused on medication safety and error prevention.
2. Foster a **non-punitive reporting culture** to encourage transparency and timely error reporting.
3. Develop **standardized protocols and checklists** for all stages of medication administration.
4. Reduce **nursing workload** to ensure adequate time for careful medication handling.
5. Provide **supervision and mentoring**, particularly for less experienced nurses, to reinforce safe practices.
6. Organize **simulation-based training** sessions to enhance practical skills in medication administration.
7. Promote **team-based communication** strategies to minimize misunderstandings and errors.
8. Regularly **audit and monitor** medication error reports to identify trends and implement corrective actions.

Future Research

Future studies should explore the impact of organizational culture, digital health interventions, and technology-assisted medication administration on error reduction. Additionally, comparative research across multiple hospitals and regions could provide deeper insights into systemic factors influencing nurses' awareness, attitudes, and practices regarding medication errors.

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