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# Assessment of Nurses Knowledge and Practice Regarding Pharmacology of the Drugs They Usually Used in Tertiary Hospital

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**ABSTRACT**

**Background**: Medication safety is a critical aspect of patient care, with nurses playing a central role in ensuring safe medication administration. Despite global initiatives such as the World Health Organization's Medication Without Harm campaign, medication errors remain prevalent in healthcare systems. These errors, particularly in the medication administration process, are often linked to gaps in nurses' knowledge, attitudes, and practices. This study aims to assess nurses knowledge and practice regarding pharmacology of the drugs they usually used in tertiary hospital.

**Methods**: A descriptive correlational cross-sectional research design was employed to explore the relationships between nurses' knowledge, attitudes, and practices in medication administration. A sample of 140 nurses was selected using simple random sampling from a population of 700 nurses. Data were collected using two main tools: a knowledge and attitude questionnaire and a performance checklist. Descriptive statistics, Pearson's correlation, and Chi-square tests were used to analyze the data.

**Results**: The majority of nurses (97.9%) were female, and 98.6% reported no formal training in medication administration. Knowledge scores were generally low, with 62.9% of nurses demonstrating insufficient understanding of medication administration. Attitudes toward medication administration were evenly split, with 51.4% expressing positive attitudes. Practices in medication administration were suboptimal, with over 75% of nurses demonstrating poor preparation practices and around 60% displaying inadequate administration practices. Significant positive correlations were found between nurses' knowledge, attitudes, and practices ($p \leq 0.05$).

**Conclusion**: This study highlights critical gaps in nurses' knowledge, attitudes, and practices regarding medication administration, which could potentially lead to medication errors. The findings underscore the need for targeted training programs to improve nurses' competency in medication administration and reinforce positive attitudes towards patient safety. Further research is needed to assess the effectiveness of such interventions and to explore the impact of socio-demographic factors on nursing practices in medication administration.

**Keywords:** knowledge, attitude, administration, Practice.

## INTRODUCTION

Medication safety has emerged as a cornerstone of patient safety initiatives globally, with organizations like the World Health Organization (WHO) leading the charge. Recognizing the profound impact of medication errors on patient health outcomes, WHO has launched successive global patient safety campaigns to tackle this issue. Most recently, WHO introduced its Third Global Patient Safety Challenge, titled Medication Without Harm, during the 2nd Global Ministerial Patient Safety Summit in Bonn, Germany. This initiative calls for a 50% reduction in severe, avoidable medication-related harm over the next five years, with participating countries

pledging their commitment to this ambitious target. The challenge highlights the widespread prevalence and cost of medication errors—estimated at $42 billion USD globally each year—and underscores the need for coordinated, multi-stakeholder interventions to create sustainable improvements in medication safety (World Health Organization, 2016).

Medication errors can occur at various stages of the medication use process, from prescribing to administration. Weaknesses in medication management systems and human factors, such as staff fatigue, challenging work environments, and workforce shortages, significantly contribute to the likelihood of these errors. Studies show that such errors are a leading cause of preventable harm in healthcare systems, sometimes resulting in severe disability and even death. Given the complexity and multi-faceted nature of medication errors, WHO emphasizes the necessity of interventions at every level of the healthcare system, including robust regulatory frameworks, effective monitoring systems, and the ongoing education of healthcare professionals. A wide mobilization of stakeholders—from government bodies to frontline healthcare workers—is critical to successfully implementing these interventions and mitigating the risk of harm (Gonzales, 2012).

Nurses, in particular, play a central role in ensuring medication safety as they are often responsible for the direct administration, documentation, and monitoring of medication effects on patients. The Nursing and Midwifery Council (NMC) mandates that nurses remain accountable for their actions and continually update their knowledge and skills to provide safe, effective care. This accountability extends to all aspects of medication administration, including understanding drug indications, dosages, and potential interactions. In doing so, nurses not only ensure compliance with safety guidelines but also help to identify and prevent medication errors before they reach the patient. WHO has also supported this effort by developing the Multi-professional Patient Safety Curriculum Guide, which provides essential guidance for safe medication practices across healthcare fields such as nursing, dentistry, and pharmacy, aiming to embed these practices early in professional training and sustain them through ongoing education (Fleming, Brady, & Malone, 2014).

The growing importance of pharmacology knowledge for nurses is reflected in the demands of modern healthcare settings, where nurses administer the majority of medication doses. For instance, in a typical hospital in the United Kingdom, approximately 7,000 medication doses are administered daily, highlighting the scale and responsibility involved in medication administration. Nurses must therefore exercise professional judgment while ensuring they adhere to evidence-based practices. Rapidly evolving therapeutic protocols and increasingly complex patient needs—such as the aging population with multiple co-morbidities—further underscore the importance of continuous learning and the ability to adapt to new information. The dynamic nature of healthcare requires nurses to remain vigilant and responsive to changes in pharmacology, treatment guidelines, and patient demographics to effectively manage medication administration in diverse clinical settings (Sulosaari et al., 2012).

In response to these ongoing challenges, this study seeks to examine the knowledge, attitudes, and practices of nurses in administering medications, aiming to identify key areas where further support or training may be needed. By exploring the relationship between nurses' knowledge, attitudes, practices, and socio-demographic factors, the research intends to provide insights that can help shape future training programs and policies to enhance medication safety. Ultimately, this study underscores the commitment of nursing professionals to minimizing the risks associated with medication errors, as well as the critical need for targeted interventions that support nurses in their role as the frontline defense against medication-related harm. Through continuous professional development and evidence-based practice, nurses can continue to make substantial contributions to improving patient safety in healthcare systems worldwide.

## MATERIALS & METHODS

This study employed a descriptive correlational cross-sectional research design to examine the relationships between variables .The study was conducted among nurses working in a specialized medical hospital.

### Tools

Two primary tools were used for data collection to meet the study objectives:

Tool I: This tool included three parts.

Part One collected socio-demographic data, covering six items related to personal information, such as age, gender, department, medication administration training, qualifications, and years of experience.

Part Two was a knowledge questionnaire assessing nurses' understanding of medication administration across 15 items. These items evaluated knowledge on topics including medication administration policy, preparation, charting, dealing with missed doses, withholding medications, PRN medications, standard administration times, intravenous push medications, handling of single and multiple dose vials, medication storage, and verification of physician orders.

Part Three was an attitude questionnaire containing 20 questions that assessed both positive and negative attitudes toward medication administration.

Scoring System: For the knowledge section, each correct and complete answer was awarded 2 points, while

incomplete answers received 1 point, and incorrect or missing answers received 0.
Tool II: This performance checklist assessed medication administration procedures, covering general preparation principles, dose administration, and post-administration care. Each correct response earned a score of one, while incorrect answers received a score of zero.
Validity and Reliability
The tools were developed by the researcher and validated by a panel of seven experts from nursing and medical faculties, who evaluated the tools for clarity, relevance, and applicability. Modifications were made based on their feedback. Reliability was assessed using Cronbach's alpha, with a reliability score of 0.89 for the knowledge, attitude, and practice tool.

**Ethical Considerations**
Ethical approval was obtained from a research ethics committee, and official permissions were secured from the relevant hospital authorities. Oral consent was obtained from each participant after explaining the study's nature and purpose. Participation was voluntary, and confidentiality, anonymity, privacy, and the right to withdraw at any time were assured throughout the study.

**Data Collection Procedure**
Upon receiving authorization from hospital administration and relevant nursing supervisors, each nurse was interviewed individually to clarify the study's purpose and nature.

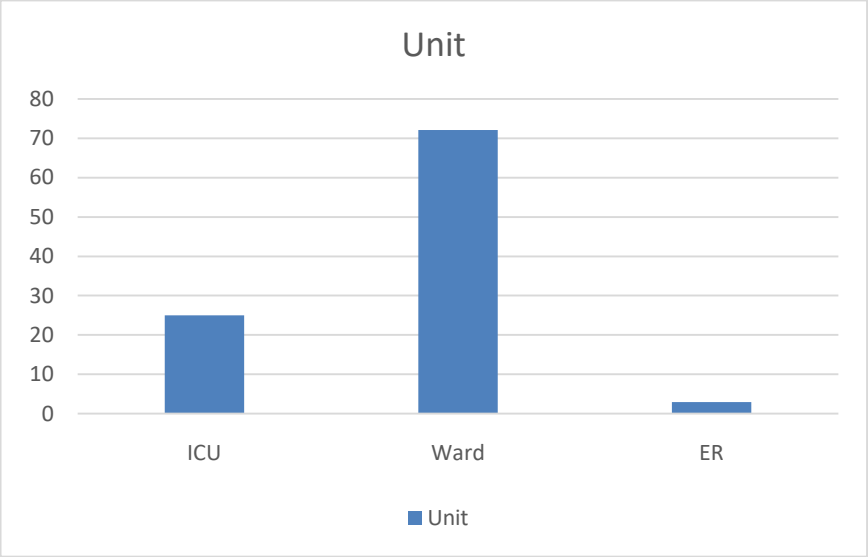
**Statistical Analysis**
The collected data were coded, entered, and analyzed using the Statistical Package for Social Sciences (SPSS version 20). Descriptive statistics, such as frequency, percentages, mean, and standard deviation, were used to summarize different characteristics. The Chi-square test was applied to examine relationships between categorical variables, and Pearson's r test was used to assess correlations between variables. For the attitude scale, a median percent score was used to categorize scores. The level of significance for this study was set at a p-value of 0.05 or lower.

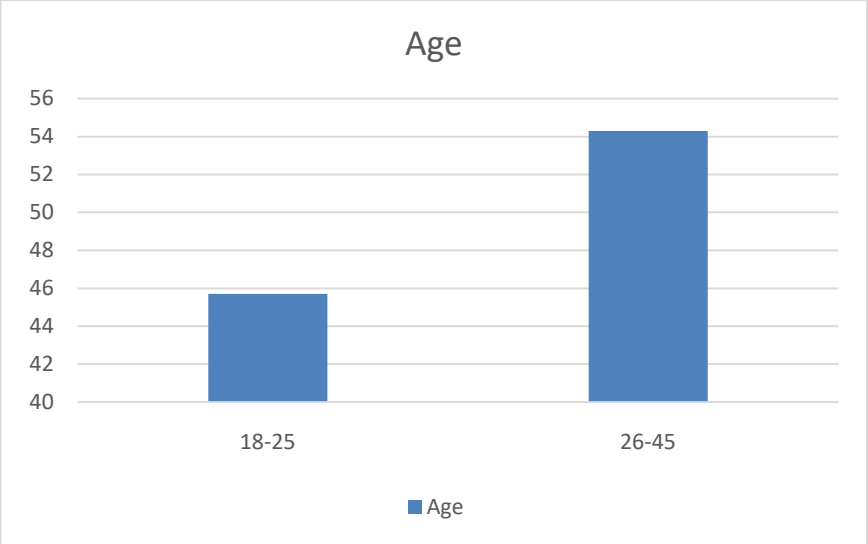
**RESULTS**
The data gathered were analyzed and the findings were organized into several categories:
Table 1 provides the demographic details of the nurses surveyed. It shows that approximately 72.1% of nurses work in hospital wards. Over half (54.3%) of the nurses are between the ages of 26-45 years, and the vast majority (97.9%) are female. Additionally, nearly all (98.6%) reported not receiving any training on medication administration. Education levels among nurses varied, with about 40.7% holding a nursing diploma and around 22.9% having a bachelor's degree. In terms of experience, around two-fifths have less than five years, while another 40.7% have between five and ten years of experience.

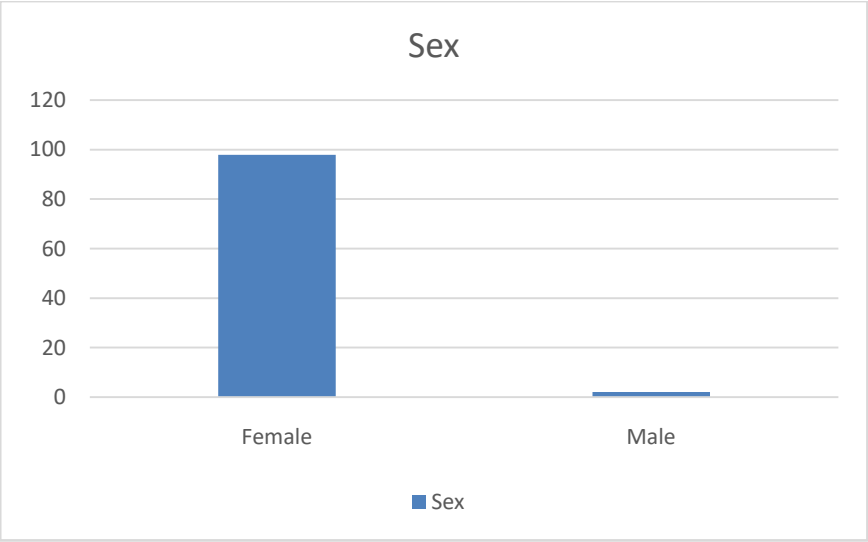
**Table 1:** Socio-Demographic Characteristics of the Nurses Studied

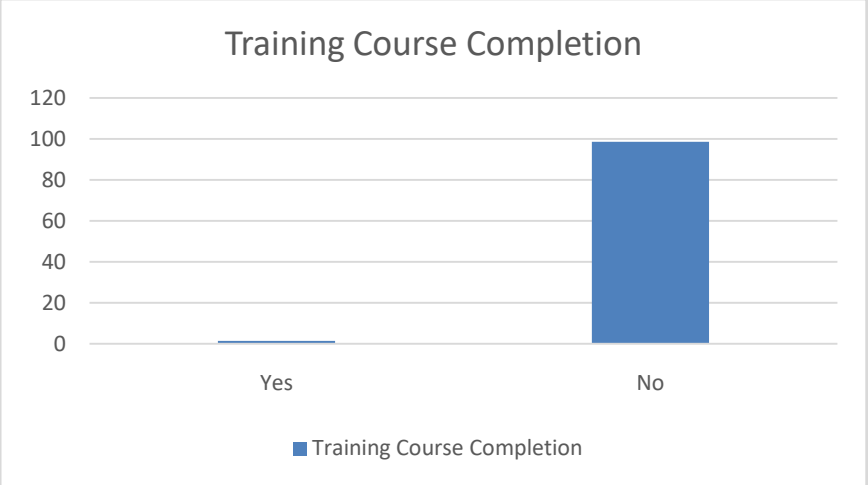
| **Nurses' Socio-Demographic Characteristics** | **Frequency (n = 140)** | **Percentage (%)** |
|---|---|---|
| Unit | | |
| ICU | 35 | 25.0 |
| Ward | 101 | 72.1 |
| ER | 4 | 2.9 |
| Age (Years) | | |
| 18-25 | 64 | 45.7 |
| 26-45 | 76 | 54.3 |
| Sex | | |
| Female | 137 | 97.9 |
| Male | 3 | 2.1 |
| Training Course Completion | | |
| Yes | 2 | 1.4 |
| No | 138 | 98.6 |
| Qualifications | | |
| Diploma | 57 | 40.7 |
| Institute/Technical | 51 | 36.4 |
| Bachelor | 32 | 22.9 |
| Experience (Years) | | |
| Less than 5 years | 54 | 38.6 |
| 5-10 years | 57 | 40.7 |

| | | |
|---|---|---|
| More than 10 years | 29 | 20.7 |





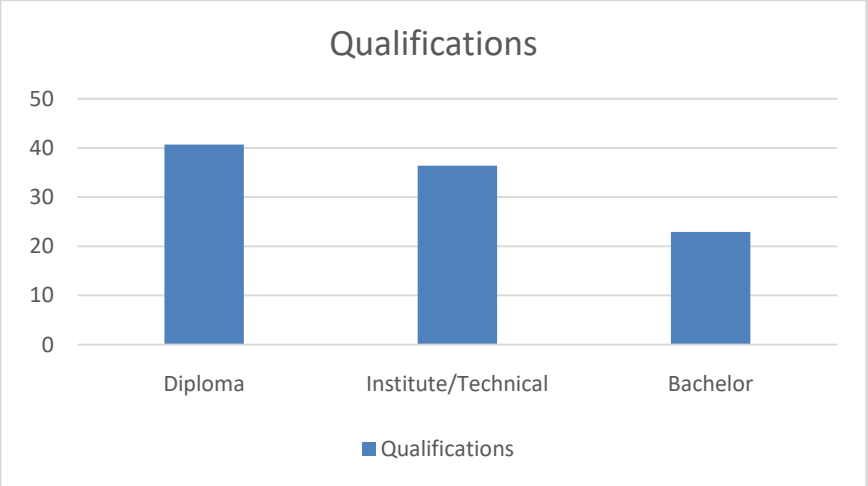



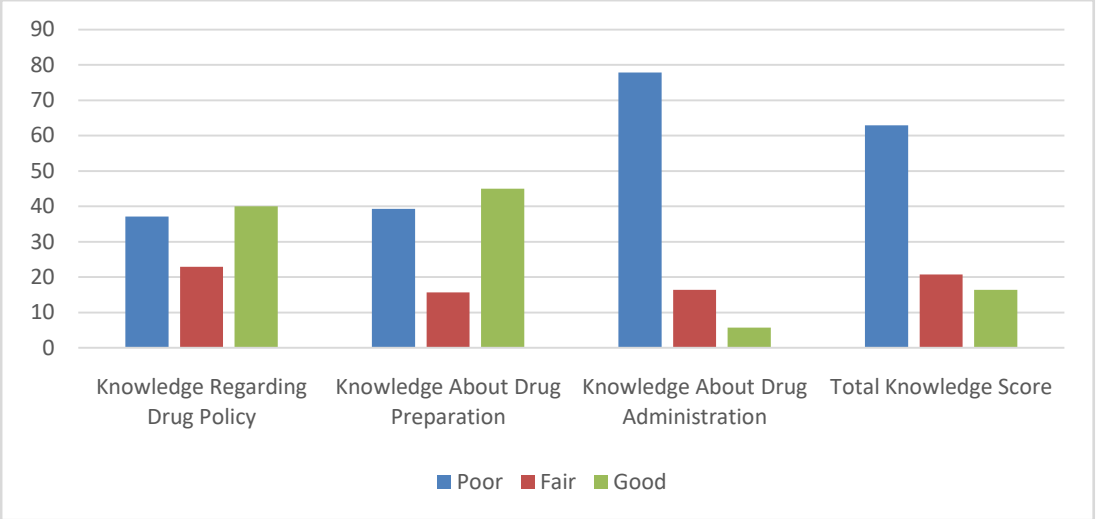


Table 2 illustrates nurses' average scores across different knowledge domains in medication administration. Higher scores were seen in areas such as general knowledge, medication preparation, administration procedures, and verifying physician orders, with mean scores of 44.92 ± 1.92, 36.58 ± 2.37, 7.82 ± 1.026, and 19.964 ± 2.07, respectively. Meanwhile, lower scores were observed in understanding medication charting, PRN (as-needed) medications, and floor-stock medication protocols, with mean scores of 6.50 ± 0.605, 5.45 ± 0.4999, and 16.335 ± 1.083, respectively. Overall, the total mean knowledge score for medication administration was 102.72 ± 35.38.

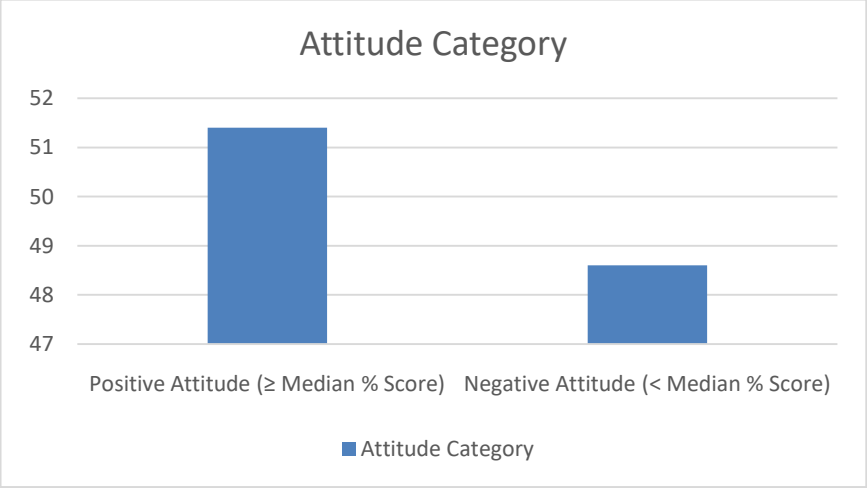
**Table 2:** Nurses' Knowledge Domain Scores Regarding Medication Administration

| Knowledge Domain | Mean ± Standard Deviation (SD) |
|---|---|
| Basic Knowledge Regarding Medication Administration | 44.92 ± 1.92 |
| Knowledge of Medication Preparation | 36.58 ± 2.37 |
| Knowledge of Medication Administration | 7.82 ± 1.026 |
| Knowledge of Charting Medications | 6.50 ± 0.605 |
| Knowledge of PRN Medications | 5.45 ± 0.4999 |
| Knowledge of Floor-Stock Medications and Supplies | 16.335 ± 1.083 |
| Knowledge of Verification of Physicians' Orders | 19.964 ± 2.07 |
| Total Knowledge Score | 102.72 ± 35.38 |

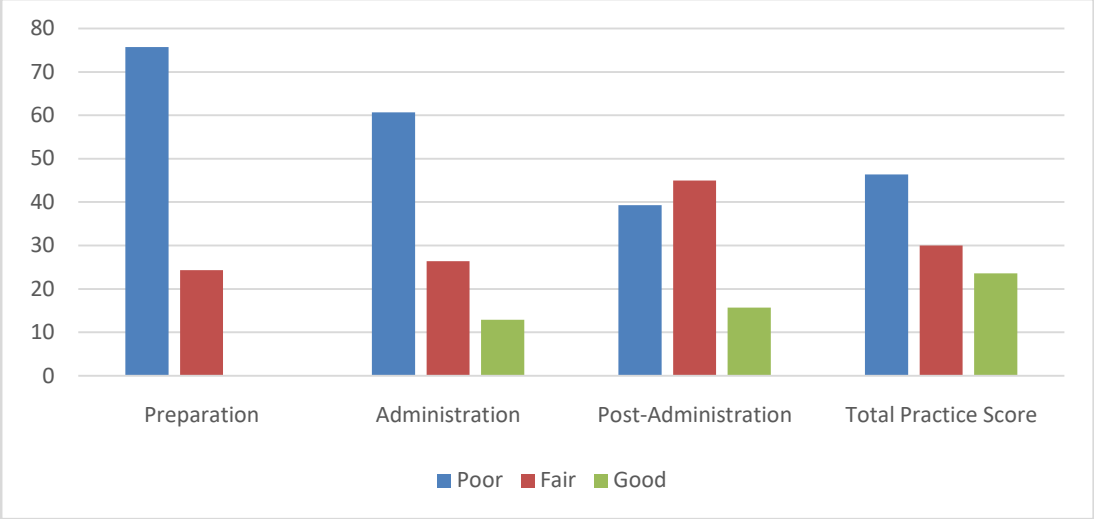
further breaks down nurses' total knowledge scores on medication administration. Approximately 37.1% of nurses had limited knowledge regarding drug policy, and 39.3% lacked adequate knowledge on drug preparation. A significant majority, 77.9%, displayed poor knowledge in drug administration. Overall, nearly two-thirds (62.9%) had a low total knowledge score in medication administration.




the attitudes of nurses toward medication administration, revealing that just over half (51.4%) held a positive attitude, while 48.6% had a negative stance. the mean and standard deviation for both positive and negative attitudes, with the mean positive attitude score being 27.53 ± 1.92 and the mean negative attitude score 12.5 ± 1.68. The overall mean attitude score was 40.04 ± 2.21.




Findings indicate that over three-quarters (75.7%) had low scores in drug preparation practices, and around 60.7% also showed poor practices in medication administration. In addition, about 39.3% had low practice scores for post-administration activities. The total practice score reflected that approximately 46.4% of the nurses had inadequate overall practice in medication administration.




Nurses' mean score for medication preparation practices was 50.66 ± 11.85, while for administration, it was 122.19 ± 14.65. The mean score for practices following medication administration was 44.17 ± 14.76, with a combined mean score of 267.05 ± 29.62 for overall practices in medication administration, a statistically significant correlation was identified between nurses' knowledge and both their practices and attitudes in medication administration, with p-values of 0.021 and 0.022, respectively. Additionally, a statistically significant relationship was found between their medication administration practices and attitudes (p = 0.002).

**DISCUSSION**

Patient safety is recognized globally as a critical concern within nursing and the broader medical field. According to the World Health Organization (WHO, 2017), patient safety can be simply defined as the prevention of healthcare-associated errors and adverse effects. Medication administration constitutes a significant part of nursing responsibilities. Reportedly, medication errors account for 33% of all hospital-related injuries, and approximately 30% of medication-related incidents reported to the U.S. Food and Drug Administration (FDA) in 2013 were fatal. Administering medications requires nurses to make informed professional decisions, prioritizing patient safety (Sulosaari et al.).

A narrative literature review indicates that medication errors comprise 12-20% of total errors, resulting in significant human, financial, and social costs (Dimuzio et al.).

The present study found that most participating nurses were female, aged 26 to 45, consistent with Feleke et al., who observed similar gender distributions. This may reflect greater exposure among middle-aged female nurses to medication administration, which is a key responsibility in their roles.

Regarding educational levels, slightly more than two-fifths of nurses had a diploma, while about one-fifth held a bachelor's degree in nursing. Similar findings were noted by Ahmed and Kimeu, where diploma holders were the majority. This lower educational level may contribute to knowledge gaps affecting medication administration practices.

A significant portion of the nurses reported no prior training in medication administration. This aligns with findings from Lavin et al., Gordon, and Ahmed et al., which showed that training positively influences patient safety in medication administration. This lack of training may indicate that nurses are not fully aware of its importance in reducing medication errors.

In terms of experience, around two-fifths of the nurses had less than five years of experience, while others had between five and ten years. Lavin et al. and Gordon similarly found that experience levels influence medication administration practices. Less experienced nurses may lack the expertise and technique necessary for high-quality care.

Pharmacological knowledge is a cornerstone of safe medication administration, as medication errors are among the most common hospital errors (Gonzales). Nurses, as the primary healthcare group responsible for administering medications, need up-to-date pharmacological knowledge as mentioned by McMullan et al

The current study assessed nurses' knowledge of medication administration, including preparation, administration, and verification of physician orders, with higher mean scores in these areas. Lower scores were observed in knowledge about medication charting, PRN medication, and floor-stock medications. Approximately two-fifths of nurses had low scores in knowledge areas related to drug policy and preparation, and nearly two-thirds had low overall knowledge scores. This finding contrasts with Nair's study, which reported above-average knowledge among nurses in pediatric medication administration. Limited training and education, as only a small portion of nurses had a bachelor's degree, may account for these knowledge deficits.

A 2013 survey in India on healthcare providers' knowledge, attitudes, and practices regarding medication errors found that doctors had significantly higher knowledge scores than nurses and pharmacists. Edwards and Axe (2015) stress that each nurse must understand indications, actions, contraindications, adverse reactions, and drug interactions to prevent errors.

A positive attitude towards medication administration is crucial for ensuring safety. Nurses' attitudes impact their response to medication administration tasks, where poor attitudes can hinder their performance throughout the process. Positive attitudes support error reporting, but fear of negative reactions from supervisors and peers discourages some nurses from reporting errors as mentioned by Cheragi et al

This study found that over two-fifths of nurses exhibited negative attitudes towards medication administration, potentially due to insufficient information and workload. In some settings, medication errors go unreported due to fear of punitive actions, leading to missed opportunities for preventing future errors. Armstrong found that fear and unfavorable attitudes affect error reporting, whereas Dimuzio et al. noted that nurses with positive attitudes use preventive measures, adhere to guidelines, participate in regular training, and report errors.

To promote safe medication administration, nurses must adhere to correct practices. The medication administration process begins with the prescription, requiring careful attention. The study found that over three-quarters of the nurses demonstrated poor practice in drug preparation, and slightly more than three-fifths showed poor administration practices. Additionally, nearly two-fifths displayed inadequate post-administration practices, with about half having poor overall practice scores.

Westbrook et al. similarly observed that nurses often failed to follow protocol and record medications properly. Wabe et al. also emphasized the need to improve post-medication practices, attributing poor performance to workload. In contrast, Al-Rukban et al. found that pharmacists in Riyadh actively educate patients about medications, a responsibility linked to their dual role in selling and prescribing drugs.

In general, the study found that nurses' knowledge scores averaged around 50%, while attitude and practice scores were closer to 60%. These findings suggest that medication administration practices may endanger patients' health, highlighting the need for nurses to minimize errors. Hughes, Vazin, and Hickner reported a 60% medication error rate, often involving incorrect timing, dosage, or administration.

This study used the KAP (Knowledge, Attitude, Practice) approach, finding a statistically significant link between nurses' knowledge, attitudes, and practices in medication administration. Dimuzio et al., however, reported that higher knowledge does not necessarily result in correct practices, possibly because their study focused solely on IV injections. Al-Sarawan similarly identified a knowledge-perception gap.

Supporting these findings, Aghakouchakzadeh et al. observed low KAP scores among medical students regarding medication errors and adverse drug reaction reporting. Vaismoradi et al. suggest that nursing curricula should emphasize medication management to foster skillful and safe practitioners. Therefore, the current study's focus on KAP aims to address weaknesses in nurses' knowledge, attitudes, and practices regarding medication administration..

Experience level was found to be significantly associated with knowledge, aligning with findings from Bifftu et al., Feleke et al., Johnson, and Thomas. These findings suggest that retaining experienced nurses can enhance training for less experienced staff.

Contrary to Al-Youssif et al., this study found no significant association between nurses' knowledge and work units, though Al-Youssif observed that emergency room nurses were more likely to report medication errors. Surprisingly, no significant link was found between nurses' knowledge and their qualifications. Dimuzio et al. reported stronger knowledge scores among nurses with university degrees, possibly because only a small number of nurses in this study held a bachelor's degree.

The study further revealed a significant association between nurses' gender, qualifications, and medication administration practices, consistent with Kimeu's findings. This association implies that nurses with higher education and experience have better medication administration practices, underscoring the importance of training and awareness regarding the consequences of poor practices.

Overall, the study highlights the need for continuous education and structured training to enhance nurses' competencies in medication administration and ensure patient safety.

## CONCLUSION

This study concludes that nurses generally have insufficient knowledge, inadequate practices, and a negative attitude toward medication administration, highlighting a need for improvement in these areas.

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