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Original Article

Knowledge about Administration and Regulation of High Alert Medication among Nurses in Oncology Department

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ABSTRACT

Background: High alert medications (HAMs) are associated with a higher risk of causing significant patient harm when used in error. Understanding the administration and regulation of these medications within oncology settings is critical due to the complex nature of cancer treatment regimens and the severity of potential medication errors.

Objective: To assess the knowledge of nurses regarding the administration and regulation of high alert medications in an oncology department of a tertiary care hospital.

Methods: A descriptive cross-sectional study was conducted among 133 registered nurses in the oncology department of Jinnah Hospital, Lahore. Data were collected using a structured questionnaire designed to evaluate nurses' knowledge of HAMs. Participants included both male (29.3%) and female (70.7%) nurses, with varying educational backgrounds and work experiences. Statistical analysis was performed using SPSS version 25, focusing on descriptive statistics such as frequencies, percentages, means, and standard deviations.

Results: The results revealed moderate knowledge levels among nurses with significant gaps in critical areas. Only 20.3% correctly identified the protocol for fast IV push of 1:1000 epinephrine in mild allergic reactions, and 33.8% mistakenly believed that 10% calcium gluconate and 10% calcium chloride were interchangeable. Additionally, 44.4% incorrectly used 'Amp' or 'Vial' for dose expression instead of 'mg' or 'gm', and 53.4% failed to recognize the importance of distinctive labeling on look-alike drugs.

Conclusion: The study highlights the need for enhanced educational programs and standardized protocols to improve the safe administration and regulation of HAMs in oncology settings. Strengthening nurses' knowledge and practices regarding HAMs is essential to reduce medication errors and improve patient outcomes.

Keywords: High Alert Medications, Nurse Education, Oncology Nursing, Medication Safety, Jinnah Hospital, Descriptive Cross-Sectional Study, Medication Errors.

INTRODUCTION

Medication errors represent a significant challenge in the nursing profession, particularly concerning high alert medications (HAMs) which carry a heightened risk of causing serious injury or death if mishandled. These medications include, but are not limited to, chemotherapeutic agents, cardiovascular drugs, narcotics, anticoagulants, neuromuscular blocking agents, and benzodiazepines. The American Pharmaceutical Association categorizes these drugs due to their high-risk nature (1). Their administration is predominantly in settings like oncology and emergency departments where the stakes of medication errors are notably high. This is exacerbated by complex drug regimens and the clinical instability of patients, particularly in intensive care units, making the consequences of errors potentially more severe (2). Globally, adverse drug events contribute to 2-5% of hospital admissions, with a significant portion being preventable; in the United States, these events are the third leading cause of death, highlighting the critical need for stringent medication management (3).

Nurses play a pivotal role in the healthcare system, often being the primary caregivers administering medications directly to patients. Their continuous patient interaction positions them uniquely to monitor and report adverse drug reactions, significantly impacting patient safety. Despite the critical nature of their role, medication delivery errors remain the most common type of nursing-related pharmaceutical errors, with issues in drug packaging frequently cited as a contributing factor (4). The administration of HAMs

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requires precise knowledge concerning drug dosage and delivery routes. For instance, certain medications such as 15% potassium chloride or 10% calcium chloride should never be administered via IV bolus, and doses of drugs like insulin are measured in units, not milliliters, to avoid dosing errors (5).

The regulation of HAMs is equally crucial, involving the meticulous management of drug storage, handling, and documentation. For example, substances like fentanyl patches are considered controlled medications and require secure storage to prevent misuse. Errors in storing similar medications together, such as insulin and heparin, can lead to dangerous mix-ups; therefore, stringent protocols are necessary to maintain safety (6). The correct handling and storage of HAMs are vital, including ensuring that medications are not only securely stored but also clearly labeled and properly documented to prevent errors. Nurses also need to regularly verify expiration dates and ensure medications are organized distinctly to avoid confusion among visually similar vial presentations (7).

The competency of nurses in managing high alert medications directly influences patient outcomes. As such, continual assessment of their proficiency, especially in dynamic and challenging practice situations, is essential. Gaps in nurses' competencies can lead to significant patient morbidity. Therefore, it is imperative that nurses not only possess the requisite knowledge and skills but also the intrinsic personality traits suitable for each setting (8).

Despite previous research on various aspects of nursing competencies within the Pakistani context, there remains a notable gap in studies focusing on the knowledge and handling of HAMs, which are among the most critical and life-threatening medications (9). Given the increased risk of medication errors due to inadequate training and experience with these drugs, further research is warranted. Thus, this study aims to assess the knowledge of nurses in the oncology department regarding the administration and regulation of high alert medications, addressing a significant gap in current medical research and aiming to enhance patient safety and care outcomes in high-risk healthcare settings.

MATERIAL AND METHODS

In this descriptive cross-sectional study, the knowledge of registered nurses regarding the administration and regulation of high alert medications was assessed. The research was conducted among the nursing staff of the Jinnah Hospital, a tertiary care facility in Lahore, Pakistan. The study population comprised both male and female registered nurses employed in the oncology department. Convenience sampling was utilized to select participants from the eligible nursing population. The inclusion criteria specified registered nurses aged between 22 and 36 years who had at least one year of experience in oncology nursing. Exclusion criteria included nursing students, nursing interns, newly hired nurses, head nurses, infection control nurses, and those not working in the oncology department (10).

The sample size was determined using Solvin’s formula, resulting in a total of 133 participants. Data were collected using an adopted questionnaire specifically designed to assess the knowledge of nurses regarding the administration and regulation of high alert medications (2). The questionnaire included both categorical and continuous variables to capture comprehensive information on the nurses' knowledge and practices (11-13).

Prior to the commencement of the study, ethical approval was obtained from the institutional review board of Jinnah Hospital, in accordance with the Helsinki Declaration. Participants were informed about the purpose of the study and assured of their anonymity and confidentiality. Written informed consent was obtained from all participants before their inclusion in the study (14).

Data analysis was conducted using SPSS version 25. Descriptive statistics, such as frequencies and percentages, were calculated for categorical variables, while mean and standard deviation were used for continuous variables. This methodological approach provided a robust framework for evaluating the competency of nurses in handling high alert medications, crucial for ensuring patient safety and effective healthcare delivery in the oncology setting.

RESULTS

The demographic characteristics of the study participants were varied, encompassing a broad range of ages, educational backgrounds, marital statuses, and work experiences (Table 1). The majority of the nurses were female, accounting for 70.7% of the participants, while male nurses comprised 29.3%. In terms of age distribution, the largest group was those between 22 and 26 years, representing over half of the sample at 50.4%. Nurses aged 27 to 31 years also formed a substantial portion, at 43.6%, whereas those between 32 to 36 years were markedly fewer, making up only 6.0% of the sample. No participants were above the age of 36 years.

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Table 1: Demographic Characteristics of Participants

Variable	Category	Frequency (%)
Gender	Male	29.3 (29.3%)
	Female	70.7 (70.7%)
Age	22-26 years	50.4 (50.4%)
	27-31 years	43.6 (43.6%)
	32-36 years	6.0 (6.0%)
	Above 36 years	0.0 (0.0%)
Marital Status	Single	41.4 (41.4%)
	Married	58.6 (58.6%)
Education	Diploma in General Nursing	9.8 (9.8%)
	Post RN	48.1 (48.1%)
	BSN (Generic)	42.1 (42.1%)
	Masters of Science in Nursing	0.0 (0.0%)
Work Experience	1-5 years	47.4 (47.4%)
	11-15 years	40.6 (40.6%)
	Above 15 years	-
Department	Emergency	65 (65%)
	Oncology	68 (68%)

Table 2: Knowledge of Nurses Regarding High Alert Medication Administration

Question	True (%)	False (%)	Don't know (%)
Fast IV push 1:1000 epinephrine 1 ampule for a patient who has a mild allergic reaction	27	97	9
When an emergency occurs, fast IV push 10% CaCl2 10 ml in 1-2 min	28	101	4
10% Ca gluconate and 10% CaCl2 are the same drug and interchangeable	45	69	19
For chemotherapy dose calculation, while adult based on BW, children BSA	67	48	18

Table 3: Knowledge of Nurses Regarding High Alert Medication Regulation

Question	True (%)	False (%)	Don't know (%)
Use 'Amp' or 'Vial' for dose expression instead of 'mg' or 'gm'	56	77	0
Use distinctive labeling on look-alike drugs	74	59	0
Use 'U' instead of 'unit' for dose expression	59	71	3
For convenience, heparin and insulin should be stored together in the refrigerator	48	77	8
Each drug better has multiple concentrations for nurse to choose	66	64	3

Regarding marital status, 58.6% of the nurses were married, and 41.4% were single. Educational qualifications among the nurses varied: 48.1% had completed a Post RN qualification, 42.1% held a BSN (Generic), and a smaller fraction, 9.8%, possessed a diploma in general nursing. Notably, none of the participants had attained a Masters of Science in Nursing. Work experience ranged, with 47.4% of the nurses having between 1 to 5 years of experience and 40.6% boasting 11 to 15 years. The representation in the departments was fairly balanced with 65% working in emergency and 68% in oncology.

The knowledge assessment regarding the administration of high alert medications revealed some critical gaps (Table 2). A notable misunderstanding was evident in the administration practices of epinephrine, with only 27% of the nurses correctly identifying the conditions under which a fast IV push of 1:1000 epinephrine 1 ampule should be administered for a mild allergic reaction; a significant 97% incorrectly believed this was appropriate. Similarly, only 28% responded correctly about the fast IV push of 10% CaCl2 10 ml in emergencies, with an erroneous 101% believing it was correct. Misconceptions also extended to drug equivalency, with 45% incorrectly assuming that 10% Ca gluconate and 10% CaCl2 were interchangeable, while 69% correctly identified that they were not.

The regulation of high alert medications also presented challenges (Table 3). About 56% of nurses incorrectly used 'Amp' or 'Vial' instead of 'mg' or 'gm' for dose expression, and 77% recognized this as incorrect. Distinctive labeling on look-alike drugs was

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appropriately acknowledged by 74% of nurses, yet 59% still incorrectly thought it was not necessary. Misunderstandings about the unit expression for dosages were prevalent, with 59% inaccurately using 'U' instead of 'unit', and 71% correctly identifying the standard practice. Furthermore, 48% mistakenly believed that heparin and insulin could be stored together for convenience, whereas 77% correctly disagreed with this practice. Finally, the opinion on having multiple concentrations of each drug for easier nurse access was split, with 66% in favor and 64% against, showing a division in preferences or understanding of best practices in medication management.

These results underscore the crucial need for ongoing education and training in the proper administration and regulation of high alert medications to enhance patient safety and healthcare outcomes.

DISCUSSION

The present study aimed to assess the knowledge regarding the administration and regulation of high alert medications (HAMs) among nurses in the oncology department of a tertiary care hospital. Utilizing a descriptive cross-sectional design, the study gathered data on various aspects of nursing practice related to HAMs. The findings indicated that the knowledge levels among nurses were only moderate, with significant gaps in understanding the correct procedures for administering and regulating these medications.

The demographic distribution of the participants showed a predominance of female nurses (70.7%), with the largest age group being between 22 and 26 years (50.4%). The majority of nurses had either a Post RN qualification (48.1%) or a BSN degree (42.1%), with varying levels of work experience, predominantly between 1 and 5 years (47.4%). This varied background suggests a diverse group of respondents, providing a comprehensive overview of the nursing knowledge landscape within the institution (14).

A significant portion of the nurses displayed a lack of accurate knowledge in critical areas. For instance, only 20.3% correctly identified the appropriate use of fast IV push 1:1000 epinephrine for a mild allergic reaction, indicating a substantial misunderstanding of emergency medication protocols. Additionally, 33.8% erroneously believed that 10% calcium gluconate and 10% calcium chloride were interchangeable, reflecting confusion about drug properties and their appropriate use (15).

Moreover, the study uncovered that misconceptions extended to the regulation of HAMs. A considerable number of nurses (44.4%) incorrectly used 'Amp' or 'Vial' instead of precise measurements like 'mg' or 'gm' for dose expression, and 44.4% mistakenly thought 'U' should be used instead of 'unit', which could potentially lead to serious dosing errors (Table 3). The lack of distinctive labeling on look-alike drugs was another area where knowledge was deficient, with 53.4% of respondents not recognizing its importance (16).

These findings align with previous studies which have demonstrated that insufficient knowledge and training on HAMs are prevalent among healthcare providers and can lead to medication errors (MEs). The current study also noted that disagreements between nurses and doctors and the absence of standardized operating procedures were frequently cited challenges, further compounding the risk of MEs (17).

The study's strength lies in its focused assessment of nurses in a high-stakes environment such as oncology, where HAMs are frequently used. However, it also faces limitations, including its reliance on self-reported data, which may be subject to bias. Additionally, the use of a single hospital setting may not provide generalizable results across different healthcare environments (18-20).

Given these insights, it is recommended that hospitals establish and regularly update a list of HAMs specific to each department to ensure all staff are aware of these critical drugs. Furthermore, developing and standardizing operating procedures for the administration and regulation of HAMs is essential. Such measures would likely enhance the competency of nurses in handling HAMs, thereby reducing the incidence of medication errors and improving patient safety (2, 9, 16).

CONCLUSION

In conclusion, this study highlights the urgent need for improved training and protocols around HAMs within hospital settings. Enhancing nurse education and establishing clear guidelines are crucial steps towards mitigating the risks associated with the administration of high alert medications.

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