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Nurses' Knowledge and Practices Regarding Safe Handling of Chemotherapeutic Agents

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Disclaimers

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ABSTRACT

Background: Chemotherapy agents are highly toxic and pose health risks not only to patients but also to healthcare providers, particularly nurses who handle these agents frequently. Safe handling practices are essential to protect both patients and healthcare staff from potential hazards.

Objective: To assess the knowledge and practices of nurses regarding the safe handling of chemotherapeutic agents.

Methods: A cross-sectional study was conducted in oncology units across five hospitals in Peshawar, Khyber Pakhtunkhwa, with 250 nurses sampled through proportionate sampling. Data were collected using an adapted questionnaire from Asefa et al. (17), comprising socio-demographic data and questions on safe handling practices. Ethical approval was granted by Bacha Khan University's Ethical Review Board, and data analysis was conducted with SPSS version 25.

Results: The mean age of participants was 35.56 years; 89% were female, and 76% held a diploma in nursing. Knowledge levels were low, with 70% displaying poor knowledge, 20% moderate, and 10% good. Practice levels were unsatisfactory in 75% of cases, with only 25% demonstrating satisfactory practices.

Conclusion: Significant gaps exist in nurses' knowledge and practices regarding chemotherapy handling. Targeted training and strict adherence to safety protocols are essential to improve these outcomes.

INTRODUCTION

Cancer remains a major health concern globally, presenting a high morbidity and mortality rate among populations (1). It is considered one of the leading causes of death, with a staggering incidence rate of 443.4 per 100,000 people and a mortality rate of 158.3 per 100,000 (3). The outcome for cancer patients heavily depends on early detection and timely treatment, where chemotherapy, a prevalent form of intervention, has shown effectiveness in targeting malignant cells (5). Chemotherapy employs cytotoxic drugs, immunotherapies, and targeted treatments designed to halt the progression of cancerous cells. However, the cytotoxic nature of these drugs not only affects patients but also places healthcare providers, particularly nurses, at substantial risk of exposure (6, 7). Nurses, as primary caregivers in oncology settings, frequently administer chemotherapy, making them susceptible to the adverse effects associated with handling these potent agents.

Research shows that exposure to cytotoxic drugs poses serious health risks to nurses, including reproductive issues, skin and respiratory problems, and even sporadic cancer occurrences due to inhalation of drug vapors or contact with contaminated surfaces (10, 11).

Literature underscores the hazardous impact of cytotoxic agents on healthcare workers, particularly nurses, who handle these drugs regularly, often leading to symptoms such as headaches, nausea, vertigo, and, in pregnant nurses, potential developmental risks to the fetus (12, 13). Furthermore, direct contact with these agents can lead to severe complications such as neural tube defects in unborn children, highlighting the critical need for safe handling practices among nurses (13). Despite the well-documented risks, adherence to safety protocols remains inconsistent, with many nurses lacking adequate knowledge and training to manage cytotoxic drugs safely. Effective handling of these agents requires specialized skills, sound judgment, and thorough understanding of safe handling practices to mitigate risks to both patients and healthcare providers (14). Ensuring safe handling encompasses various activities including proper storage, administration, disposal, and decontamination of chemotherapy-related materials (15). Without these practices, the repercussions can extend beyond the individual healthcare provider to affect the broader healthcare environment, as well as patient safety.

Several studies from developing countries indicate a prevalent gap in knowledge and practices among nurses handling chemotherapy, emphasizing an

urgent need for structured training programs to enhance their understanding and adherence to safety guidelines (18, 20). Similar findings from other studies reveal that a significant proportion of nurses do not wear appropriate protective equipment, such as nonabsorbent gowns and gloves, during chemotherapy administration, thus exposing themselves to unnecessary risk (23). This lack of adherence underscores a systemic issue that necessitates immediate attention from healthcare institutions. Educational interventions and practical guidelines have been shown to improve safety practices significantly among nurses, suggesting that periodic training and policy reinforcement could address these deficiencies effectively (25). Implementing comprehensive training programs, coupled with rigorous adherence to established protocols, can play a vital role in safeguarding nurses, thereby enhancing the quality of care provided to patients. This study, therefore, seeks to explore the extent of knowledge and practical application of safe handling measures among nurses dealing with chemotherapeutic agents in oncology units, with the aim of identifying areas that require targeted intervention to ensure a safer healthcare environment.

A cross-sectional study was conducted in Peshawar, Khyber Pakhtunkhwa, focusing on nurses' knowledge and practices regarding the safe handling of chemotherapeutic agents. The study included nurses working in oncology units at five major hospitals: Hayatabad Medical Complex, Lady Reading Hospital, Rehman Medical Institute, North West General Hospital, and the Institute of Radiotherapy and Nuclear Medicine in Peshawar. A sample of 250 nurses was selected using proportionate sampling, ensuring representation across these institutions. Participants included only those with at least six months of experience in oncology settings to ensure familiarity with chemotherapy handling.

Data collection involved an adapted questionnaire based on a similar study by Asefa et al., which provided relevant constructs to assess knowledge and practices around chemotherapy handling (17). The questionnaire comprised two main sections: Section A addressed socio-demographic variables, including age, gender, education level, and years of experience, while Section B evaluated knowledge and practices specific to the safe handling of chemotherapy agents. Before data collection, the study received approval from the Ethical Review Board of Bacha Khan University, Peshawar, ensuring adherence to ethical standards in research. All participants provided written informed consent, having been fully informed of the study's aims, objectives, and procedures. The study protocol was conducted in compliance with the Declaration of Helsinki, ensuring participants' rights and well-being were safeguarded throughout the research.

Upon completion of data collection, responses were compiled and coded for analysis. Statistical analysis was performed using SPSS version 25, which allowed for descriptive and inferential analyses of participants' knowledge and practices related to chemotherapy handling. Frequencies and percentages were calculated for categorical variables, while means and standard deviations were used for continuous variables. Additionally, Chi-square tests were conducted to assess associations between socio-demographic characteristics and levels of knowledge and practice, identifying any significant patterns in safe-handling competency among participants. The results were organized to provide a clear overview of the current state of knowledge and adherence to safe handling practices among nurses in the selected oncology units.

RESULTS

The study included a total of 250 nurses from oncology units in Peshawar. The mean age of participants was 35.56 years, with nearly half (49%) aged under 30 years. Most participants (89%) were female, reflecting the gender distribution in nursing within the region. Regarding educational qualifications, 76% held a diploma in nursing, while 24% had completed a Bachelor of Science in Nursing (BScN) or Post RN program. In terms of experience, 35.2% of participants had worked between 2 to 5 years in oncology settings. Detailed socio-demographic characteristics of the participants are presented in Table 1.

Table 1: Socio-Demographic Profile of Participants (n=250)

Variable	Frequency (f)	Percentage (%)
Age of Participants		
Less than 30 years	123	49.0
30 - 40 years	89	36.0
More than 40 years	38	15.0
Total	250	100.0
Gender		

Variable	Frequency (f)	Percentage (%)
Male	27	11.0
Female	223	89.0
Total	250	100.0
Educational Qualification		
Diploma in Nursing	189	75.6
BScN/Post RN	61	24.4
Total	250	100.0
Experience in Oncology		
Less than 2 years	78	31.2
2 - 5 years	88	35.2
5 - 10 years	52	20.8
More than 10 years	32	12.8
Total	250	100.0

The findings related to nurses' knowledge and practices regarding chemotherapy handling are summarized in Figures 1 and 2. Knowledge Levels: Out of the total participants, 70% were found to have poor knowledge regarding the safe handling of chemotherapeutic agents, 20% demonstrated moderate knowledge, and only 10% had good knowledge.

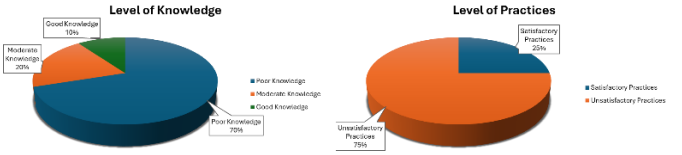

Figure 1: Knowledge Levels Among Participants on Safe Handling of Chemotherapy; Figure 2: Practice Levels Among Participants on Safe Handling of Chemotherapy

In terms of practices, 75% of the participants reported unsatisfactory practices related to chemotherapy handling, whereas only 25% reported satisfactory practices. Association Analysis: No statistically significant associations were found between socio-demographic characteristics (age, gender, education, experience) and knowledge or practice levels. This suggests that the gaps in knowledge and practices regarding chemotherapy handling may be uniformly distributed across different demographic groups in this sample.

These results highlight the prevalent gaps in knowledge and practices regarding safe handling of chemotherapeutic agents among nurses, underscoring a critical need for targeted interventions to improve safety standards in oncology settings.

DISCUSSION

The findings of this study revealed substantial gaps in nurses' knowledge and practices regarding the safe handling of chemotherapeutic agents, with 70% of participants displaying poor knowledge and 75% reporting unsatisfactory practices. These results align with previous studies that have identified similar deficiencies among nursing staff in oncology units, particularly in developing countries where resources and training opportunities are often limited. Comparable studies conducted in regions such as Bangladesh and India reported that nurses frequently lack adequate knowledge and adherence to safety protocols, with many participants showing limited understanding of safe handling procedures (18, 19, 20). Such findings highlight a widespread issue that warrants immediate attention from healthcare administrators and policymakers.

In exploring the potential reasons behind the observed knowledge and practice gaps, one strength of this study was its representation of multiple hospitals, offering a broader view of oncology nursing practices within Peshawar. The inclusion of a large sample size also provided robust data, increasing the generalizability of the findings. However, a limitation of the study was its reliance on self-reported data, which may be subject to social desirability bias, as participants may have reported more favorable practices than what occurs in routine care. Additionally, the cross-sectional design limits causal interpretations, as it captures only a snapshot of current knowledge and practices rather than changes over time.

Several studies have emphasized the risks healthcare professionals, especially nurses, face when handling cytotoxic drugs, as these agents can lead to significant health complications, including reproductive issues, respiratory ailments, and even malignancies (10, 12). Safe handling practices are crucial to minimize these risks, yet findings consistently indicate a lack of adherence to recommended guidelines.

For instance, a study on oncology nurses reported that a significant number failed to use essential personal protective equipment, such as nonabsorbent gowns and gloves, during chemotherapy administration, which further exacerbates the risk of exposure (23).

Similarly, in this study, only a small percentage of nurses engaged in satisfactory practices, reflecting a considerable shortfall in compliance with safe handling guidelines. These deficiencies underscore the urgent need for targeted educational interventions to bridge the knowledge gap and improve safety practices among nurses.

Recommendations for addressing these issues include implementing structured training programs and refresher courses focused on the safe handling of chemotherapeutic agents. Studies have shown that educational interventions can lead to significant improvements in nurses' knowledge and adherence to safety protocols (25). Incorporating hands-on training sessions, coupled with regular assessments, could ensure that nurses remain updated on best practices. Hospital administrators and policymakers should prioritize resources for such programs, as doing so could substantially reduce the health risks associated with cytotoxic drug exposure, ultimately benefiting both healthcare providers and patients.

Another notable aspect is the importance of developing and enforcing standardized protocols that nurses can easily follow. This could involve updating existing policies to reflect international standards for the safe handling of chemotherapeutic agents and ensuring that adequate personal protective equipment is available. Regular monitoring and evaluation of adherence to these guidelines would also be beneficial, as it could identify areas needing improvement and help sustain safe practices over time.

CONCLUSION

Overall, this study has added to the growing body of evidence on the need for improved training and resources to protect healthcare professionals involved in chemotherapy administration. By addressing these gaps in knowledge and practice, healthcare institutions can work toward creating a safer environment for nurses and enhancing the quality of care provided to oncology patients.

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