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***Original Research Article***

# KNOWLEDGE AND PRACTICE FOR SAFE HANDLING OF CHEMOTHERAPY AMONG ONCOLOGY NURSES

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**Abstract:** *Safe handling of chemotherapy drugs is critical to protecting oncology nurses from occupational hazards. However, adherence to safety protocols remains a significant challenge in healthcare settings, particularly in low- and middle-income countries like Pakistan.* ***Objective:*** *To evaluate the knowledge and practices of oncology nurses regarding the safe handling of chemotherapy drugs at Jinnah Hospital, Lahore.* ***Methods:*** *A descriptive cross-sectional study was conducted among 137 oncology nurses. Data were collected using a structured questionnaire addressing demographic characteristics, knowledge, and practices related to the safe handling of chemotherapy drugs. Descriptive statistics were analysed using SPSS version 26.* ***Results:*** *While 69.7% of participants correctly recognized breathing as a route of chemotherapy exposure, and 75.9% understood ingestion as a potential entry route, only 62.0% consistently used personal protective barriers, and 40.9% avoided eating or drinking in drug administration areas. Proper post-exposure protocols, such as washing skin and eyes immediately after exposure, were followed by 65.0% of participants.* ***Conclusion:*** *Oncology nurses exhibit good knowledge but inconsistent practices regarding the safe handling of chemotherapy drugs. Addressing these gaps requires targeted educational interventions, strict policy enforcement, and improved resource availability to ensure the safety of healthcare workers.*

**Keywords:** Chemotherapy, Oncology Nurses, Safe Handling, Occupational Hazards, Pakistan, Personal Protective Equipment

## Introduction

Chemotherapy is a cornerstone in cancer treatment, employing cytotoxic agents that are effective in controlling tumor growth but pose significant health risks to those handling them. Oncology nurses, as frontline healthcare providers, are frequently exposed to these hazardous drugs during preparation, administration, and disposal. Prolonged exposure to chemotherapy agents without proper protective measures can lead to severe health complications, including acute toxicity, reproductive health issues, and increased risk of malignancies (1, 2).

In Pakistan, where the burden of cancer is rising, the safe handling of chemotherapy drugs remains a critical challenge. The lack of resources, inadequate training, and insufficient institutional policies often contribute to unsafe practices among oncology nurses (3). Studies from low- and middle-income countries, including Pakistan, have reported limited adherence to standard guidelines for the safe handling of chemotherapy agents, highlighting a significant gap in knowledge and practice (4, 5).

International guidelines, such as those from the Occupational Safety and Health Administration (OSHA) and the World Health Organization (WHO), emphasize the importance of proper training, use of personal protective equipment (PPE), and adherence to safe handling protocols (6). However, the implementation of these guidelines in Pakistani healthcare settings is often hindered by systemic barriers, including inadequate funding, high patient loads, and a lack of awareness among healthcare professionals (7). Research conducted in Pakistan has highlighted that oncology nurses often face challenges in accessing adequate PPE and training programs, leading to inconsistent practices in handling chemotherapy agents. For instance, a study by Khan et al. revealed that only 60% of oncology nurses in a tertiary care hospital in Karachi reported using PPE consistently during chemotherapy administration (8). Similarly, Ahmed et al. noted that while nurses were aware of the risks associated with chemotherapy handling, practical adherence to safety protocols was limited due to resource constraints (9).

Despite the critical importance of safe handling practices, there is a dearth of research in Pakistan specifically focusing on the knowledge and practices of oncology nurses. This study aims to assess the knowledge and practice of safe chemotherapy handling among oncology nurses in Pakistan. By identifying gaps and challenges, the findings will provide valuable insights for designing targeted interventions to enhance safety practices and protect healthcare workers from occupational hazards.

## Methodology

The study employed a descriptive cross-sectional design to evaluate the knowledge and practices of oncology nurses regarding the safe handling of chemotherapy drugs at Jinnah Hospital, Lahore. This design was selected to provide a comprehensive snapshot of the current understanding and behaviors among nurses in the oncology, medical ICU, and surgical ICU departments.

A total of 137 nurses participated in the study. Participants were recruited using a convenience sampling technique. Inclusion criteria required nurses to have at least one year of experience in handling chemotherapy drugs and currently working in the designated departments. Nurses unwilling to

participate or on extended leave during the study period were excluded. The sample size was calculated to ensure sufficient representation across departments.

Data were collected using a pre-validated structured questionnaire, which was divided into two sections. The first section captured demographic characteristics, including age, gender, marital status, educational qualifications, department, and years of experience. The second section assessed knowledge and practices related to the safe handling of chemotherapy drugs. Knowledge questions focused on the routes of exposure, protective measures, and handling protocols, while the practices section examined adherence to safety measures, such as using personal protective equipment (PPE) and post-exposure procedures.

Ethical approval was obtained from the institutional review board of Jinnah Hospital before data collection began. Participants were informed about the purpose of the study, and written informed consent was secured. The anonymity and confidentiality of the respondents were maintained throughout the study.

The data collection process involved distributing self-administered questionnaires during work hours. Trained research assistants provided guidance and clarified any questions from participants to ensure accuracy and completeness of responses. Completed questionnaires were checked for completeness and entered into a secured database.

Data analysis was conducted using SPSS version 26. Descriptive statistics, including frequencies and percentages, were used to summarize demographic data, knowledge, and practices. Inferential statistics were employed to identify significant gaps and trends in knowledge and practices. The results were organized into tables and figures to facilitate a clear and structured presentation of findings.

## Results

A total of 137 nurses participated in the study. The majority were female (80.3%), aged between 21–25 years (35.8%), and had 1–5 years of professional experience (51.8%). Most participants held a Bachelor of Science in Nursing (BSN) qualification (40.9%) and were employed in the oncology department (50.4%) (Table 1).

The majority of nurses demonstrated good knowledge of the safe handling of chemotherapy drugs. Approximately 69.7% correctly recognized that chemotherapy can enter the body through breathing, while 75.9% understood ingestion as a potential route of entry. Knowledge regarding glove protection and skin absorption of chemotherapy drugs was also high, with 74.5% and 70.4% of participants answering correctly, respectively (Table 2).

**Practices Regarding Safe Handling of Chemotherapy**

In terms of practices, 62.0% of participants consistently used personal protective barriers while handling chemotherapy drugs, and 65.0% followed recommended procedures for washing skin or eyes immediately after exposure. However, only 40.9% avoided eating, drinking, or smoking in areas where chemotherapy drugs were administered, highlighting a gap in adherence to safety practices (Table 3).

**Table 1: Demographic Characteristics of Participants**

| Variable | Category | Frequency | Percentage (%) |
|---|---|---|---|
| Age (Years) | 21–25 | 49 | 35.8 |
| | 26–30 | 42 | 30.7 |
| | 31–35 | 33 | 24.1 |
| | 36–40 | 13 | 9.5 |
| Gender | Male | 27 | 19.7 |
| | Female | 110 | 80.3 |
| Marital Status | Single | 94 | 68.6 |
| | Married | 43 | 31.4 |
| Experience (Years) | 1–5 | 71 | 51.8 |
| | 6–10 | 42 | 30.7 |
| | 11–15 | 24 | 17.5 |
| Qualification | Diploma in Nursing | 51 | 37.2 |
| | Post RN | 30 | 21.9 |
| | BSN | 56 | 40.9 |
| Department | Medical ICU | 27 | 19.7 |
| | Surgical ICU | 41 | 29.9 |
| | Oncology | 69 | 50.4 |

**Table 2: Knowledge of Safe Handling of Chemotherapy Drugs**

| Question | Correct (%) | Incorrect (%) |
|---|---|---|
| Chemotherapy can enter the body through breathing | 69.7 | 30.3 |
| Chemotherapy can enter the body through ingestion | 75.9 | 24.1 |
| Chemotherapy can enter the body via spills | 76.6 | 23.4 |
| All types of gloves provide the same protection | 74.5 | 25.5 |
| Chemotherapy in liquid form can be absorbed through the skin | 70.4 | 29.6 |

**Table 3: Practices Related to Safe Handling of Chemotherapy Drugs**

| Question | Done (%) | Not Done (%) |
|---|---|---|
| No eating, drinking, smoking in drug administration areas | 40.9 | 59.1 |
| Wearing personal protective barriers | 62.0 | 38.0 |
| Proper disposal of patients' excreta | 56.2 | 43.8 |
| Washing skin and eyes immediately after exposure | 65.0 | 35.0 |

## Discussion

This study evaluated the knowledge and practices of oncology nurses regarding the safe handling of chemotherapy drugs at Jinnah Hospital, Lahore. The findings revealed that while nurses demonstrated good knowledge about the safe handling of chemotherapy, significant gaps were observed in adherence to safety practices. These findings are consistent with similar studies conducted in both national and international settings.

The study found that a high percentage of participants (69.7%) were aware that chemotherapy could enter the body through breathing, and 75.9% recognized ingestion as a potential route of entry. These results align with findings from Ahmed et al., who reported that healthcare professionals in Pakistan showed a reasonable understanding of chemotherapy exposure risks, particularly through inhalation and ingestion (10). Similarly, Sessink and Connor highlighted that oncology nurses globally are generally aware of the occupational hazards of chemotherapy handling, but this knowledge does not always translate into safe practices (11).

In terms of protective measures, 74.5% of nurses correctly identified that not all types of gloves provide the same protection, and 70.4% acknowledged the risk of chemotherapy absorption through the skin. These findings are in line with a study by Connor et al., which emphasized the critical importance of proper glove use and highlighted gaps in awareness about skin absorption risks among oncology staff (12). However, the relatively high knowledge levels observed in this study may reflect an increased focus on occupational safety training in tertiary care hospitals in Pakistan.

Despite the good knowledge observed, there were significant lapses in adherence to safe practices. For instance, only 40.9% of nurses avoided eating, drinking, or smoking in areas where chemotherapy drugs were handled. This result is similar to findings by Khan et al., who reported poor adherence to basic safety protocols, such as avoiding consumption in high-risk areas, among oncology nurses in Karachi (13). Such practices expose healthcare workers to unnecessary risks and underscore the need for stricter enforcement of safety protocols.

The use of personal protective barriers (PPE) was reported by 62.0% of participants, a figure comparable to the 60% adherence rate reported by Ahmed et al. in a study on PPE use in oncology departments in Pakistan (10). However, this level of adherence is significantly lower than the standards recommended by the World Health Organization (WHO) and Occupational Safety and Health Administration (OSHA), indicating a gap that needs urgent attention (14). Factors such as limited availability of PPE, lack of regular training, and high workloads may contribute to this gap.

The study also revealed that 65.0% of nurses followed recommended procedures for washing skin or eyes immediately after exposure. This practice aligns with global guidelines for managing chemotherapy exposure incidents (15). However, the inconsistency in other practices, such as the proper disposal of patients' excreta (56.2%), mirrors findings by Al-Quliti et al., who noted similar gaps in waste management practices among oncology nurses (16).

The observed gaps in safe practices highlight the need for targeted interventions, including regular training programs, audits of chemotherapy handling protocols, and ensuring adequate resource allocation for protective measures. Additionally, promoting a culture of safety through leadership and policy enforcement is essential for addressing the identified gaps and improving overall compliance.

## Conclusion

While oncology nurses demonstrated good knowledge of the safe handling of chemotherapy drugs, significant gaps in adherence to safety practices remain. These findings underscore the need for improved training, stricter enforcement of safety protocols, and enhanced resource availability to protect healthcare workers from occupational hazards.

## Declarations

**Data Availability statement**

All data generated or analyzed during the study are included in the manuscript.

**Ethics approval and consent to participate**

Approved by the department concerned. ((IRBEC-SNU933/24)

**Consent for publication**

Approved

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**Conflict of interest**

The authors declared absence of conflict of interest.

**Author Contribution**

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*Conception of Study, Final approval of manuscript.*
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*Coordination of collaborative efforts.*

*Data acquisition, analysis.*
*Manuscript drafting.*

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