Original Research Article

Assessment of Knowledge Regarding Neutropenic Patients Among Oncology Nurses

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Abstract: *Neutropenia is a frequent and potentially life-threatening complication among oncology patients, particularly those receiving chemotherapy. Early identification of infection risk and implementation of evidence-based preventive strategies are essential to reduce morbidity and mortality. Oncology nurses play a pivotal role in monitoring neutropenic patients and implementing infection-control measures. However, variability in nurses' knowledge may compromise patient safety. This study assessed oncology nurses' knowledge of neutropenic patients in tertiary care hospitals in Lahore, Pakistan.* **Objective:** *To assess the level of knowledge regarding neutropenic patients among oncology nurses in selected public and private tertiary care hospitals.* **Methods:** *A descriptive cross-sectional study was conducted from March to August 2025 in oncology departments of selected tertiary care hospitals in Lahore. A purposive sample of 150 registered oncology nurses directly involved in patient care was recruited. Data were collected using an adopted structured questionnaire comprising 30 true/false knowledge-based items covering definition, causes, clinical manifestations, infection control measures, environmental precautions, dietary considerations, oral care, and nursing management of neutropenic patients. Descriptive statistics were computed using SPSS version 25. Knowledge scores were categorized into low, average, and high levels based on predetermined criteria.* **Results:** *Among 150 participants, 56.0% were aged 21–30 years, and 91.3% were female. Regarding qualification, 39.3% held BSN/Post RN degrees, 35.3% had diplomas, and 25.3% had specialization training. High correct response rates were observed for daily skin and mucosa assessment (94.0%), stomatitis as a common complication (92.7%), use of personal protective equipment (90.0%), patient and family education (90.7%), and requirement of private rooms (88.7%). Lower correct response rates were noted for room cleaning sequence (48.7%), glycosuria as a sign of infection (50.0%), oral care with sodium bicarbonate (54.7%), and identification of infection signs (56.0%). Overall knowledge classification revealed that 40.0% of nurses had low knowledge, 26.0% had average knowledge, and 34.0% demonstrated high knowledge regarding the management of neutropenic patients.* **Conclusion:** *A substantial proportion of oncology nurses demonstrated low to average knowledge regarding neutropenic patient management. Although awareness of core infection-control measures was generally adequate, notable gaps persisted in specific clinical and preventive domains. Targeted continuing education programs and structured competency-based training may help strengthen oncology nursing practice and improve patient safety outcomes.*

Keywords: Neutropenia, Oncology Nurses, Knowledge Assessment, Infection Prevention, Chemotherapy-Induced Neutropenia

Introduction

Neutropenia is defined as a reduction in circulating neutrophils below the normal reference range. It is commonly classified as an absolute neutrophil count below 1500 cells/mm³, with severe neutropenia occurring at levels below 500 cells/mm³. Neutrophils play a central role in host defense against bacterial and fungal pathogens through mechanisms such as phagocytosis and intracellular killing. A deficiency in these cells significantly compromises the immune response and predisposes patients to life-threatening infections (1).

Chemotherapy remains one of the most widely used modalities in cancer management. Although it targets rapidly dividing malignant cells, it also suppresses bone marrow function, leading to decreased neutrophil production. Chemotherapy-induced neutropenia is associated with increased morbidity, mortality, prolonged hospitalization, and higher healthcare costs (2). The global cancer burden continues to rise due to aging populations, lifestyle factors, and environmental exposures, further increasing the number of patients at risk of neutropenia (3). According to recent global cancer projections, the incidence of cancer is expected to increase substantially in the coming decades, particularly in low- and middle-income countries, where healthcare systems may already be resource-constrained (4).

The pathophysiology of neutropenia is closely linked to bone marrow suppression, which may result from cytotoxic chemotherapy, radiotherapy, hematologic malignancies, or other systemic disorders.

Neutrophils have a short lifespan in circulation and require continuous production in the bone marrow; therefore, any disruption in hematopoiesis can rapidly lead to neutropenic states (5). Radiotherapy, especially when directed at large bone marrow–containing areas, further contributes to myelosuppression and immunosuppression (6).

Infection is the most serious complication of neutropenia. Because inflammatory responses may be blunted, classical signs of infection may be subtle or absent. Early recognition of symptoms such as fever and hypotension is critical, as delayed management can lead to sepsis and adverse outcomes (7). Effective prevention and management strategies rely heavily on nursing vigilance, infection control measures, environmental precautions, dietary guidance, and patient education. Oncology nurses are often the primary healthcare professionals responsible for monitoring neutropenic patients, implementing protective isolation measures, and educating patients and families regarding infection prevention.

Previous studies have indicated variability in nurses' knowledge regarding chemotherapy-induced neutropenia and its management. Al Qadire et al. reported moderate levels of knowledge among oncology nurses, with notable gaps in specific clinical domains (8). Similar findings were observed in multinational surveys assessing student nurses' knowledge related to neutropenia management, highlighting the need for structured educational interventions (9). Mortada and Moussa also identified deficiencies in infection prevention practices among nurses caring for neutropenic patients, emphasizing the importance of

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continuous professional development (10). In the Pakistani context, Mir et al. documented knowledge and practice gaps among oncology and bone marrow transplant nurses in the management of neutropenic fever, underscoring the relevance of local data for guiding targeted educational strategies (11).

Given the increasing burden of cancer and the critical role of nurses in preventing infection-related complications, assessing knowledge regarding neutropenic patient management is essential. Identifying knowledge gaps can inform evidence-based training programs and improve the quality of oncology nursing care. Therefore, this study aimed to assess oncology nurses' knowledge regarding neutropenic patients in selected tertiary care hospitals.

Methodology

A descriptive cross-sectional study was conducted to assess oncology nurses' knowledge of neutropenic patients. The study was carried out in the oncology departments of selected public and private tertiary care hospitals in Lahore, including Ittefaq Hospital, Saleem Memorial Hospital, INMOL Hospital, and Mayo Hospital. Data collection was completed over approximately six months, from March 2025 to August 2025.

The target population comprised registered staff nurses working in oncology units of the selected hospitals. Nurses directly involved in the care of oncology patients were eligible for inclusion. Head nurses, student nurses, and nurse internees were excluded to ensure that only practicing clinical nurses with direct patient care responsibilities were included in the assessment. A purposive sampling technique was applied. The sample size was calculated using Slovin's formula ($n = N / 1 + Ne^2$) with a 5% margin of error, resulting in a final sample of 150 participants

. Recruitment continued until the required sample size was achieved.

Data were collected using an adopted structured questionnaire consisting of 30 knowledge-based items related to neutropenia and its management

. The instrument was divided into two sections. The first section captured demographic variables, including age, gender, and educational qualification. The second section assessed knowledge of the definition, causes, clinical manifestations, infection-control measures, environmental precautions, dietary considerations, oral care, and nursing management of neutropenic patients. Each knowledge item required a true/false response. Total knowledge scores were calculated by summing correct responses, and participants were categorized into low, average, and high knowledge levels based on predetermined scoring criteria.

Content validity of the instrument was ensured through review by nursing faculty and subject experts. Minor modifications were made to enhance clarity and contextual relevance. Prior to full-scale data collection, the questionnaire was reviewed to ensure appropriateness for the target population. Reliability and consistency of the data collection process were maintained by providing uniform instructions to all participants.

Administrative approval was obtained from the Principal of Ittefaq College of Nursing and from the relevant hospital authorities before initiating the study

. Written informed consent was obtained from each participant after the purpose and procedures of the study were explained. Participants were assured of confidentiality and anonymity, and no identifying information was recorded. They were informed of their right to withdraw from the study at any time without any consequences. Ethical principles outlined by the institutional ethical committee were strictly followed throughout the study period.

Data were coded and entered into the Statistical Package for Social Sciences (SPSS) version 25 for analysis.

Descriptive statistics were used to summarize the data. Categorical variables were presented as frequencies and percentages. Mean and standard deviation were calculated where appropriate. Knowledge levels were categorized based on total scores. A p-value of ≤0.05 was considered statistically significant where inferential analysis was applicable. Data were checked for completeness and accuracy prior to analysis to ensure data quality and integrity.

A total of 150 oncology nurses were included in the analysis. Most participants were aged 21–30 years (56.0%),

Results

followed by 31–40 years (32.7%). The majority were female (91.3%). Regarding educational qualification, 39.3% held a BSN/Post RN degree, 35.3% had a diploma, and 25.3% had specialization training. Detailed demographic characteristics are presented in Table 1.

Table 1. Demographic Characteristics of Participants (n = 150)

Variable	Category	n	%
Age (years)	21–30	84	56.0
	31–40	49	32.7
	41–50	16	10.7
	51–60	1	0.7
Gender	Male	13	8.7
	Female	137	91.3
Qualification	Diploma	53	35.3
	Specialization	38	25.3
	BSN / Post RN	59	39.3

Responses to individual knowledge items showed variable levels of correctness. The highest correct responses were observed for daily skin and mucosa assessment (94.0%), stomatitis as a common complication (92.7%), and use of personal protective equipment (90.0%). High awareness was also noted regarding patient and family education (90.7%), the requirement for a private room (88.7%), and lymphoma as a cause of neutropenia (85.3%). Lower correct response rates were recorded for room cleaning sequence (48.7%), glycosuria as a sign of infection (50.0%), oral care with sodium bicarbonate (54.7%), and identification of infection signs (56.0%). Full item-wise distribution is provided in Table 2.

Table 2. Knowledge Responses for Individual Items (n = 150)

No.	Knowledge Statement (Abbreviated)	Correct %	Incorrect %
1	Neutropenia characteristics	52.0	48.0
2	Neutrophil function	81.3	18.7
3	Definition level	74.7	25.3
4	Lymphoma cause	85.3	14.7

5	Hypotension symptom	76.7	23.3
6	8-hour assessment	64.0	36.0
7	Infection signs difficult	56.0	44.0
8	Radiotherapy suppression	82.7	17.3
9	Endogenous flora source	56.0	44.0
10	IV dressing frequency	62.0	38.0
11	Daily bath	70.7	29.3
12	IV over IM/SC	79.3	20.7
13	Avoid coughing	66.0	34.0
14	Glycosuria	50.0	50.0
15	Enema use	56.7	43.3
16	GI infections	85.3	14.7
17	Stomatitis	92.7	7.3
18	Sodium bicarbonate oral care	54.7	44.7
19	Mouth rinse frequency	86.0	14.0
20	Tap water restriction	77.3	22.7
21	Fresh produce	56.7	43.3
22	Respiratory isolation	70.7	29.3
23	Restricted visitors	70.0	30.0
24	Private room	88.7	11.3
25	Cleaning order	48.7	51.3
26	Damp mop cleaning	71.3	28.7
27	PPE requirement	90.0	10.0
28	Routine catheterization	60.0	40.0
29	Daily skin assessment	94.0	6.0
30	Patient/family education	90.7	9.3

Overall knowledge classification showed that 40.0% of nurses had low knowledge, 26.0% demonstrated average knowledge, and 34.0% had high knowledge regarding the management of neutropenic patients. A larger proportion of participants fell within the low knowledge category (Table 3).

Table 3. Overall Knowledge Level (n = 150)

Knowledge Level	n	%
Low	60	40.0
Average	39	26.0
High	51	34.0
Total	150	100.0

Discussion

The present study assessed knowledge regarding neutropenic patients among oncology nurses and demonstrated that a considerable proportion of participants possessed low to average knowledge levels. Although several core clinical concepts were well recognized, important gaps remained in areas related to definition, infection signs, and specific preventive practices. These findings suggest variability in theoretical understanding and practical application of neutropenia management principles.

In this study, 40% of nurses demonstrated low knowledge, 26% had average knowledge, and only 34% exhibited high knowledge. Comparable findings have been reported internationally. Mallah et al. (12) observed suboptimal knowledge and inconsistent infection-control practices among oncology nurses, particularly in dietary precautions and environmental hygiene measures. Similarly, Mortada and Moussa (10) identified moderate knowledge levels among nurses caring for neutropenic patients, with deficiencies in certain infection-prevention domains. These results align with the current study, where several critical items showed only modest correct response rates.

Knowledge regarding the definition and classification of neutropenia showed variability. Although most nurses correctly identified common causes such as lymphoma and bone marrow suppression, fewer demonstrated full conceptual clarity regarding diagnostic thresholds. Raj et al. (7) emphasized that accurate understanding of absolute neutrophil count thresholds is essential for timely recognition and management of neutropenic states. Inadequate knowledge in this area may delay early identification of high-risk patients.

The majority of participants correctly identified neutrophils' role in host defense and the association between radiotherapy and bone marrow suppression. Burn et al. (5) highlighted the central immunological role of neutrophils in protecting against bacterial and fungal infections, reinforcing the importance of foundational knowledge in clinical practice. In addition, Koper et al. (13) discussed the myelosuppressive effects of chemotherapy and radiotherapy, supporting the high correct response rates observed for related items in the present study.

Recognition of infection risk and early warning signs remains critical in neutropenic care. In this study, a substantial proportion of nurses correctly acknowledged hypotension as an important indicator of sepsis, and most recognized the importance of daily skin and mucous membrane assessment. Ayele et al. (9) similarly reported that nurses demonstrated relatively stronger knowledge in areas directly linked to infection surveillance compared to more nuanced aspects of preventive care. However, variability in responses related to subtle infection indicators suggests ongoing educational needs.

Environmental precautions and protective isolation practices were generally well understood. Most participants correctly indicated the need for private rooms, use of personal protective equipment, and patient-family education. Sargidy et al. (14) reported comparable findings, showing that oncology nurses were more knowledgeable regarding visible infection-control practices such as gowning and masking, but less consistent in understanding procedural details. In the present study,

responses regarding room cleaning order and urinary catheterization revealed mixed knowledge, reflecting similar inconsistencies.

Dietary and oral care practices demonstrated moderate knowledge levels. While many nurses recognized the importance of mouth rinsing and safe water consumption, fewer showed clarity regarding specific oral care solutions or dietary recommendations. Kim et al. (15) emphasized that patient education and supportive care during chemotherapy require structured nursing training to ensure consistency in home-based infection prevention strategies. These findings support the need for focused educational reinforcement.

Overall, the pattern observed in this study is consistent with multinational evidence. Al Qadire et al. (2) reported that oncology nurses achieved moderate average scores on neutropenia knowledge scales, with gaps in specific clinical management domains. The similarity between their findings and the present results suggests that knowledge variability may be a widespread issue rather than a context-specific problem. However, given the rising global cancer burden described by Bahrami and Tafrihi (3), strengthening oncology nursing competence is increasingly important, particularly in low- and middle-income settings.

The predominance of low to average knowledge levels in this study may reflect limited access to structured continuing education programs, variability in oncology specialization training, or inconsistent institutional protocols. Conversely, the presence of a substantial proportion of nurses with high knowledge indicates that improvement is achievable when adequate training and exposure are available.

These findings underscore the need for targeted educational interventions, periodic competency assessments, and evidence-based clinical guidelines tailored to oncology settings. Strengthening continuing professional development programs and integrating updated neutropenia management content into nursing curricula may help bridge the identified knowledge gap and improve patient safety outcomes.

Conclusion

The study identified considerable knowledge variability among oncology nurses regarding neutropenic patient management, with 40% demonstrating low knowledge levels. While essential infection-control principles were well recognized, important gaps were evident in specific clinical practices. Strengthening continuing professional development and implementing evidence-based training initiatives may enhance nursing competence and contribute to improved outcomes for neutropenic patients.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
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The authors declared the absence of a conflict of interest.

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All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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