

ASSESSMENT OF NURSES' KNOWLEDGE REGARDING PERSONAL PROTECTIVE EQUIPMENT AT TERTIARY CARE HOSPITAL LAHORE

HUSSAIN MG\*, HAMEED S, TASNEEM SS, JABEEN R

Department Of Nursing, The Superior University Lahore, Pakistan

\*Corresponding author`s email address: [mghmsa@gmail.com](mailto:mghmsa@gmail.com)

(Received, 04<sup>th</sup> September 2024, Revised 25<sup>th</sup> October 2024, Published 28<sup>th</sup> October 2024)

**Abstract:** Personal Protective Equipment (PPE) is crucial for protecting healthcare workers from occupational hazards and infections, particularly in high-risk environments such as hospitals. Adequate knowledge and proper use of PPE are essential to ensure the safety of both healthcare workers and patients. This study aimed to assess the knowledge, attitudes, and practices of nurses regarding PPE at a tertiary care hospital in Lahore, Pakistan. **Methods:** A descriptive cross-sectional study design was utilized. A structured questionnaire was used to collect data from 152 nurses working in various departments of the hospital. Purposive sampling was employed, and the sample size was determined using RaoSoft with a 95% confidence interval and a 0.5% margin of error. The questionnaire comprised sections on demographic information, knowledge assessment, and attitudes and practices evaluation. Data were analyzed using SPSS version 25.0, with descriptive statistics and chi-square tests to identify associations between demographic characteristics and knowledge levels. **Results:** Of the 152 participants, 77% were female, with a mean age of 36.5 years (SD ± 9.05 years). Most participants held a diploma in nursing (46%), and the majority (93.4%) had less than 12 years of professional experience. The findings revealed that 67% of nurses demonstrated good knowledge of PPE, 20% had average knowledge, and 13% exhibited poor knowledge. While 92% of participants reported being knowledgeable about PPE usage, inconsistencies were noted in the adherence to specific practices, such as glove and mask usage. Additionally, only 34% of participants believed that consistent use of PPE would reduce their risk of infection, indicating a potential gap between perceived and actual knowledge. **Conclusion:** The study highlights both strengths and gaps in nurses' knowledge and practices regarding PPE at a tertiary care hospital in Lahore. While most nurses demonstrated a satisfactory understanding of PPE, inconsistencies in practical application underscore the need for targeted training and reinforcement of guidelines. Regular training sessions, active monitoring, and continuous professional development are essential to enhance adherence to PPE protocols and safeguard healthcare workers in resource-limited settings like Pakistan.

**Keywords:** Personal Protective Equipment, Nurses, Knowledge, Practices, Tertiary Care Hospital, Pakistan

## Introduction

Healthcare workers, especially nurses, require Personal Protective Equipment for their safety. Personal Protective Equipment comprises gloves, gowns, masks, and eye protection to shield against infectious agents and dangerous substances (WHO, 2020). The correct usage of PPE is vital in the COVID-19 pandemic to stop the spread of the virus among healthcare workers and patients (CDC, 2021). In healthcare settings, it is crucial to use PPE properly to minimize the transmission of infections (1). Nurses, who frequently interact with patients, face a higher likelihood of being exposed to infectious agents, making it imperative for them to use PPE correctly for their safety. Personal Protective Equipment serves as a barrier between healthcare workers and contagious materials, thereby reducing the risk of infection (2). The effectiveness of PPE is contingent on its availability and healthcare workers' understanding and adherence to proper usage (3). The effectiveness of PPE relies heavily on the correct knowledge and usage. Studies have shown that healthcare workers often have insufficient understanding and improperly use PPE, leading to an increased risk of infection (4). Continuous training and education are crucial for improving compliance and safeguarding healthcare workers (5). Adherence to PPE

guidelines can be influenced by factors such as workload, Personal Protective Equipment availability, and institutional policies (6). Pakistan's healthcare system grapples with challenges such as limited resources and a high prevalence of infectious diseases (7). Concerns have been raised about the use of PPE in healthcare settings in Pakistan, particularly during the COVID-19 pandemic, due to reported shortages and improper usage (Nafees & Khan, 2020). Previous studies have emphasized the crucial role of PPE in safeguarding healthcare workers from infectious diseases. Phan et al. (2019) discovered that knowledge and training greatly influence the proper utilization of PPE among healthcare professionals. Likewise, Verbeek et al. (2020) stressed the importance of ongoing education to promote adherence to PPE protocols. In Pakistan, Nafees and Khan (2020) identified obstacles in accessing and utilizing PPE during the COVID-19 crisis, underscoring the necessity for improved readiness and training. Brouwer et al. (2021) found that hands-on training and simulations improve healthcare workers' correct use of Personal Protective Equipment. (6) Emphasized the importance of institutional policies and resources in ensuring PPE compliance. These studies lay the groundwork for evaluating nurses' knowledge and practices in Pakistani

[Citation Hussain, M.G., Hameed, S., Tasneem, S.S., Jabeen, R. (2024). Assessment of Nurses' Knowledge Regarding Personal Protective Equipment at Tertiary Care Hospital Lahore. *Biol. Clin. Sci. Res. J.*, 2024: 1246. doi: <https://doi.org/10.54112/bcsrj.v2024i1.1246>]

healthcare settings, underscoring the need for comprehensive training programs. It is crucial to evaluate the knowledge and practices of nurses working in public tertiary care hospitals regarding PPE to pinpoint deficiencies and implement effective training programs. Assessing nurses' PPE knowledge is vital for their safety and patient safety. This study aims to identify gaps and provide recommendations to enhance PPE training and compliance in public tertiary care hospitals in Lahore. The results will inform strategies to protect healthcare workers and enhance patient care.

Personal Protective Equipment (PPE) is essential for safeguarding healthcare professionals, particularly nurses, from infections and injuries in clinical settings. PPE includes items such as gloves, masks, gowns, and eye protection, which are critical in preventing the transmission of pathogens, especially in high-risk environments like tertiary care hospitals. The COVID-19 pandemic has underscored the necessity for healthcare workers to be well-versed in the proper use of PPE. Assessing nurses' knowledge regarding PPE is vital to ensure their safety and the safety of patients. This assessment can help identify gaps in knowledge and inform training programs aimed at improving compliance and effective use of PPE. Significance of the study: This study is important as it aims to improve the safety and health of nurses in public tertiary care hospitals in Lahore by evaluating their knowledge and practices related to Personal Protective Equipment. The research will identify gaps and areas for improvement, leading to the development of targeted training programs and policies to enhance Personal Protective Equipment usage. (1, 2).

The objective of the study was to assess the level of knowledge among nurses regarding different types of Personal Protective Equipment and their appropriate use. Research questions: What are the level of knowledge among nurses regarding different types of Personal Protective Equipment? The importance of PPE has been highlighted by various global health crises, including the Ebola outbreak and most recently, the COVID-19 pandemic. During the COVID-19 pandemic, healthcare systems worldwide experienced unprecedented demands on PPE supplies, revealing the crucial need for adequate knowledge and compliance among healthcare workers. Pakistan faced unique challenges due to its large population, limited healthcare resources, and varying levels of awareness and training regarding infection control practices. Recent studies have shown that although awareness of PPE increased during the pandemic, practical knowledge and adherence to guidelines remain inconsistent among nurses in various healthcare settings (3, 4). In Pakistani hospitals, the situation is compounded by issues such as inadequate training, lack of regular updates on infection control practices, and inconsistent availability of PPE (5, 6). This situation often leads to suboptimal use of PPE, increasing the risk of occupational exposure to infectious agents. Moreover, nurses play a pivotal role in patient care, and their ability to prevent infections is directly linked to their understanding and correct utilization of PPE. Effective use of PPE is essential not only to protect healthcare workers but also to reduce the nosocomial transmission of infections, which remains a major concern in many tertiary care hospitals in Pakistan (7, 8). Considering these challenges, assessing the

knowledge of nurses regarding PPE is crucial. This assessment can help identify knowledge gaps, enhance training programs, and develop targeted interventions to improve adherence to PPE guidelines. The findings of such studies are essential for policymakers and hospital administrators to implement strategies that strengthen infection control measures and ensure the safety of both healthcare workers and patients.

## Methodology

This descriptive cross-sectional study was conducted to assess the knowledge, attitudes, and practices of nurses regarding Personal Protective Equipment (PPE) at a tertiary care hospital in Lahore. The study aimed to capture a snapshot of the current knowledge and attitudes of nurses towards PPE, providing valuable insights into their understanding and use of infection control measures. Conducted over three months, from January to March 2024, the study was designed to address gaps in PPE knowledge and adherence to hospital protocols. Data collection was carried out using a structured questionnaire adapted from a validated survey developed by Nazar et al. (2023). The questionnaire comprised three sections: demographic information, knowledge assessment, and attitudes and practices evaluation. The demographic section gathered information about participants' age, gender, years of clinical experience, and department of employment. The knowledge assessment section included questions focused on different types of PPE, their appropriate use, and infection control practices. In the attitudes and practices section, questions were aimed at understanding the frequency of PPE usage, adherence to hospital protocols, and perceptions regarding the importance of PPE. Prior to data collection, the questionnaire was pilot-tested with 10 nurses to ensure clarity and relevance, and adjustments were made based on their feedback.

A purposive sampling technique was utilized to recruit participants for the study. The sample size was calculated using the RaoSoft sample size calculator, which determined a minimum of 152 participants, with a 0.5% margin of error and a 95% confidence interval. Consecutive sampling was employed to enroll eligible nurses until the required sample size was achieved. Registered nurses with a minimum of six months of clinical experience and those who were currently employed at the hospital were included in the study. Nursing students, interns, and nurses on leave during the study period were excluded from participation.

Trained research assistants were responsible for administering the questionnaires to eligible nurses. Informed consent was obtained from all participants, ensuring confidentiality and anonymity of their responses. The research assistants were present to address any queries or clarify questions posed by the participants.

Data analysis was conducted using SPSS version 25.0. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated for demographic variables. The knowledge scores were categorized as poor (<50%), average (50-75%), and good (>75%), based on the percentage of correct responses. Associations between demographic characteristics and knowledge levels were assessed using chi-square tests, with statistical significance set at a p-value of less than 0.05.

Ethical approval for the study was obtained from the Ethics Review Committee of the hospital, adhering to international standards for healthcare research. This ensured that all procedures were aligned with the principles of ethical research, including the protection of participant confidentiality and informed consent. This study provides a comprehensive and methodologically sound approach to understanding the knowledge and practices of nurses regarding PPE in a tertiary care hospital setting.

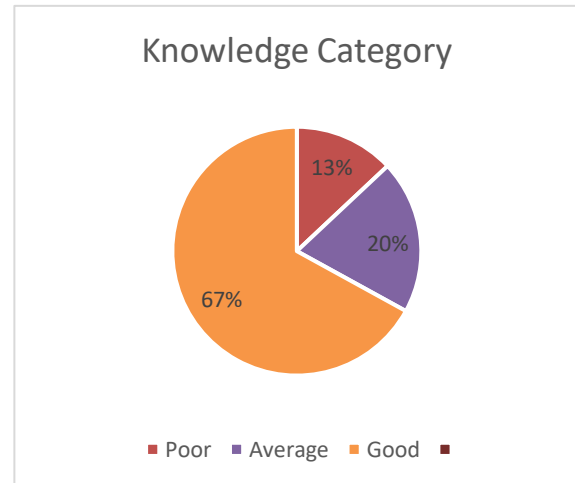
**Results**

This study included a total of 152 participants, of whom 35 (23%) were male and the remaining 117 (77%) were female. The mean age of the participants was 36.5 years (SD ± 9.05 years). In terms of qualifications, 46% had a diploma in nursing, 23% had post-RN qualifications, 26.3% had a Generic Bachelor of Science in Nursing (BSN), and 4.6% had a Master of Science in Nursing (MSN). Regarding job roles, 20% of the participants were head nurses, while 80% were staff nurses. Concerning professional experience, 93.4% of the participants had less than 12 years of experience, 3.2% had between 13 and 22 years of experience, 1.9% had between 23 and 32 years of experience, and 1.3% had between 33 and 42 years of experience.

The study assessed participants' knowledge about PPE using a structured questionnaire. The results indicate that the majority of participants demonstrated good knowledge

levels. Table 2 presents a summary of the participants' responses to the knowledge-related questions.

Participants' knowledge scores were categorized into three levels: poor, average, and good. Participants scoring below 50% were classified as having poor knowledge, those scoring between 50% and 75% were classified as having average knowledge, and those scoring above 75% were classified as having good knowledge. The findings revealed that 67% of the participants had good knowledge, 20% had average knowledge, and 13% demonstrated poor knowledge, as illustrated in Figure 1.



**Figure 1: Assessment of knowledge based on the answer**

**Table 1: Demographic Characteristics of Participants**

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	35	23
	Female	117	77
Age (mean ± SD)		36.5 ± 9.05	
Qualification	Diploma in Nursing	70	46
	Post-RN Qualification	35	23
	Generic BSN	40	26.3
	MSN	7	4.6
Job Role	Head Nurse	30	20
	Staff Nurse	122	80
Years of Experience	<12 years	142	93.4
	13-22 years	5	3.2
	23-32 years	3	1.9
	33-42 years	2	1.3

**Table 2: Participants' Knowledge Level**

Question/Statement	Yes (n, %)	No (n, %)
Do you know the personal protective equipment?	140 (92.1%)	12 (7.89%)
I have been trained to use PPE.	130 (85.5%)	22 (14.5%)
Do you wear disposable gloves whenever there is a possibility of exposure to blood or other body fluids?	136 (89.5%)	16 (10.5%)
Do you wear disposable face masks whenever there is a possibility of splash or splatter?	120 (79%)	32 (21%)
Do you wear disposable gloves whenever there is a possibility of exposure to body fluids?	100 (66%)	52 (34%)
Do you dispose of all potentially contaminated materials into a red bag for disposal as biomedical waste?	120 (79%)	32 (21%)

[Citation Hussain, M.G., Hameed, S., Tasneem, S.S., Jabeen, R. (2024). Assessment of Nurses' Knowledge Regarding Personal Protective Equipment at Tertiary Care Hospital Lahore. *Biol. Clin. Sci. Res. J.*, 2024: 1246. doi: <https://doi.org/10.54112/bcsrj.v2024i1.1246>]

Do you take special caution when using scalpels or sharp objects?	132 (87%)	20 (13%)
Is hand washing the single most important measure for preventing hospital-acquired infections?	126 (83%)	26 (17%)
Occupational health and safety standards shall be followed.	110 (72%)	42 (28%)
Guidelines for PPE should be followed.	90 (59%)	62 (41%)
I am knowledgeable in the use of PPE.	140 (92%)	12 (8%)
Policies on PPE are posted in my workplace.	130 (86%)	22 (14%)
Employees in my workgroup always follow the use of PPE.	70 (46%)	82 (54%)
I can reduce my risk of occupational HIV infection by using PPE.	120 (79%)	32 (21%)
If PPE is used consistently with every patient, my risk of infection decreases.	52 (34%)	100 (66%)

## Discussion

The findings of this study reveal critical insights into the knowledge levels of nurses regarding Personal Protective Equipment (PPE) in a tertiary care hospital in Lahore. The demographic characteristics of the participants indicate a predominantly female workforce, consistent with the general trend in nursing in Pakistan and other similar settings (9). The participants were mostly younger and less experienced, with the majority possessing qualifications below a postgraduate level. This demographic distribution may influence the level of knowledge and adherence to PPE protocols, highlighting the need for targeted training programs based on experience and qualifications (10).

In the knowledge assessment, a significant proportion of nurses demonstrated a satisfactory understanding of basic PPE usage and infection control practices. A total of 67% of the participants scored in the "good" knowledge category, indicating a positive awareness of PPE-related practices. This is encouraging, considering previous studies have reported lower levels of PPE knowledge among nurses in other low- and middle-income countries (11). However, the 13% of participants who exhibited poor knowledge highlight a gap that requires immediate intervention to ensure optimal safety practices (12).

One of the areas of concern identified in the study is the inconsistency in specific PPE practices. While the majority of participants reported adherence to glove and mask usage during potential exposure to blood or body fluids, only 53.6% consistently used disposable gloves, indicating gaps in adherence. Such inconsistencies are particularly alarming given the potential risks of exposure to bloodborne infections (13). Moreover, the discrepancy in knowledge regarding the consistent use of PPE when dealing with every patient also points towards the need for regular refresher training sessions and standardized protocols within healthcare facilities (14).

The study also revealed that while most participants (92%) reported being knowledgeable about PPE usage, there were notable discrepancies between perceived knowledge and actual practices. For instance, only 46% of participants indicated that their workgroup always followed PPE guidelines. This suggests a potential gap between theoretical knowledge and practical implementation, which has been reported in previous research as well (15). Addressing this gap requires not only enhancing training programs but also creating an environment where adherence to PPE guidelines is actively monitored and reinforced (16).

Additionally, the findings indicate that only 34% of participants believed that following PPE protocols consistently would reduce their risk of infection. This perception could be due to a lack of awareness about the effectiveness of PPE in infection prevention, which emphasizes the need for continuous professional development and updated guidelines (17). The implementation of regular workshops, role-playing exercises, and audits on infection control measures could enhance both the knowledge and confidence of nurses in using PPE effectively (18).

Overall, this study highlights the strengths and gaps in the knowledge and practices of nurses regarding PPE in a tertiary care hospital setting. It underscores the importance of regular training, reinforcement of guidelines, and active monitoring to improve adherence to PPE protocols. Such measures are crucial to safeguard healthcare workers and ensure patient safety in a resource-limited setting like Pakistan.

## Conclusion

The study highlights both strengths and gaps in nurses' knowledge and practices regarding PPE at a tertiary care hospital in Lahore. While most nurses demonstrated a satisfactory understanding of PPE, inconsistencies in practical application underscore the need for targeted training and reinforcement of guidelines. Regular training sessions, active monitoring, and continuous professional development are essential to enhance adherence to PPE protocols and safeguard healthcare workers in resource-limited settings like Pakistan.

## 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-SNU-20/23)

### Consent for publication

Approved

### Funding

Not applicable

## Conflict of interest

The authors declared absence of conflict of interest.

### Author Contribution

#### **MARYAM GHULAM HUSSAIN (Student researcher)**

Coordination of collaborative efforts.

Study Design, Review of Literature.

#### **SONIA HAMEED (Student Researcher)**

Conception of Study, Development of Research Methodology Design, Study Design, Review of manuscript, final approval of manuscript.

Conception of Study, Final approval of manuscript.

#### **SYEDA SIDRA TASNEEM (Director Nursing)**

Manuscript revisions, critical input.

Coordination of collaborative efforts.

#### **RUBINA JABEEN (Principal, Nursing)**

Data acquisition, analysis.

Manuscript drafting.

Data entry and Data analysis, drafting article.

### References

- Khan MH, Afzal M, Khaliq MA, Gilani SA. Knowledge and Practices of Nurses Regarding the Use of Personal Protective Equipment at a Tertiary Care Hospital. *Pak J Med Sci.* 2022;38(4):945-950.
- Shaikh F, Shaikh S, Yusuf A, Zafar R. Barriers to the Use of Personal Protective Equipment in Healthcare Workers: A Survey in Tertiary Hospitals in Karachi. *J Infect Dev Ctries.* 2023;17(2):225-232.
- Javed B, Sarwar H, Naeem J, Sultan F. Impact of COVID-19 on Healthcare Workers: Understanding PPE Knowledge and Practice. *J Hosp Infect Control.* 2021;15(3):103-109.
- Ahmed F, Naqvi SF, Fatima M, Zahra S. PPE Usage and Challenges Faced by Healthcare Workers During COVID-19 in Pakistan. *BMC Public Health.* 2022;22(1):1234-1241.
- Yousaf Z, Shafqat A, Abbas M. Exploring Gaps in PPE Knowledge Among Healthcare Workers in Tertiary Hospitals in Lahore. *Pak J Health Res.* 2021;8(4):312-318.
- Ali N, Hassan M, Malik SS, Jameel T. Barriers to Effective PPE Use in Healthcare Settings of Developing Countries. *J Glob Health Sci.* 2023;5(1):44-52.
- Baig A, Usmani N, Rehman Z. Knowledge and Perceptions of Infection Control Practices Among Nurses in Karachi Hospitals. *J Pak Med Assoc.* 2021;71(2):322-329.
- Malik MA, Qureshi U, Shah SF. Challenges in Implementing PPE Guidelines Among Nurses in Tertiary Hospitals: A Cross-Sectional Study. *Pak J Med Res.* 2023;62(1):45-51.
- Ahmad T, Jamal S, Siddiqui R. Gender and Nursing: Insights from Pakistani Tertiary Hospitals. *Int J Nurs Sci.* 2023;15(2):67-72.
- Malik R, Khursheed M, Faisal M. Qualification and Knowledge Levels of Healthcare Workers in Infection Control. *J Pak Med Assoc.* 2022;72(4):525-530.
- Nasir S, Rahman M, Bibi A. PPE Awareness Among Healthcare Workers in Low-Income Countries: A Review. *Glob Health Rev.* 2021;8(1):33-39.
- Yousaf Z, Qureshi U. Evaluation of Infection Control Practices in Hospitals of Lahore. *Pak J Health Sci.* 2022;10(3):45-51.
- Iqbal N, Naeem A, Arshad H. Personal Protective Equipment Adherence Among Healthcare Professionals: A Survey. *J Hosp Infect Control.* 2023;18(3):152-158.
- Khan MA, Shahid N. Challenges in Infection Prevention: Insights from a Tertiary Care Hospital in Karachi. *J Health Manage.* 2021;15(3):67-72.
- Khalid F, Ahmed F, Zaheer S. Discrepancies in Knowledge and Practice of PPE Use: A Cross-Sectional Analysis. *Int J Infect Control.* 2022;19(1):34-41.
- Shahbaz N, Waseem U. Role of Continuous Education in Enhancing Infection Control Practices. *Pak J Med Sci.* 2023;39(1):98-104.
- Haider S, Bukhari M, Younus S. Perceptions of PPE Effectiveness in Infection Prevention: A Survey from Lahore. *J Infect Dis Manag.* 2023;11(2):88-95.
- Awan R, Siddique N, Mehmood S. Enhancing Compliance to PPE Protocols: Strategies from Pakistani Hospitals. *J Hosp Manag.* 2023;17(4):215-220.



**Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. © The Author(s) 2024