

Knowledge and Practice Gaps in the use of Personal Protective Equipment among Nurses in Islamabad: A Cross-Sectional Study

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Abstract

Background: Personal protective equipment (PPE) is an essential component of standard precautions and is central to reducing occupational exposure and healthcare-associated infection risks in clinical settings. Nurses are frequently exposed to blood, body fluids, respiratory secretions, and invasive procedures; therefore, their knowledge and consistent use of PPE directly affect patient and staff safety.

Objective: To assess nurses' knowledge and reported practices regarding the use of PPE in clinical practice in the Cardiology Ward of Pakistan Institute of Medical Sciences (PIMS), Islamabad, Pakistan.

Methods: A descriptive cross-sectional study was conducted from October 2023 to January 2024 among charge nurses and student nurses in the Cardiology Ward of PIMS Islamabad. A convenience sample of 30 participants completed a structured closed-ended questionnaire covering demographic variables and 17 items related to PPE training, use, indications, hand hygiene,

mask use, gloves, gowns, donning and doffing, and workplace policy. Data were summarized using descriptive statistics.

Results: Of the 30 participants, 16 (53.3%) were aged 20-25 years and 14 (46.7%) were older than 25 years. Most participants were BSN students or nurses (n=18,

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60.0%), followed by Post RN (n=9, 30.0%) and General Nursing (n=3, 10.0%). Only 33% reported formal PPE training, while 67% had not received training. Appropriate PPE use in moderate-risk situations was reported by 37%, and 47% identified PPE as a preventive measure against hospital-acquired infection. Hand hygiene before mask use and correct mask removal were each reported by 40%. Perceptions and practices related to gloves, gowns, and compulsory PPE use were inconsistent.

Conclusion: The findings indicate important knowledge and practice gaps regarding PPE among nurses in a tertiary-care cardiology ward. Structured training, clear institutional PPE policies, supervised practice, and continuous monitoring are recommended to improve adherence and strengthen infection prevention.

Introduction

Personal protective equipment (PPE) refers to specialized clothing or equipment worn by healthcare workers to protect themselves and others from infectious materials and occupational hazards. In clinical practice, PPE includes gloves, surgical masks, gowns, goggles, face shields, and other protective items used according to the expected route and level of exposure.

Nurses are a central component of the healthcare system and frequently provide direct patient care in settings where contact with blood, body fluids, respiratory secretions, and contaminated surfaces can occur. Correct PPE selection, donning, use, doffing, and disposal are therefore essential for protecting nurses, patients, colleagues, and the general public from the spread of infection.

Healthcare-associated infections remain a major challenge for hospitals, particularly in resource-limited settings where training, supervision, supplies, and standardization of infection prevention practices may be inconsistent. PPE is not a replacement for other standard precautions such as hand hygiene, environmental cleaning, and safe waste disposal; rather, it is one part of a broader infection prevention system.

Despite the recognized importance of PPE, gaps may exist between knowledge and practice. Some healthcare workers may underestimate the importance of PPE, perceive it as uncomfortable or time-consuming, or lack clear training on which PPE is required in specific clinical situations. In the Cardiology Ward of PIMS Islamabad, preliminary observations suggested average knowledge, lack of structured training, and variable adherence to PPE practices among nurses. This study was therefore conducted to assess nurses' knowledge and reported practices related to PPE use in clinical practice.

Literature Review

Previous studies have shown that nurses' knowledge and adherence to PPE are influenced by training, understanding of standard precautions, workplace safety culture, availability of PPE, and perceived risk. Morioka and colleagues [6] reported that insufficient knowledge of standard precautions was associated with reduced PPE adherence among nurses in Japanese tertiary-care hospitals. Similarly, studies from India, Saudi Arabia, Nigeria, Palestine, and Pakistan have emphasized the need for ongoing infection prevention education and practical demonstrations for healthcare workers.

Kajagar and Degavi [5] reported that the majority of nurses in a public hospital in Belagavi, Karnataka had good knowledge and acceptable practice regarding PPE; however, other studies have identified gaps in compliance and practice even when knowledge is present. Evidence from healthcare settings suggests that PPE training should not only provide theoretical knowledge but also include hands-on demonstrations, role modeling, feedback, and periodic monitoring.

The available literature supports the need for local assessment because PPE knowledge and practice vary across hospitals, departments, and categories of

healthcare workers. Data from single clinical units can help nursing administrators identify immediate training needs and create targeted interventions.

Study Aim and Objectives

The aim of this study was to improve understanding of nurses' knowledge and reported practices regarding PPE use in clinical practice. The specific objective was to assess the knowledge of nurses regarding the use of personal protective equipment in the Cardiology Ward of PIMS Hospital Islamabad.

Research Questions

This study was guided by two research questions: (1) Why is personal protective equipment important at all times in the workplace? and (2) What is the current level of knowledge regarding personal protective equipment among nurses?

Methods

Study Design

A descriptive cross-sectional study design was used.

Study Setting

The study was conducted in the Cardiology Ward of Pakistan Institute of Medical Sciences (PIMS) Hospital, Islamabad, Pakistan.

Study Duration

The study was conducted from October 2023 to January 2024.

Study Population and Sample

The target population comprised charge nurses and student nurses working or training in the Cardiology Ward of PIMS Hospital Islamabad. A convenience sampling technique was used. The final sample included 30 participants.

Eligibility Criteria

Participants were eligible if they were student nurses or charge nurses present at the time of data collection, willing to participate, and provided informed consent. Nurses with General Nursing, Post RN, or BSN educational backgrounds were included. Participants were excluded if they declined participation, were absent during data collection, or were nursing managers, doctors, or paramedical staff not directly involved in bedside clinical practice.

Data Collection Tool

Data were collected through a structured closed-ended questionnaire. The tool included demographic variables such as age, gender, and education, followed by 17 yes/no questions related to PPE training, appropriate use, prevention of hospital-acquired infection, use during exposure to blood and body fluids, hand hygiene, mask use, gloves, gowns, donning and doffing, and workplace policies.

Data Collection Procedure

After obtaining informed consent, the questionnaire was administered in a one-to-one setting. Participants were asked to complete the questionnaire, which took approximately 10-15 minutes. The questionnaire was coded before administration to maintain confidentiality.

Data Analysis

Data were analyzed using descriptive statistics. Frequencies and percentages were used to summarize demographic characteristics and responses to PPE-related items.

Because of the small sample size and descriptive purpose of the study, inferential statistical testing was not performed.

Ethical Considerations

Privacy and confidentiality were maintained throughout the study. Informed consent was obtained from participants, and participation was voluntary. Participants were informed that they could withdraw from the study at any time. A formal institutional ethics approval number was not reported in the source thesis and should be inserted before journal submission if available.

Results

A total of 30 charge nurses and student nurses participated in the study. Demographic data are summarized in Table 1. The source thesis listed gender as a demographic variable but did not provide gender frequencies; therefore, gender-disaggregated analysis could not be presented.

Table 1. Demographic characteristics of participants (n=30)

Characteristic	Category	n (%)
Age	20-25 years	16 (53.3)
Age	Above 25 years	14 (46.7)
Education	General Nursing	3 (10.0)
Education	Post RN	9 (30.0)
Education	BSN	18 (60.0)

Responses to the PPE-related questionnaire are summarized in Table 2. Overall, the results indicate limited formal training and inconsistent knowledge and reported practices regarding PPE. Only 33% of participants reported receiving formal PPE training or demonstration, while 67% reported no such training. Only 37% reported using appropriate PPE during moderate-risk procedures. Less than half of participants recognized PPE as a preventive measure against hospital-acquired infection, and only 40% reported hand hygiene before mask application and correct mask removal technique.

Table 2a. Responses to PPE-related knowledge and practice items (items 1-9)

No.	Questionnaire item	Yes (%)	No (%)
1	Received formal training or demonstration regarding use of PPE	33	67
2	Uses appropriate PPE when taking action with moderate risk	37	63
3	PPE is used for prevention of hospital-acquired infection	47	53
4	Staff and patients' visitors should use PPE when contact with blood, body fluids, or respiratory secretions is	40	60

	expected		
5	PPE is a wastage of time and money	50	50
6	One should clearly know about the PPE kit and its uses	43	57
7	PPE is compulsory for employees at the workplace	30	70
8	Use of PPE can create hazards such as heat stress, physical or psychological stress, impaired vision, mobility, or communication	70	30
9	Hand hygiene is the single most important measure for preventing hospital-acquired infection	47	53

Table 2b. Responses to PPE-related knowledge and practice items (items 10-17)

No.	Questionnaire item	Yes (%)	No (%)
10	Before putting on a mask, wash hands with alcohol-based hand rub and water	40	60
11	Remove mask from behind, discard immediately in a closed bin, then wash hands with alcohol-based hand rub and water	40	60
12	A surgical mask should be worn to protect the nose and mouth during invasive procedures	43	57
13	Wearing gloves protects hands from germs and helps reduce spread of germs	31	69
14	Gloves are necessary while cleaning wounds, applying dressing, or performing a surgical procedure	50	50

15	Double gloves can reduce the chance of cross-infection	37	63
16	Wearing a gown is necessary when entering a critical area	43	57
17	Wearing a gown during surgical procedure protects healthcare personnel from microorganisms, body fluids, and blood splash	53	47

The strongest area of concern was the lack of compulsory PPE policy reported by participants, with only 30% indicating that PPE was compulsory at the workplace. In addition, 50% of respondents considered PPE a wastage of time and money, suggesting unfavorable attitudes that may affect adherence. In contrast, 70% acknowledged that PPE itself can create occupational hazards, such as heat stress and impaired mobility or communication, indicating awareness of discomfort and barriers that may influence use.

Discussion

This study assessed knowledge and reported practices regarding PPE among nurses in the Cardiology Ward of PIMS Islamabad. The findings show substantial gaps in formal training, appropriate PPE use, recognition of PPE as an infection prevention measure, and correct practices related to hand hygiene, masks, gloves, and gowns. These findings are important because cardiology wards include procedures and patient-care activities where nurses may be exposed to blood, body fluids, respiratory secretions, and invasive devices.

Only one-third of participants reported receiving formal PPE training or demonstration. This finding is a major concern because PPE use is skills-based. Correct selection and use of PPE require practical training in risk assessment, donning and doffing, disposal, and integration with hand hygiene. The low training rate in the current study may explain the inconsistent responses across other PPE items.

The finding that only 37% reported appropriate PPE use during moderate-risk activities suggests a gap between expected clinical safety standards and reported practice. Similar concerns have been identified in studies examining standard precautions and infection control among nurses [3,7,10]. Morioka et al. [6] highlighted that lack of knowledge about standard precautions can reduce adherence to PPE, while other studies have emphasized that continuous education and practical demonstrations are necessary to improve compliance.

Less than half of the participants identified PPE as a method for preventing hospital-acquired infections. This is an important knowledge gap because PPE is a visible and practical part of infection prevention. However, PPE alone is not sufficient; it must be combined with hand hygiene, safe disposal, environmental cleaning, and standard precautions. The finding that only 47% identified hand hygiene as the single most important measure for preventing hospital-acquired infection also indicates the need to strengthen basic infection prevention education.

Attitudes toward PPE were mixed. Half of the respondents considered PPE a wastage of time and money. Such perceptions may reduce compliance, especially in busy

clinical settings. At the same time, 70% acknowledged that PPE can create hazards such as heat stress, impaired vision, reduced mobility, and communication difficulties. These barriers are real and should be addressed through proper fit, adequate supply, staff rotation, practical demonstrations, and supportive supervision rather than by avoiding PPE.

Responses related to gloves and gowns also reflected inconsistency. Only 31% reported that gloves protect hands from germs and reduce the spread of germs, while 50% agreed that gloves are necessary during wound cleaning, dressing, or surgical procedures. Similarly, only 43% agreed that wearing a gown is necessary when entering a critical area, although 53% agreed that gowns protect healthcare personnel during surgical procedures. These findings suggest that participants may understand PPE use in some specific situations but lack a consistent framework for deciding when PPE is required.

Compared with studies reporting higher knowledge and practice scores among nurses, the current study shows lower awareness and adherence. This difference may be related to the small sample size, department-specific environment, limited training opportunities, and absence of clearly enforced policy. Nevertheless, the results are useful for local quality improvement because they identify immediate areas for training and policy strengthening within the ward.

The findings support the need for a structured infection prevention intervention in the Cardiology Ward. Such an intervention should include formal PPE training, practical demonstrations, posters or quick-reference guides, competency checklists, regular audits, supervisor feedback, and adequate availability of PPE. Training should emphasize both the benefits and limitations of PPE, correct mask use, glove indications, gown use, and the importance of hand hygiene before and after PPE use.

Conclusion

This descriptive cross-sectional study found important knowledge and practice gaps related to PPE use among nurses in the Cardiology Ward of PIMS Islamabad. Most participants had not received formal PPE training, and many did not report appropriate PPE use in moderate-risk situations. Knowledge related to PPE as a preventive measure for hospital-acquired infection, hand hygiene, mask use, glove use, and gown use was inconsistent. Immediate training, clear institutional policy, supervised practice, and continuous monitoring are needed to improve PPE adherence and protect both healthcare workers and patients.

Recommendations

Implement immediate structured PPE training for all nurses, including demonstrations of donning, doffing, disposal, and hand hygiene.

Develop and display clear ward-level PPE protocols based on standard precautions and risk of exposure.

Conduct regular competency assessments and observational audits of PPE use.

Ensure continuous availability of PPE supplies in the ward.

Address negative attitudes by explaining the role of PPE in staff safety, patient safety, and infection prevention.

Assign infection prevention focal persons or senior nurses to supervise practice and provide feedback.

Repeat the study after training to evaluate improvement in knowledge and practice.

Limitations

This study had several limitations. First, the sample size was small and included only 30 participants. Second, the study was conducted in one ward of one hospital, which limits generalizability. Third, convenience sampling may have introduced selection bias. Fourth, the study used self-reported questionnaire responses, which may be

influenced by social desirability or recall bias. Fifth, gender frequencies and some raw count details were not available in the source thesis, limiting subgroup analysis. Future studies should include larger samples, multiple departments or hospitals, validated tools, and direct observation of PPE practice.

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