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EVALUATION OF KNOWLEDGE AND COMPLIANCE TO STANDARD PRECAUTIONS AMONG NURSING STUDENTS: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Standard precautions are essential in preventing healthcare-associated infections, yet compliance among nursing students often varies. Assessing their knowledge and practices is crucial for guiding educational and institutional interventions.

Objective: This study aimed to evaluate the knowledge and compliance with standard precautions among nursing students.

Methods: A cross-sectional study was conducted at the Lahore School of Nursing among 58 fifth-semester BSN students, selected from a population of 76 using Slovin's formula and convenient sampling. Data were collected using a validated questionnaire adapted from Getachew study which included 19rekated to knowledge and 17 Likert-scale items on compliance. Knowledge and compliance were categorized into levels, and data were analysed using SPSS version 22. Descriptive statistics summarized participant characteristics, while Pearson's correlation tested the association between knowledge and compliance ($p \leq 0.05$).

Results: The findings revealed that overall knowledge of standard precautions was relatively high, though gaps existed in specific areas such as nosocomial infections and hand hygiene. Compliance levels varied, with students demonstrating stronger adherence in some practices than others. A positive correlation was observed between knowledge and compliance, indicating that greater knowledge was associated with better adherence to standard precautions.

Conclusion: While nursing students showed good knowledge of standard precautions, compliance required strengthening, particularly in critical areas. Educational interventions focusing on practical demonstrations, continuous reinforcement, and role modelling by educators are recommended to improve adherence and ensure patient and nurse safety.

INTRODUCTION: A healthcare facility is o ne of the riskiest workplaces, as healthcare pro fessionals routinely encounter biological hazar ds during clinical practice, exposing them to microorganisms that may cause serious or eve n fatal infections (Salah et al., 2024). Nurses, who are directly involved in patient care, are p articularly vulnerable to these biological risks (Nankongnab et al., 2021). In hospital settings, such risks include direct contact with bodily f luids and sharp instruments, which can expose both patients and healthcare workers to blood -borne illnesses such as hepatitis B, hepatitis C, and HIV (Yavorovsky et al., 2020).

To ensure safe, high-quality care for patients and protect the occupational health of staff, effective risk management strategies must include infection prevention and control (IPC) (Organization, 2024). Beyond preventing avoidable infections, the implementation of IPC measures is also a legal and ethical obligation for safeguarding both patients and healthcare professionals (Elliott et al., 2023). A comprehensive and well-coordinated infection prevention and control program within healthcare facilities is therefore essential (Moghnieh et al., 2023).

Nursing students are also at risk of infection and injury due to possible accidental contamination during their clinical training and practice (Eyi & Eyi, 2020). By adhering to recommended precautions designed to minimize exposure to infectious materials whether from known or unexpected sources the risk of contracting occupational infections can be significantly reduced (Harland, 2024). The Centers for Disease Control and Prevention (CDC) developed standard precautions that are to be applied to all patients, regardless of their diagnosis or infection status, in order to prevent hospital-acquired infections (Hu et al., 2020).

Standard precautions involve hand hygiene, use of protective barriers, safe waste disposal, patient isolation based on transmission, and proper handling of sharps (Festa, 2025). Hand hygiene is the most crucial precaution, essential for preventing infections and protecting both patients and nurses (Hillier, 2020).

The risk of occupational hazards can be effectively reduced through consistent implementation and adherence to these precautions (Cunha et al., 2020). For example, maintaining proper hand hygiene alone can cut infection rates nearly in half. Conversely, neglecting standard measures, such as safe handling of sharps, greatly increases the likelihood of injuries and subsequent infections (Tsegaye Amlak et al., 2023).

Despite their importance, many studies have indicated that nurses often lack awareness of, or fail to consistently follow, standard precautions (Al-Faouri et al., 2021). Familiarity with these guidelines has been shown to strongly influence compliance levels (Alhumaid et al., 2021). Factors affecting adherence include personal attributes such as education and experience, as well as environmental conditions like availability of materials, equipment, and management oversight (Van Belle et al., 2024).

Improving compliance requires education, motivation, management support, and system-level changes. This study addresses gaps in nursing students' knowledge of standard precautions in Punjab, aiming to guide health authorities in developing interventions, provide baseline data, and enhance nursing education and practice.

Material and Methods: A cross-sectional study was carried out at the Lahore School of Nursing to assess 5th-semester BSN students' knowledge and compliance with standard precautions. Using Slovin's formula, 58 participants were selected from a population of 76 through convenient sampling. Data were collected over 1.5 months using a validated questionnaire adapted from Getachew which included 19 yes/no knowledge items and 17 Likert-scale compliance items (Getachew,

2022). Knowledge was categorized from poor to very good, while compliance was rated from very low to high. The study tool's validity and reliability were ensured through a pilot test before use. Data were entered and analyzed using SPSS version 22, with descriptive statistics applied to assess socio-demographics, knowledge, and compliance levels. Pearson's correlation coefficient was used to determine the relationship between knowledge and compliance, with statistical significance set at $p \leq 0.05$.

Results: These findings describe the distribution of respondents based on gender, age, and marital status, providing context for subsequent analyses of knowledge and compliance with standard precautions.

Table 1: Description of Demographic Characteristics

Characteristics	Category	Respondents	
		n	%
Gender	Male	20	34.5
	Female	38	65.5
Age in years	17-20	31	53.4
	21-23	27	46.4
Marital Status	Married/Engaged	9	15.5
	Unmarried	49	84.5

Table 1: presents the demographic characteristics of the respondents. The majority of the participants were female (65.5%), while males constituted 34.5%. In terms of age distribution, more than half of the respondents (53.4%) were between 17–20 years, whereas 46.4% fell within the 21–23 years category. Regarding marital status, a significant proportion of the respondents were unmarried (84.5%), with only 15.5% being married or engaged. This indicates that most participants were young, unmarried females in the sample.

Table 2: Knowledge Regarding Nosocomial Infections and Precautionary Standards

Statements	Response	n	%
Nosocomial infection			
Environment (air, water, surfaces) as major source	No	6	10.34
Advanced or very young age increases risk	Yes	47	81.03
Invasive procedures increase risk	Yes	51	91.07
Precaution standards			
Protect only the patients	No	53	91.38
Protect both patients and healthcare workers	Yes	58	100
Apply to all patients	Yes	49	84.48
Apply only to those in contact with body fluids	No	45	77.58

Table 2: shows that most respondents demonstrated good knowledge about nosocomial infections and precautionary standards. The majority recognized advanced or very young age (81.03%) and invasive procedures (91.07%) as major risk factors, while few (10.34%) considered the hospital environment as the main source. All respondents (100%) correctly identified that precautionary standards protect both patients and healthcare workers, with 84.48% acknowledging their application to all patients. Overall, the findings indicate strong awareness among respondents regarding infection risks and preventive measures.

Statements	Response	n	%
When is hand hygiene			

recommended?			
Before or after contact with a patient	No	29	50.00
Before and after contact with a patient	Yes	56	96.55
Between patient contacts	Yes	37	63.79
After removal of gloves	Yes	49	84.48
Use of gloves according to standard precautions			
For each procedure	No	6	10.34
When risk of contact with blood or body fluids	Yes	58	100
When there is a risk of a cut	Yes	57	98.27
When healthcare workers have a cutaneous lesion	Yes	54	93.10
When at risk of splashes or spray of blood/body fluids, healthcare workers must wear:			
Only mask	No	54	93.10
Only eye protection	No	56	96.55
Only a gown	No	55	94.83
Mask, goggles, and gown	Yes	57	98.27

Table 3: highlights respondents' knowledge regarding hand hygiene and standard precautions. Almost all (96.55%) correctly identified that hand hygiene is required both before and after patient contact, while 84.48% recognized its importance after glove removal, and 63.79% between patient contacts. Regarding glove use, all respondents (100%) acknowledged the need when in contact with blood or body fluids, with most also recognizing its necessity during risk of cuts (98.27%) and in cases of cutaneous lesions (93.10%). For protection against splashes, nearly all (98.27%) correctly identified the combined use of mask, goggles, and gown, while the majority rejected single protective measures. Overall, the findings suggest a high level of awareness about essential infection control practices.

Table 4: Overall, Knowledge of Student Nurses on Standard Precautions

Knowledge	Frequency (n=58)	Percentage (%)
Very Good (16 – 19)	25	43.10
Good (12 – 15)	27	46.55
Average (8 – 11)	5	8.62
Poor (0 – 7)	1	1.72
Average Score	**14.45**	100

Table 4: Summarizes the overall knowledge levels of student nurses regarding standard precautions. Nearly half of the respondents (46.55%) demonstrated good knowledge, while 43.10% showed very good knowledge. A smaller proportion had average knowledge (8.62%), and only 1.72% fell into the poor category. The average score was 14.45, indicating that most student nurses possessed a satisfactory to high level of understanding about standard precautions.

Table 5: Summary of Compliance of Standard Precautions

Components of Standard Precautions	Weighted Mean	Rank
Hand washing	3.49	4
Use of Gloves	3.40	5
Use of Masks	3.95	1
Use of Eye goggles	3.19	6
Use of Protective Suit	3.93	2
Proper disposal of used needles	3.57	3

Grand Mean	**3.59**	

Table 5 shows the standard precautions components. When the elements were grouped into the 6 components, an average was calculated for all the elements of each component for each respondent. The global averages were then calculated based on the respondents' average scores for each item. The data indicate that the use of the mask has the highest degree of compliance with a weighted average of 3.95 which is interpreted as "High compliance". On the other hand,
the use of glasses has the lowest degree of compliance with a weighted average of 3.19, which is interpreted as "average compliance".

Table 6: Relationship between the knowledge of nursing students and compliance with standard precautions

Variables	r-value	p-value
Knowledge and Compliance of Standard Precautions	0.51449	0.03
Significance level, a = 0.05		

Table 6 shows the relationship between the knowledge of nursing students and compliance with standard precautions. As seen in the table, the relationship between the knowledge of nursing staff and compliance with standard precautions has registered an r value of 0.51 with a calculated p-value of 0.03 which was lower than level of meaning of 0.05.

Discussions: This study explored the knowledge and degree of compliance with standard precautions among nursing students in a private nursing school. The findings revealed that student nurses demonstrated good awareness of standard precautions, aligning with the results of Kim and Park study reported higher knowledge levels among nursing students (Kim & Park, 2021). However, this contradicts the findings of Obed who observed that only 46.2% of student nurses had very good knowledge of standard precautions (Obed, 2020).

Similar to the present study, Kaushal and clement found that 90% of nurses were knowledgeable about standard precautions, suggesting that such awareness may be linked to structured educational programs (Kaushal & Clement, 2022). The inclusion of precautionary concepts in the Philippines' nursing curriculum could explain the strong knowledge levels observed in this study. This is consistent with Emekolom and colleagues, who emphasized that adequate knowledge is a critical factor influencing compliance with standard precautions, while lack of knowledge was identified as the primary barrier (Emekolom et al., 2024).

Contrary to these findings, Da'seh and colleagues reported that only 75.6% of nurses in a Brazilian hospital demonstrated adequate understanding of standard precautions (Da'seh et al., 2023). Similarly, Akinade & babatude observed that just half of the 1,444 nurses surveyed were aware of all standard precautionary measures (Akinade & Babatunde, 2021), while Mohammed and colleagues noted that 50% of health workers lacked awareness of universal precautions (Mohammed et al., 2024). Such disparities highlight the contextual differences in training, healthcare infrastructure, and institutional policies.

Notably, this study also revealed that knowledge of nosocomial infections was the lowest among the five components of standard precautions. Many students incorrectly identified the environment as the primary source of pathogens, overlooking patients as the main reservoir. This finding underscores the need to intensify classroom teaching on infection sources and transmission pathways, as reinforced by previous literature (Kafai et al., 2022).

Regarding compliance, the results indicated high adherence to standard precautionary

practices among students. This may be attributed to close supervision by faculty during clinical rotations and favorable student-to-faculty ratios, which allowed for effective monitoring. Ensuring compliance is critical, as poor application of standard precautions has been linked to increased healthcare-associated infections (Zeb & Ali, 2021). Nevertheless, these results differ from previous reports where compliance levels were lower, particularly in resource-constrained settings (Sharma & Cotton, 2023). Despite generally high compliance, the use of personal protective equipment (PPE) such as eye goggles remained low. This appears to be related to limited availability of PPE across clinical training sites. A similar observation was made by Fan and Colleagues, who reported poor use of eye shields, masks, and gowns among Chinese nurses (Fan et al., 2020), and by Anyinasong who noted that less than two-thirds of health workers wore gowns and gloves during surgical procedures (Anyinasong, 2022).

An important finding of this study is the lack of significant association between knowledge and compliance with standard precautions. This suggests that having theoretical knowledge does not necessarily guarantee its practical application. Ahmed and colleagues reported a positive correlation between knowledge and compliance, while other authors strongly argued that greater knowledge enhances adherence (Ahmed et al., 2020). The inconsistency in findings highlights a persistent gap between theory and practice. As suggested by multiple scholars, compliance is influenced by a combination of factors including availability of resources, institutional policies, staff supervision, and workplace culture, rather than knowledge alone.

In summary, this study contributes to the ongoing debate regarding the relationship between knowledge and compliance with standard precautions. While students demonstrated high knowledge and compliance, the weak correlation between the two highlights the need for multifaceted interventions that go beyond theoretical instruction (Manan et al., 2024). Structured training, adequate supply of PPE, supportive institutional policies, and continuous supervision are crucial in bridging the gap between knowledge and practice.

Conclusions: The study revealed that while students demonstrated a satisfactory level of knowledge regarding standard precautions, their understanding of nosocomial infections and hand hygiene practices was comparatively limited. Consequently, educational interventions should place greater emphasis on these critical areas. Incorporating practical teaching strategies such as demonstrations, reflective diaries, nursing care plans, and anecdotal records may facilitate better integration of theoretical knowledge into clinical practice.

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