Original Research Article

The Student Nurses Knowledge and Compliance with Standard Precautions to Prevent Hospital-Acquired Infections at Selected Institution, Kulgam

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Abstract: ***Background***: Hospital-acquired infections (HAIs) pose a major threat to patient safety and healthcare quality. Adherence to standard precautions is essential for infection prevention, particularly among nursing students who are frequently exposed to clinical risks during training. ***Objective***: This study aimed to assess the knowledge and compliance of nursing students with standard precautions for the prevention of HAIs at South Kashmir Paramedical and Nursing College, Kulgam, Jammu and Kashmir. ***Methods***: A descriptive cross-sectional study was conducted among 200 nursing students using a structured, self-administered questionnaire based on CDC guidelines. Data were analyzed using descriptive statistics and Pearson's correlation to evaluate the relationship between knowledge and compliance. ***Results***: The mean knowledge score was 5.2 ± 1.1 (out of 7), and the mean compliance score was 36.8 ± 5.4 (out of 45), indicating moderate to high levels of awareness and adherence. A statistically significant moderate positive correlation ($r = 0.42$, $p < 0.01$) was found between knowledge and compliance. ***Conclusion***: While students demonstrated satisfactory knowledge and compliance, gaps remain in translating knowledge into consistent clinical practice. Strengthening hands-on training, mentorship, and institutional support is recommended to enhance infection control outcomes.

Keywords: Hospital-Acquired Infections, Standard Precautions, Infection Prevention, Nursing Students, Compliance, Knowledge.

INTRODUCTION

Hospital-acquired infections (HAIs) remain one of the most pressing challenges in modern healthcare, significantly impacting patient safety and clinical outcomes. These infections, which develop during a patient's hospital stay and are unrelated to the primary reason for admission, can prolong hospitalization, increase treatment costs, and, in severe cases, result in patient mortality. The World Health Organization (WHO) has recognized HAIs as a global public health concern, affecting millions of patients annually—particularly in developing regions where infection control systems are often under-resourced [1].

To mitigate the risk of HAIs, healthcare professionals are required to follow standard precautions—core infection prevention and control (IPC) practices. These include proper hand hygiene, use of personal protective equipment (PPE), safe handling and disposal of sharps, respiratory hygiene, and effective cleaning of the patient care environment [2]. These practices are endorsed by global health authorities, including the Centers for Disease Control and Prevention (CDC), and aim to protect both healthcare workers and patients from cross-contamination and transmission of infectious diseases [3].

Among healthcare workers, nurses and nursing students are particularly at risk due to their frequent exposure to blood, body fluids, and contaminated surfaces during clinical training and practice. Given their direct involvement in patient

care, consistent adherence to standard precautions is essential. However, nursing students often face challenges in applying these precautions effectively. These challenges may include limited practical experience, inadequate clinical supervision, and uncertainty regarding proper infection control procedures [4, 5].

Previous studies have documented inconsistencies in nursing students' knowledge and compliance with standard precautions. While many students possess a theoretical understanding of these guidelines, this knowledge does not always translate into safe clinical practice. For instance, a study conducted in Ethiopia revealed that although most nursing students were aware of standard precautions, their implementation—particularly with respect to hand hygiene and PPE use—was inconsistent [6]. Similarly, Asmr and El-Didamony found that a significant proportion of Egyptian nursing students did not fully adhere to infection prevention protocols despite having moderate knowledge levels [7].

International research further underscores the persistent knowledge-practice gap. Gammon *et al*., highlighted barriers such as insufficient training, limited resources, and lack of positive role models as key contributors to non-compliance among both students and professionals [8]. In India, Agarwal *et al*., reported that students who received regular IPC training demonstrated higher compliance [9]. Additionally, studies by Sessa *et al*., and Kermode *et al*., emphasized the influence of cultural norms, institutional policies, and the availability of PPE on adherence levels in different healthcare settings [10, 11].

Given the essential role of nursing students in shaping the future healthcare workforce, it is imperative to assess their knowledge and compliance with standard precautions. This study aims to evaluate the understanding and implementation of IPC (infection prevention and control) measures among student nurses at South Kashmir Paramedical and Nursing College, Kulgam, Jammu and Kashmir. The findings will help identify educational gaps and inform strategies to enhance infection control training in nursing education programs.

MATERIAL AND METHODS

This study employed a descriptive, cross-sectional research design to assess the knowledge and compliance of student nurses with standard precautions for the prevention of hospital-acquired infections (HAIs). A cross-sectional approach was chosen because it enables the collection of data at a single point in time, making it suitable for evaluating current levels of awareness and practices among nursing students [12].

The research was conducted at South Kashmir Paramedical and Nursing College, located in Kulgam, Jammu and Kashmir. The target population consisted of nursing students enrolled in various years of their training programs. This group was selected due to their active participation in clinical rotations, during which adherence to standard precautions is critical. However, existing evidence suggests gaps in compliance during training [13].

A total of 200 student nurses participated in the study. A simple random sampling technique was used to select participants, ensuring that each student in the population had an equal chance of being included. Inclusion criteria comprised nursing students currently enrolled in diploma and undergraduate programs who had completed at least one clinical rotation. Students who were absent during data collection or declined to participate were excluded from the study.

Data were collected using a structured, self-administered questionnaire developed based on CDC guidelines on standard precautions and previously validated tools used in similar studies [14, 15]. The questionnaire consists of three sections:
- **Section A: Demographic Information** – Includes age, gender, year of study, program enrolled, prior training on infection control, and clinical rotation experience.
- **Section B: Knowledge on Standard Precautions** – Comprises 7 multiple-choice questions assessing the participants' understanding of standard precautions. Each correct response will be awarded 1 point; total score = 7.
- **Section C: Compliance with Standard Precautions** – Contains 9 statements measured using a 5-point Likert scale ranging from "Never (1)" to "Always (5)". Higher scores reflect better compliance, with a total score ranging from 9 to 45.

Before data collection, participants were briefed about the purpose and significance of the study. Informed consent was obtained, and the questionnaires were administered via an online survey created using Google Forms. Confidentiality and anonymity were strictly maintained throughout the study.

Statistical Analysis

Data from 200 nursing students were analyzed using IBM SPSS Statistics version 25. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were computed to summarize demographic variables as well as knowledge and compliance scores related to standard precautions. The relationship between knowledge and

compliance was assessed using Pearson's correlation coefficient (r). Statistical significance was established at a p-value < 0.05.

Ethical Considerations

This study was conducted in compliance with the ethical principles outlined in the Declaration of Helsinki (2013). Ethical approval was obtained from the Institutional Ethical Committee of South Kashmir Paramedical and Nursing College, Kulgam, Jammu and Kashmir prior to data collection. Informed consent was obtained from all participants prior to their participation in the survey, after providing a clear explanation of the study's objectives, procedures, and the voluntary nature of participation, including the right to withdraw at any stage without any repercussions. To ensure confidentiality, all data were anonymized using unique codes in place of personal identifiers and were used exclusively for research purposes. Participation was entirely voluntary, with no form of coercion or incentive offered during the recruitment process.

RESULTS

Table 1: Demographic Characteristics of Participants (N = 200)

Variable	Category	Frequency (N)	Percentage (%)
Age	< 20 years	50	25%
	20–22 years	88	44%
	23–25 years	44	22%
	> 25 years	18	9%
Gender	Female	136	68%
	Male	62	31%
	Other/Not specified	2	1%
Program & Year	B.Sc. Nursing 1st Year	48	24%
	B.Sc. Nursing 2nd Year	36	18%
	GNM 1st Year	50	25%
	GNM 2nd Year	30	15%
	GNM 3rd Year	36	18%
Infection Control Training	Yes	154	77%
	No	46	23%

Table 1 shows out of 200 student nurses, most participants (44%) were between the ages of 20 and 22 years, suggesting that the sample largely comprised students in the middle of their academic programs. Approximately 25% of the respondents were younger than 20 years, likely representing those in their first year of study. Another 22% were aged between 23 and 25 years, while only a small proportion (9%) were older than 25 years.

The gender distribution showed that the majority of participants were female (68%), followed by males (31%). A small fraction (1%) identified as another gender or preferred not to disclose their gender identity.

Participants were drawn from various levels and programs of nursing education. Of the total, 48 students (24%) were enrolled in the BSc Nursing 1st year program, and 36 students (18%) were in the BSc Nursing 2nd year. Among those enrolled in the General Nursing and Midwifery (GNM) program, 50 students (25%) were in the 1st year, 30 (15%) in the 2nd year, and 36 (18%) in the 3rd year.

When asked about previous exposure to infection control training, a significant majority (77%) of the students reported having received formal instruction or lectures on infection prevention and control measures. In contrast, 23% indicated they had not received any formal training in this area.

Table 2: Student Nurses' Responses to Knowledge Questionnaire on Standard Precautions (N = 200)

Q. No.	Knowledge Question	Correct Answer	Correct Response (N)	Correct (%)	Incorrect / Don't Know (N)	Incorrect (%)
1	Hand hygiene should be performed before and after patient contact.	Yes	182	91%	18	9%
2	Gloves must be worn for all patient contact.	No	154	77%	46	23%
3	Used needles should be recapped before disposal.	No	162	81%	38	19%
4	Standard precautions are used only for patients with infections.	No	148	74%	52	26%

Q. No.	Knowledge Question	Correct Answer	Correct Response (N)	Correct (%)	Incorrect / Don't Know (N)	Incorrect (%)
5	PPE includes gloves, gown, mask, and eye protection.	Yes	170	85%	30	15%
6	Standard precautions include safe handling of contaminated equipment.	Yes	160	80%	40	20%
7	Alcohol-based hand rub can replace handwashing in all situations.	No	146	73%	54	27%

Table 2: Shows the knowledge assessment included 7 key questions related to standard precautions. The overall results show that the majority of student nurses demonstrated good theoretical understanding, but there are still areas that require improvement.

1. High Performance Areas:
- Question 1: *"Hand hygiene should be performed before and after patient contact"* had a 91% correct response rate, indicating that this basic principle is well understood.
- Question 5: *"PPE includes gloves, gown, mask, and eye protection"* saw 85% correct answers, reflecting a solid understanding of essential protective equipment.
- Question 3: *"Used needles should be recapped before disposal"* had 81% correct answers, suggesting good knowledge of safe disposal practices.

These high scores indicate that foundational infection control concepts are well-integrated into the students' education.

2. Moderate to Low Performance Areas:
- Question 7: *"Alcohol-based hand rub can replace handwashing in all situations"* had only 73% correct responses. This shows a lack of clarity about when hand rub is appropriate and when soap and water are necessary (e.g., when hands are visibly soiled).
- Question 4: *"Standard precautions are used only for patients with infections"* was correctly answered by 74%, meaning 26% still misunderstand that standard precautions apply to all patients, not just those with known infections.
- Question 2: *"Gloves must be worn for all patient contact"* had 77% correct answers, indicating some confusion about when glove use is necessary.

Table 3: Student Nurses' Responses to Compliance Questionnaire on Standard Precautions (N = 200)

Q. No.	Compliance Statement	Always	Often	Sometimes	Rarely	Never	Mean Score
1	I wash my hands before and after patient contact.	128	40	20	8	4	4.4
2	I wear gloves when there is a risk of exposure to blood or body fluids.	120	46	20	10	4	4.3
3	I use face masks when necessary.	98	54	30	12	6	4.1
4	I dispose of used needles in sharps containers without recapping.	140	30	20	6	4	4.5
5	I clean and disinfect reusable equipment after each use.	110	48	24	12	6	4.2
6	I wear protective gowns/aprons during procedures that may cause splashes.	92	50	36	14	8	4.0
7	I report any needle-stick or sharp injuries to the concerned authority.	85	58	32	16	9	3.9
8	I avoid touching my face (mouth, eyes, nose) while working with patients.	102	48	30	14	6	4.1
9	I follow standard precautions with all patients regardless of diagnosis.	108	52	26	10	4	4.2

Table 3: Shows that the highest compliance was seen in safe needle disposal (Q4) and hand hygiene (Q1), with mean scores of 4.5 and 4.4, respectively. The lowest compliance was reported in injury reporting (Q7) with a mean score of 3.9, suggesting the need for awareness on reporting procedures. The overall mean compliance score (from all items) was approximately 36.8/45, indicating moderate to high compliance among most student nurses.

Table 4: Knowledge and Compliance with Standard Precautions among Student Nurses (N = 200)

Category	Level	Score Range	Number of Students (N)	Percentage (%)	Mean Score	Standard Deviation (SD)
Knowledge	High	6 – 7	84	42%	5.2	±1.1
	Moderate	4 – 5	92	46%		
	Low	0 – 3	24	12%		
Compliance	High	40 – 45	58	29%	36.8	±5.4
	Moderate	30 – 39	110	55%		
	Low	< 30	32	16%		

Table 4 shows the mean knowledge score was 5.2 ± 1.1, indicating that most students answered 4–6 questions correctly out of 7. The mean compliance score was 36.8 ± 5.4 out of 45, showing generally good but varied levels of adherence to standard precautions. The highest percentages of students fell in the moderate category for both knowledge (46%) and compliance (55%), suggesting a solid but improvable foundation.

Table 5: Pearson's Correlation between Knowledge and Compliance (N = 200)

Variables	Mean ± SD	Pearson's r	p-value	Interpretation
Knowledge Score	5.2 ± 1.1			
Compliance Score	36.8 ± 5.4	0.42	< 0.01	Moderate positive correlation (significant)

Table 5 shows that the Pearson's correlation coefficient (r = 0.42) indicates a moderate positive relationship between knowledge and compliance. The p-value (< 0.01) demonstrates that this correlation is statistically significant.

DISCUSSION

This study evaluated the knowledge and compliance of 200 nursing students at South Kashmir Paramedical and Nursing College, Kulgam, regarding standard precautions for the prevention of hospital-acquired infections (HAIs). The findings revealed a mean knowledge score of 5.2 ± 1.1 (out of 7), indicating a moderate to high level of theoretical understanding among participants. Similarly, the mean compliance score was 36.8 ± 5.4 (out of 45), suggesting a generally favorable level of adherence to infection prevention practices during clinical training.

A moderate positive correlation was observed between knowledge and compliance scores (r = 0.42, p < 0.01), implying that students with higher knowledge levels were more likely to demonstrate appropriate infection control practices. This supports the notion that educational interventions can influence safe clinical practice, although knowledge alone may not guarantee compliance.

The results of this study are in agreement with previous literature. Agarwal *et al*., (2022) reported that 41.7% of nursing students in India demonstrated high knowledge of infection control and that knowledge significantly influenced their level of compliance, particularly in practices such as hand hygiene and the use of personal protective equipment (PPE) [16]. Similarly, Sessa *et al*., (2011) found a positive correlation between knowledge and compliance among nursing students in Italy, emphasizing the need for structured and targeted infection control education in nursing programs [17].

Compared to earlier research by Kermode *et al*., (2005) in rural India, where healthcare workers exhibited low knowledge and poor compliance with standard precautions, the present study's relatively higher scores may reflect enhanced infection control training, increased curricular emphasis, and heightened awareness following the COVID-19 pandemic [18]. This global health crisis has likely contributed to greater sensitivity toward infection risks and preventive measures among health science students.

In terms of specific practices, the highest levels of compliance were reported in needle disposal (mean = 4.5) and hand hygiene (mean = 4.4), which are encouraging trends. Similar patterns were observed by Nofal *et al*., (2017) in Jordan, where students exhibited high adherence to sharps disposal protocols and handwashing [19]. However, compliance was lower in the reporting of injuries (mean = 3.9). This finding is consistent with observations made by Stein *et al*., (2003), who reported that underreporting of needlestick injuries was common due to fear of stigma, lack of knowledge about reporting procedures, or institutional barriers [20].

Despite the overall positive results, a subset of students demonstrated lower levels of knowledge and compliance, indicating disparities in educational exposure and practical training. Asmr *et al*., (2023) identified similar issues among nursing students in Egypt, where gaps in practical application and motivation were noted despite moderate knowledge levels [21].

The moderate correlation observed in this study aligns with findings by Gyamfi *et al*., (2017) in Ghana, where a positive but not perfect relationship was noted between knowledge and practice. Their study, like the current one, emphasized that while theoretical knowledge is essential, factors such as clinical supervision, workload, access to PPE, and institutional support significantly affect the translation of knowledge into consistent practice [22].

Overall, the findings highlight the need to strengthen infection control education through both theoretical instruction and hands-on training in skills lab and clinical area. Regular workshops, simulation-based learning, and improved mentorship during clinical rotations may help bridge the gap between knowledge and compliance, thereby enhancing patient and provider safety.

Implications for Practice
The study's findings point to the importance of reinforcing infection prevention education through both classroom instruction and hands-on clinical experiences. Nursing programs should place greater emphasis on practical training methods such as simulations, skill demonstrations, and supervised clinical activities that allow students to apply standard precautions effectively. Strengthening mentorship and supervision during clinical placements can further support students in developing consistent infection control practices. Additionally, creating a supportive environment where students feel comfortable reporting exposure incidents without fear of repercussions is essential. Ensuring that personal protective equipment and other infection control resources are readily accessible will also contribute to improved compliance and a safer clinical setting for both patients and healthcare providers.

Limitations
This study was limited to a single nursing institution in South Kashmir, which may restrict the generalizability of the findings to other regions or educational settings. Additionally, the reliance on self-reported questionnaires may have introduced social desirability bias, potentially affecting the accuracy of responses related to compliance with standard precautions. Future research should consider incorporating observational methods to validate self-reported practices and expanding the sample to include multiple institutions across diverse geographic areas to enhance the representativeness and robustness of the results.

CONCLUSION AND RECOMMENDATIONS
This study demonstrated that nursing students possessed a satisfactory level of knowledge and a moderate to high degree of compliance with standard precautions for infection prevention. While the results align with existing literature from both regional and international contexts, they also highlight areas in need of improvement, particularly in translating knowledge into consistent practice. Addressing these gaps requires a greater focus on experiential learning, regular reinforcement of infection control principles, and institutional support for safe clinical practices. Enhancing these elements within nursing education is essential to minimizing the risk of hospital-acquired infections and ensuring the safety of both patients and healthcare providers.

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