

Original Research Article

A cross sectional study to assess knowledge and self-expressed practices regarding universal precautions among nursing students

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Received: 16 November 2023

Revised: 10 January 2024

Accepted: 12 January 2024

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ABSTRACT

Background: Each year, 2 million healthcare workers (HCWs) are exposed to HBV, 9 million to HCV and 1 lakh 70 thousand to HIV. To reduce disease transmission, blood and body fluid precautions were recommended in 1983 by the United States Centre for Disease Control (CDC). Objective was to assess the knowledge and Self-Expressed Practices (SEPs) regarding universal precautions among B.Sc. Nursing (BSN) students and the association between knowledge and SEPs.

Methods: A descriptive approach and cross-sectional study design was used. A total of 200 students from BSN 1st year, 2nd year and 3rd years 60, 70 and 70, respectively, consented to participate in the study. Bio-data profile, a self-structured questionnaire to assess knowledge and a Likert scale to assess SEP.

Results: Only 2.9% of students of BSN 2nd year fall in the adequate knowledge category, whereas 56.67 % (n=60) students of 1st year, 71.5% (n=70) students of 2nd year, and 68.6% (n=70) students of 3rd year belonged to moderate knowledge category. 86.67% of students in BSN 1st year, 78.57% of students 2nd year and 68.57% of students 3rd year fall in the adequate SEPs category. Only BSN 3rd year students showed a significant association between knowledge and SEPs sum total score (p=0.02).

Conclusions: Maximum students had moderate knowledge, but SEPs were in an inadequate category. Students repeatedly receive training regarding universal precautions as they are the future of the health care system, and continuous surveillance of occupational hazards should be conducted to ensure safety and awareness among students and other Health Care Workers (HCWs).

Keywords: Nursing students, Self-expressed practices, Universal precautions

INTRODUCTION

In the realm of healthcare, the foundation of patient safety lies in the knowledge and adherence to universal precautions by healthcare professionals. Universal precautions, a set of infection control guidelines, were developed in response to the escalating risk of healthcare-associated infections (HAIs) and the potential exposure to

bloodborne pathogens. These guidelines serve as a comprehensive framework to safeguard healthcare workers, patients and the community at large from the transmission of infectious diseases. Globally, 3 million HCWs experienced percutaneous exposure to bloodborne pathogens. Each year, 2 million are exposed to HBV, 9 million to HCV and 1,70,000 to HIV. These injuries may result in HCV (15,000 cases/year), HBV (70,000 cases/year) and cases of HIV (1,000 cases/year).¹⁻⁴

Healthcare-associated infections are a significant public health concern, imposing considerable clinical and economic burdens on healthcare systems worldwide. The potential transmission of infectious diseases, such as HCV, HBV and HIV and various bacterial and viral infections, underscores the critical importance of universal precautions. In 1983, the CDC recommended blood and body fluid precautions for those who were suspected of blood and body fluid pathogens. But in 1987, they changed the term to universal precaution and used these precautions for all patients regardless of their infection status. CDC defined universal precautions as a set of infection control measures that presume all blood and certain body fluids are infectious, regardless of the patient's diagnosis.^{5,6} In 2007, WHO considered universal precautions as basic level precautions to protect HCWs from percutaneous injuries and to prevent nosocomial infection. The enlisted practices include proper hand hygiene, work practices (waste disposal, linen disposal, environment cleaning and patient care equipment), PPE (gloves, gown, face mask, goggles and face shield) and safe injection practices.

Among healthcare professionals, nursing students, as emerging healthcare professionals, represent a vital and dynamic segment of the workforce. They play an essential role in the direct care of patients and are at an increased risk of exposure to infectious materials during their clinical rotations and patient interactions. Their knowledge and adherence to universal precautions are integral in minimizing the risk of HAIs, thereby ensuring the safety of patients and the overall quality of care. The integration of universal precautions into their nursing practice is, therefore, fundamental to ensuring patient safety and preventing the spread of HAIs. This is particularly pertinent in light of the evolving landscape of healthcare, marked by emerging infectious diseases and the continual threat of pandemics.^{7,8}

To address this critical issue, research into the knowledge and practices of nursing students regarding universal precautions is essential. Evaluating the extent to which nursing students are aware of these precautions and the degree to which they implement them in their clinical practice is vital in enhancing patient safety and reducing the risk of HAIs.^{7,9,10}

Literature has shown that there is still inadequate knowledge and noncompliance with universal precautions among HCWs like doctors, nurses, technicians, nursing students etc. as there is noncompliance with use of personal protective devices, hand hygiene.^{8,11-14} Some studies have shown that this noncompliance is due to lack of resources, workload, busy schedule, emergencies, administrative workload etc. in the setting also.^{7,15-17} There is significant correlation between knowledge and practices regarding universal precautions among health care workers.^{14,18,19} This research article aims to provide a comprehensive assessment of the knowledge and practices of nursing students regarding universal

precautions. It identifies potential gaps in understanding, and sets the stage for an empirical investigation into nursing students' awareness and adherence to universal precautions. By shedding light on this critical aspect of nursing education and practice, this research contributes to the ongoing efforts to enhance patient safety, reduce the burden of HAIs, and promote best practices in healthcare settings.

METHODS

A descriptive approach and cross-sectional design were used to conduct this study at the National Institute of Nursing Education (NINE), PGIMER, to assess knowledge and SEPs of universal precautions among students pursuing B.Sc. Nursing (BSN) from January 2015 to June 2015. A total enumeration sampling technique was used.

Inclusion criteria

Students who were able to understand and write English and willing to participate in the study were included.

Exclusion criteria

Students in B.Sc. 4th year were excluded.

Permission from the Head of the Department (principal) and Ethical clearance were taken from NINE, PGIMER ethical committee. Informed consent was taken from each participant. At the time of data collection, a total of 273 BSN students were in the 1st, 2nd and 3rd years. Among 273, 200 BSN students gave consent and willingly participated in the study.

After an extensive literature review, tools were prepared and under the supervision of the experts in the area, i.e., nursing faculty, doctors and nursing officers. The tool consisted of a Bio-data profile, a self-structured questionnaire to assess knowledge and a 5-point Likert scale to assess SEPs. In the Biodata profile, data regarding age, marital status, current year of the degree, any training/ program/conference/workshop attended regarding universal precautions and any history of needle stick injury was gathered. In the knowledge questionnaire, data regarding universal precautions, needle stick injury, spill management, personal protective equipment and bio-medical waste management was collected in the form of 15 multiple-choice questions and eight dichotomous questions. Scores were 0-23, and total sum score was categorized in adequate, moderate and inadequate knowledge, i.e. 17-23, 11.5-16 and <11.5, respectively. SEPs were assessed by a self-structured 23-item questionnaire on a Likert scale in which adequate practices were scored five and bad practices were scored 1. So, the total sum of scores was 12-60 and categorized into adequate, moderate and inadequate SEPs, i.e., 45-60, 30-45 and <30, respectively. Statistical Package for Social Sciences (SPSS version 19) was used for data

analysis, and descriptive and inferential analysis was performed. Findings were interpreted and presented in the form of tables and graphs.

RESULTS

Table 1 depicts that 70 (35%), 70 (35%) and 60 (30%) belonged to BSN 1st year, BSN 2nd year and BSN 3rd year, respectively. 86 (43%), 111 (55.5%), and 3 (1.5%) were from the 17-19 years age group, 20-22 years age group and >22 years age group, respectively. Approximately half (53%) of the participants are from the Hindu religion.

Table 1: Biodata profile of the study participant (n=200).

Variables	F (%)
Age (years)	
17-19	86 (43)
20-22	111 (55.5)
>22	3 (1.5)
Current year of degree	
B.Sc. Nursing 1 st year	70 (35)
B.Sc. Nursing 2 nd year	70 (35)
B.Sc. Nursing 3 rd year	60 (30)
Academic qualification	
10+2	193 (96.5)
Graduate	7 (3.5)
Religion	
Hindu	106 (53)
Sikh	81 (40.5)
Christian	6 (3)
Muslim	2 (1)
Others	5 (2.5)

Table 2 represents those 61 (30.5%) participants who had attended the training/program/conference/workshop regarding universal precautions. Approximately one-fourth [56 (28%)] of the participants had a history of needle stick injuries, and among them, 16 (28.5%) only got themselves tested for HIV/HCV/HBV antigen and got medical attention.

Table 2: Previous experience of the study participants regarding universal precaution (n=200).

Variables	F (%)
Any training program/ training/ conference/ workshop attended regarding universal precautions	
Yes	61 (30.5)
No	139 (69.5)
Past history of needle stick injury	
Yes	56 (28)
No	144 (72)
If yes, then get tested for HIV/HBV/ HCV	
Yes	16 (28.5)
No	40 (71.5)

Table 3 represents the correct responses to the self-structured questionnaire of knowledge and their frequency with percentage. The majority of the participants had knowledge that universal precautions are for all (96.5%), HIV can't survive outside the human body (92%), and soiled linen with bodily fluid should be dipped in 1% hypochlorite solution (70%). Study participants had fair knowledge in the PPE domain of knowledge as there were the highest correct responses.

Table 4 shows the SEPs of study participants regarding universal precautions on the Likert scale and their frequency with percentage.

Table 3: Correct responses of the knowledge domain of universal precautions among study participants (n=200).

	Variables	F (%)
Universal precautions	Universal precautions are meant to protect all.	193 (96.5)
	While dealing with patients ensure their health status.	191 (95.5)
	HIV cannot survive outside the body.	184 (92)
	Universal precautions refer to method of infection control in which all human blood products, certain human body fluids as well as fresh tissues and cells of human origin are handled as if they are known to be infectious for HIV, HBV and other blood borne pathogens.	80 (40)
	Universal precautions and standard safety precautions are same.	72 (36)
	HBV can survive outside the body.	61 (30.5)
	In case of cut cover it with water proof bandage.	48 (24)
Disinfection	Soiled linen with bodily fluids should be dipped in 1% hypochlorite solution.	140 (70)
	1% hypochlorite solution comprises of 25ml in 75ml of water.	107 (53.5)
	In PGIMER, Chandigarh 4% hypochlorite solution is available.	60 (30)
	1% bleaching powder is made by mixing 1.6gm in 100 ml water.	8 (4)
PPE	Soiled linen with bodily fluids should be dipped in 1% hypochlorite solution.	140 (70)
	1% hypochlorite solution comprises of 25ml in 75ml of water.	107 (53.5)
	In PGIMER, Chandigarh 4% hypochlorite solution is available.	60 (30)
	1% bleaching powder is made by mixing 1.6gm in 100 ml water.	8 (4)

Continued.

Variables		F (%)
Needle stick injury	Prophylactic Treatment after needle stick injury is post- exposure prophylaxis.	171 (85.5)
	Rinse under running water after needle stick injury.	166 (83)
	Report immediately after needle stick injury at emergency department.	88 (44)
	In PGIMER, Chandigarh SMO of emergency department is informed about needle stick injury.	64 (32)
	After needle stick injury of HIV patient go for blood test within 6 months.	57 (28.5)
	After using needle should be burnt and disposed in puncture proof container.	17 (8.5)

Table 4: SEP of universal precautions among study participants (n=200).

Variables		Always f (%)	Usually F (%)	About half the time F (%)	Seldom F (%)	Never F (%)
Universal precaution	I practice Universal Precautions.	108 (54)	72 (36)	13 (6.5)	7 (3.5)	-
	I wash my hands before wearing and removing gloves. after	148 (74)	42 (21)	7 (3.5)	2 (1)	1 (2.5)
	I wash my hands after cleaning blood and bodily fluids even if I wore gloves	162 (81)	25 (12.5)	7 (3.5)	4 (2)	2 (1)
	I cover my cuts while dealing with the patient under precautions. Universal	166 (83)	27 (13.5)	2 (1)	4 (2)	1 (0.5)
PPE	Gloves are used while changing linen and body fluids.	151 (75.5)	29 (14.5)	11 (5.5)	8 (4)	1 (0.5)
	I reuse gloves after cleaning them with sterillium.	1 (0.5)	16 (8)	20 (10)	40 (20)	123 (61.5)
	I continuously change gloves instead of hand washing while dealing with different patients.	77 (38.5)	65 (32.5)	21 (10.5)	21 (10.5)	16 (8)
	I wear gloves, gown and mask while monitoring vital signs of the patient under Universal Precautions.	40 (20)	52 (26)	25 (12.5)	45 (22.5)	38 (19)
Needle stick injury	I dispose of needle after burning its tip after using it patient on under Universal Precautions.	172 (86)	15 (7.5)	4 (2)	3 (1.5)	6 (3)
	I recap the needle after use it on patient under precautions. Universal	15 (7.5)	12 (6)	14 (7)	29 (14.5)	130 (65)
	I discard the used needles under Precaution of patients Universal in the bucket kept near their bed.	159 (79.5)	23 (11.5)	3 (1.5)	7 (3.5)	8 (4)
	I disinfect the site after injury. needle stick	81 (40.5)	48 (24)	8 (4)	19 (9.5)	44 (22)

Table 5: Association between knowledge and SEPs regarding Universal precaution among study participants (n=200).

		Adequate SEPs	Moderate SEPs	Inadequate SEPs	χ^2 (df) p
BSN 1 st year	Adequate knowledge	-	-	-	1.381 (1) 0.239
	Moderate knowledge	32	3	-	
	Inadequate knowledge	21	5	-	
BSN 2 nd year	Adequate knowledge	1	1	-	4.79 (1) 0.09
	Moderate knowledge	42	8	-	
	Inadequate knowledge	11	7	-	
BSN 3 rd year	Adequate knowledge	-	-	-	5.13 (1) 0.02
	Moderate knowledge	37	11	-	
	Inadequate knowledge	11	11	-	

Table 5 shows the association between knowledge and SEPs of study participants, and only the BSN 3rd year group has shown a significant association between knowledge and SEPs, i.e., knowledge and SEPs are related to each other.

Figure 1 depicts the knowledge sum score in a bar diagram, which was categorized into adequate, moderate and inadequate knowledge, i.e., 17-23, 11.5-16 and <11.5 total sum score, respectively. Only two students from BSN 2nd year fell in the adequate knowledge category. 132 (66%) participants were in moderate knowledge category.

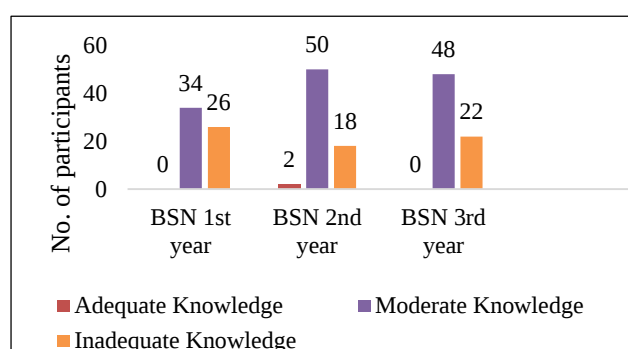


Figure 1: Graph depicting the total sum score of knowledge regarding universal precautions among study participants (n=200).

Figure 2 represents SEPs regarding universal precautions of study participants, which were categorized as adequate, moderate and inadequate SEPs as participants scored 45-60, 30-45 and <30 scores on the Likert scale. 77.5% of the total participants were in the good SEP category, and none fell in the inadequate SEP category.

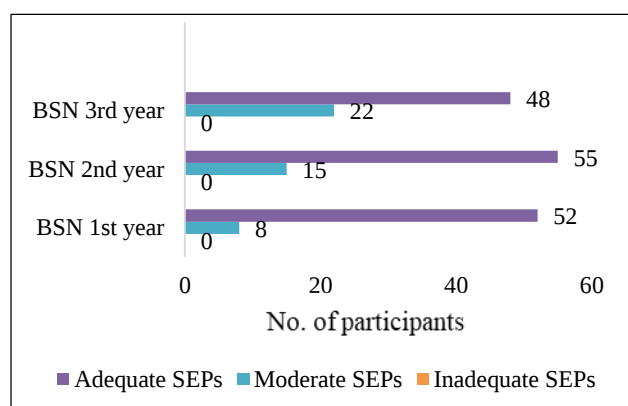


Figure 2: Graph depicting the total sum score of SEP regarding universal precautions among study participants (n=200).

DISCUSSION

Globally, about 3 million care workers experience percutaneous exposure to blood-borne pathogens each

year, with 2 million of these exposed to HBV, 0.9 million to HCV, and 1,70,000 to HIVs.¹⁻⁴

To reduce disease transmission, blood and body fluid precautions were recommended first in 1983 by the US Centre for Disease Control (CDC).^{5,6} So, for every medical personnel, knowledge of these guidelines plays a vital role, as well as practice of these precautions is equally important. A total of 200 subjects were enrolled in the current study, out of which students from BSN 1st year, 2nd year and 3rd year were 60, 70, 70 respectively.

A previously conducted study from Iran has shown that 80% of HCWs didn't receive any training on standard precautions, although 80% of the participants wanted to attend some training program on standard precautions.⁸ In the current study also, we found that 69% of the participants didn't receive any training program during data collection.

Manisha Gholap et al conducted a descriptive study to assess the knowledge and practices of Universal Precautions among the nursing students at HSK Hospital Bagalkot. They studied 50 subjects, which were selected by purposive sampling technique. The study revealed that 66% (33) of nursing students had an average knowledge, whereas 34% (17) students showed a satisfactory performance.²⁰ In the current study, it was found that out of 200 subjects, only 1% (2) had good knowledge, 66% (132) had average knowledge, and 33% (66) had poor knowledge regarding Universal precaution.

In another study by Karim et al, 220 students participated, and it was found that 60% (range 61.8-96.4) students had average knowledge and 38.2% (84) had poor knowledge regarding universal precautions, whereas the prevalence of poor practices was 27.7% (61). Grade point average was significantly associated with the knowledge level of the respondents; however, it was not significantly associated with the practice of universal 14 precautions.²¹

In the current study, it was found that the prevalence of good practice was 77.5% (155), and average practice was 22.5 % (45). This study also revealed that the practice of Universal precautions was inversely proportional to the study year, whereas, in the case of knowledge, it was found that students of BSN 2nd had more knowledge as compared to the knowledge of students of BSN 1st year and 3rd year.

A cross-sectional study was conducted at the University of Nigeria Teaching Hospital Enugu regarding knowledge and practices of universal precautions in tertiary health hospital facilities. Two hundred forty-six healthcare workers participated in the study. They found 50.6% (124) of respondents were aware of universal precautions. 35.8% (88) knew the correct definition of universal precautions. 13.8% (39) had received training on universal precautions.²² In the current study, 200 students participated, and 80 (40%) students knew the correct

definition of universal precautions. 61 (30.5%) students had received a training program on universal precautions.

In another study conducted by Saddique et al, it was found that in 282 subjects, 94% (265) of total subjects had a history of needle stick injury, and only 16.7% (47) were aware of their immune status after being pricked.²³ In the current study, 200 students participated, and it was found that 56 (28%) subjects of the total subjects experienced needle stick injury. Out of these, only 16 (8%) subjects were aware of their immune status after being pricked.

In the study conducted by Sharma et al, it was found that out of total subjects (n=322) who experienced needle stick injury 22.4% (72), 60.9% (43) washed site of injury with soap and water.¹³ In current study, it was found that 40.5% (81) subjects disinfected the site of injury.

In a cross-sectional study, conducted by Subramaniam et al it was found that out of total 40 subjects 12.5% (5) of students did not wash their hands before procedure.¹² In current study only 1.5% (3) students reported that they did not wash hands before and after removing gloves.

In another cross-sectional study, conducted by Sreedharan et al, 101 subjects were studied. Out of only 45.9% (46) agreed that universal precautions are aimed for both health care workers as well as patients.¹¹ In current study it was found that out of total 200 participants 96.5% (193) agreed that universal precautions are aimed at protection of both.

In a cross-sectional study conducted by Askaran et al, regarding knowledge, attitude and practices related to standard precautions. It was found that there was no significant co-relation between knowledge and practices.⁸ But some other studies have shown that better the knowledge regarding the universal precaution or standard precaution, there is better practices too.¹⁴ In current study, it has been found that there was also no significant co-relation between knowledge and practices regarding universal precautions.

Study was limited to cross sectional study design, limited to one setting, only BSN students were included and practices were self-expressed or self-reported. So, a multicentric and study with large sample size can be conducted to generalize the findings.

CONCLUSION

Nursing students should have knowledge regarding universal precautions because they attend many patients with unknown status for blood borne diseases. If they have knowledge then they will be able to perform task accurately and will not get infected.

Maximum students had moderate knowledge but their self-expressed practices were in adequate SEP category.

Most of them were unaware of preparation of disinfectants. Many BSN 1st year students had attended some educational program/conference/seminars on universal precaution. Probably that's why they showed maximum good response in case of knowledge. BSN 1st year scored highest in SEPs also. So, educational fairs, trainings, programs etc. should be organized to enhance the knowledge of nursing students that may help to decrease the prevalence of blood borne diseases and occupational hazard in the future and keep them updated on crucial area of their profession as they are the future of the health care system. Surveillance programs and awareness programs should be conducted on regular basis. Occupational hazard management team in a hospital can be appointed to ensure safety and instant medical attention in case of exposure and HAIs for better occupational health of HCWs.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee of National Institute of Nursing Education (NINE), PGIMER, Chandigarh, India

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Cite this article as: Khandelwal N, Negi P, Kaur P, Kaur P, Shruti, Nagi M. A cross sectional study to assess knowledge and self-expressed practices regarding universal precautions among nursing students. *Int J Community Med Public Health* 2024;11:823-9.