

Awareness and Practice of Standard Precautions for Infection Control among Student Nurses

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Date Received: 8 November 2019 Revised: 20 January 2020 Accepted: 2 February 2020

Abstract

Infection control knowledge is critical among healthcare providers. This study sought to determine the awareness and practice of standard precautions (handwashing, safe handling of needles and other sharp devices, and disposal of contaminated materials) for infection control among student nurses. Students ($N = 121$) were surveyed through purposive sampling. The awareness of the respondents was very high to excellent for practices involving handwashing along with proper handling and disposal of contaminated materials, with very good practice in the safe handling of sharps. There was a statistically significant positive relationship between awareness and practice in the handling and disposal of contaminated materials. However, no such relationship was shown with handwashing and safe handling of sharps. Year level and gender did not make any significant difference in safety practices. However, year level and gender were significant predictors of the practice of standard precautions for infection control in terms of safe handling of sharps, wherein students at higher training levels tended to have better practices. Awareness was a significant predictor of the practice of standard precautions involving proper handling and disposal of contaminated materials; the higher the awareness, the better was the practice. This study affirmed that awareness of standard precautions for infection control promoted better practice.

Keywords: *Standard precautions, awareness, infection control*

Introduction

Infection control should be observed by every nurse because non-compliance with standard precautions is associated with the spread of infection. According to Samson-Akpan and Bassey (2012), one of the major causes of morbidity in the clinical area is nosocomial infection. Healthcare-associated infections are grave problems in the healthcare sector that impose a great threat to patient safety (Hammoud, Ghazi, Nassredine, & Haidar, 2017). Nurses should have proper knowledge of infection control and should act according to standard precautions while giving care to patients. This provides an initial level of infection control. Previous studies have shown that student nurses can perform poorly when it comes to standard infection control, although they have good knowledge about the standard precautions (Barikani & Afaghi, 2012). Studies have been completed among staff nurses on practice and knowledge of standard precautions to control infection. However, there is dearth of literature and studies among nursing students.

The aim of the study was to determine the level of awareness and the extent of practice pertaining to standard precautions for infection control among nursing students, i.e., in terms of handwashing, safe handling of needles and other sharp devices, and proper handling and disposal of contaminated materials. Moreover, the relationship between awareness and infection control practice was investigated considering the year level of training and gender, as well as the predictors of infection control practices.

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This paper was presented at the 7th International Scholar's Conference held on October 28–29, 2019 at Universitas Advent Indonesia, and selected for publication in HBDS.

Literature Review

Awareness

Despite developments in health care systems, the risk of having hospital-acquired infection still exists. Nursing personnel possess a high risk of acquiring disease from patients and may possibly transmit infections to their patients. Having an awareness of standard precautions and practicing them has a vital role in preventing infection and reducing the risk of succumbing to hospital-acquired infections (Acharya, Khandekar, Sharma, Tilak, & Kataria, 2013; Kulkarni et al., 2016). Solutions to the growing problem of healthcare-associated infections and their impact on healthcare systems have relied greatly on infection control policies that have emphasized good hygiene. However, healthcare workers' must consistently follow these practices for the infection control strategies to be effective (Aboelela, Stone, & Larson, 2012). Nurses who have a high level of awareness regarding infection control tend to educate their patients and family members more about these practices compared to nurses with low awareness (Hammoud et al., 2017).

Iliyasu, Dayyab, Habib, Tiamiyu, Abubakar, Mijinyawa, and Habib (2016) argued that poor knowledge about the risk of transmission of blood borne pathogens meant under-estimation of the risk of transmission. This situation may put healthcare workers at risk of being infected with blood borne pathogens after exposure. Awareness is essential in health care and delivery systems, and helps the medical staff deliver care more effectively.

Practice of Standard Precaution for Infection Control

Standard precautions are a set of protocols for infection control practices. This set of protocols is used to prevent transmitting diseases that can be acquired by contact with non-intact skin and mucous membranes, blood, or body fluids. Even if the client or equipment/materials seem non-infectious, these infection control practice standards are needed in providing care to every individual (Wisconsin Department of Health Services, 2018).

Hamadah, Kharraz, Alshanqity, AlFawaz, Eshaq, and Abu-Zaid (2015) argued that the compliance of all healthcare workers with universal standards on precautions for infection control was an effective tool in controlling and also in preventing the occurrence of hospital-acquired infections. Following these control precautions protects patients and also healthcare workers. It is essential to implement these processes and procedures to safeguard patients, care providers, and facilities.

Infections developed in hospitals or healthcare facilities can affect people of any age. These infections can worsen existing or underlying health conditions of clients, can delay their recovery, and can affect the quality of life. Healthcare-associated infections can occur not only among sick clients, but even among healthy individuals. This means that healthcare workers and family members are also at risk of acquiring health care-associated infections when caring for people. High standards of infection prevention and keeping the environment clean can help reduce the risk of healthcare associated infections (Mehta et al., 2014).

Three indicators of practice of standard precautions for infection control are included in this study, namely: (a) hand washing, (b) safe handling of needles and other sharp devices, and (c) proper handling and disposal of contaminated materials.

Hand Washing

According to Hamadah et al. (2015), hand washing is the most essential precautionary tool in reduction of nosocomial healthcare associated infections. Also, the Wisconsin Department of Health Services (2018) stated that hand washing should be performed before and after every interaction and process done in a facility. Hand washing should be performed every time there is a contact with the client, immediately after touching body fluids and blood, contact with contaminated items, immediately after removing gloves, when moving from contaminated body sites to clean body sites during client care, and after touching objects and medical equipment in the immediate client-care vicinity.

The importance of proper hand hygiene must be given emphasis in health-related curricula and healthcare facilities because improper hand washing may lead to patient's morbidity and mortality. The higher and wider the level of knowledge and awareness that nurses have regarding hand washing standards, the more precautions will be observed, and the greater will be the reduction in health associated infection rates (Hamadah et al., 2015).

Safe Handling of Needles and Other Sharp Devices

To prevent health care workers from being exposed to blood borne pathogens, safe handling of needles and other sharp devices is necessary (Wisconsin Department of Health Services, 2018). The US Needle Stick Safety and Prevention Act (Foley & Leyden, 2000) ordered the use of sharp items with engineered safety features if suitable devices existed and were available. Due to outbreaks of hepatitis B and C infections, healthcare facilities should re-emphasize safe injection practices. All healthcare personnel who give injections should strictly follow the Centers for Disease Control and Prevention (CDCP) recommendations—whenever a medication vial or IV bag is being retrieved, new needles and syringes should be used, every injection given to a client requires new needles and syringes, and only one client should be treated per medication vial as much as possible (CDCP, 2017).

Sharps must be in a container that is rigid, puncture resistant, closable, and leak proof—with a label that says sharps—and with the biohazard symbol. Sharps must be used with extreme caution. The clipping, breaking, and recapping of needles is discouraged. Containers for sharps should not be filled more than two-thirds full. If a container is filled with sharps, it must be closed securely and destroyed as medical waste by incineration (Hraishawi & Naji, 2015).

Proper Handling and Disposal of Contaminated Materials

The World Health Organization (2018) defined infectious waste as a contaminated waste if it included blood, infectious agents, waste from patients who were isolated, diagnostic samples that were discarded because they contained blood and body fluids, other contaminated materials such as swabs and bandages, and equipment such as disposable medical devices.

According to Burton (2017), items that can be a threat to cleaners and people who are handling waste disposal includes syringes and needles, scalpel blades, bandages, bedding, soiled clothing and sanitary waste products. When personnel are working in an environment with high risks, like a healthcare setting, they should consider, act and think that everything being handled is infectious. According to the World Health Organization (2018), generally, 85% of waste involving health care settings is non-hazardous, but 15% of the waste is possibly infectious. This waste material may contain organisms that are harmful, and it may affect other patients, staff and the general public.

Methodology

This study utilized a quantitative descriptive-evaluative, descriptive-comparative, and descriptive-correlational research design.

Population and Sampling

Data were collected from 121 nursing students who were in their second, third and fourth years, selected through purposive sampling, from a nursing school in Cavite, Philippines. Out of the 121, 49 were males and 72 were females; 39 were in their second year, 39 were in their third year, and 43 were in their fourth year. Those who had clinical experience or practice aside from what is required in the nursing curriculum were excluded from the study.

Questionnaire

The survey questionnaire included three parts. The first part involved demographic profiles of the respondents. The second part consisted of questions on awareness of standard precautions for infection control adapted from the study of Samson-Akpan and Bassey (2012). Some items were modified on the basis of relatability to the target population and relevant literature. Each item was

scored on a five-point Likert scale (strongly disagree, disagree, neither agree nor disagree, agree and strongly agree). The final section contained questions to evaluate the practice of standard precautions for infection control that included handwashing, safe handling of needles and other sharp devices, and proper handling and disposal of contaminated materials. The questions were adapted from the study of Tufail, Afzal, Perveen, Waqas, and Gilani (2017), with some modifications to fit the respondents and related literature. Responses were measured using a five-point Likert scale (never, rarely, sometimes, most of the time, and always). The survey questionnaire was tested for reliability and content validation by five experts who were nurse educators and clinical practitioners who held masters and doctoral degrees in nursing.

Analysis of Data

The Statistical Package for Social Sciences (SPSS) Version 22 was used for analysis. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to describe the demographic profiles of respondents, the level of awareness, and the extent of practice. Pearson product-moment correlation was used to determine the relationship between awareness and practice of standard precautions for infection control. Analysis of variance was used to determine differences in practice when gender and year level were considered. Further, linear regression was used to determine the predictors of practice of standard precautions for infection control.

Ethical Considerations

Approval was secured from the institution where the study was conducted, and from the institution's Ethics Review Committee. The students were given a detailed explanation about the nature and the purpose of the study. It was emphasized that participation was voluntary, and that participation in the study would have no influence on either their coursework grade or clinical requirements. Informed verbal consent was secured and all data sheets were kept confidential and anonymous.

Results

Level of Awareness on Standard Precautions for Infection Control

Table 1 shows that the level of awareness was Very High.

Table 1. Level of Awareness of the Respondents

Feature Investigated	Mean	SD	Qualitative Descriptor
Used needles and sharps should be disposed of in sharp containers.	4.84	0.59	Very High
Disinfection of instruments should be done after each contact with patients.	4.80	0.57	Very High
Gloves should be used to handle contaminated materials.	4.83	0.57	Very High
Needle injuries should be reported to authority.	4.70	0.65	Very High
Hands should be washed before and after procedures.	4.88	0.45	Very High
Hands should be washed before and after each patient care.	4.86	0.46	Very High
Precautionary measures prevent HIV/AIDS and Hepatitis B.	4.69	0.62	Very High
Awareness	4.80	0.45	Very High

Legend: 1.00–1.49 = Very Low, 1.50–2.49 = Low, 2.50–3.49 = Fair, 3.50–4.49 = High, 4.50–5.00 = Very High

Handwashing Awareness

Table 2 indicates that the practice of standard precautions for infection control in terms of handwashing had an overall mean score of 4.54, which was Excellent.

Table 2. Extent of Practice on Standard Precautions for Infection Control in Terms of Handwashing

Feature Investigated	Mean	SD	Qualitative Descriptor
I wash my hands before and after each procedure for 1 minute.	4.29	0.82	Very Good
I wash my hands with soap under running water.	4.64	0.72	Excellent
I wash my hands before and after donning of gloves.	4.60	0.69	Excellent
I wash my hands above the elbow.	3.93	1.08	Very Good
I wash my hands before and after invasive procedures.	4.87	0.39	Excellent
I wash my hands after touching patient's surroundings.	4.57	0.72	Excellent
I wash my hands when I come in contact with patient's blood, bloody fluids, and secretions.	4.91	0.29	Excellent
Handwashing	4.54	0.45	Excellent

Legend: 1.00–1.49 = Poor; 1.50–2.49 = Fair; 2.50–3.49 = Good; 3.50–4.49 = Very Good; 4.50–5.00 = Excellent

Safe Handling of Needles and Other Sharp Devices

Table 3 shows that the practice on standard precautions for infection control in terms of safe handling of needles and other sharp devices had an overall mean score of 3.91, which is interpreted as Very Good. Using new needles for each injection of a client received the highest score, while the lowest score was recorded for recapping needles before disposing of them. This practice received a score of 1.63 and was interpreted as fair.

Table 3. Extent of Practice in Terms of Safe Handling of Needles and Other Sharp Devices

Feature Investigated	Mean	SD	Qualitative Descriptor
I use a separate syringe for aspirating different vials.	4.80	0.52	Excellent
I recap needles before disposing of them.	1.63	1.15	Fair
I use a new needle for each injection of a client.	4.89	0.35	Excellent
I reuse syringes for the same client.	3.98	1.50	Very Good
I use the same needle for aspirating different vials.	3.76	1.61	Very Good
I use a separate needle for aspirating different vials.	4.39	1.15	Very Good
Sharps	3.91	0.56	Very Good

Legend: 1.00–1.49 = Poor; 1.50–2.49 = Fair; 2.50–3.49 = Good; 3.50–4.49 = Very Good; 4.50–5.00 = Excellent

Proper Handling and Disposal of Contaminated Materials

Table 4 (please see following page) shows that the practice on standard precautions for infection control in terms of proper handling and disposal of contaminated materials was Excellent, with an overall mean score of 4.85.

Table 4. Extent of Practice in Terms of Proper Handling and Disposal of Contaminated Materials

Feature Investigated	Mean	SD	Qualitative Descriptor
I wear gloves when handling soiled linens and clothing.	4.70	0.67	Excellent
I dispose of the following in a designated bin for infectious waste material:			
a. Used dressings	4.94	0.23	Excellent
b. Used gloves	4.93	0.28	Excellent
c. Used masks	4.87	0.46	Excellent
d. Used needles	4.78	0.83	Excellent
e. Used syringes	4.88	0.55	Excellent
Disposal	4.85	0.32	Excellent

Legend: 1.00–1.49 = Poor; 1.50–2.49 = Fair; 2.50–3.49 = Good; 3.50–4.49 = Very Good; 4.50–5.00 = Excellent

Awareness and Practice on Standard Precautions for Infection Control

Table 5 figures show that there was no significant relationship between awareness and practice on standard precautions for infection control among student nurses in terms of handwashing and safe handling of needles and other sharp devices. However, there was a significant relationship ($r = .18$; $p \leq .05$) between awareness and practice in terms of proper handling and disposal of contaminated materials.

Table 5. Relationship between Awareness and Practice on Standard Precautions for Infection Control

Feature Investigated	<i>r</i>	<i>p</i>	Qualitative Descriptor
Handwashing	.14	.115	Not Significant
Sharps	.02	.796	Not Significant
Disposal	.18	.044	Significant

Precautions for Infection Control Influenced by Year Level and Gender

There were no significant differences in the practice of standard precautions for infection control among student nurses when year level was considered. Trends suggested that differences might be observed among the years in a larger study. When gender was considered, there also were no significant differences in the practice of standard precautions for infection control among student nurses regarding handwashing, safe handling of needles and other sharp devices, and proper handling and disposal of contaminated materials.

Predictors for Safe Practices

Among the variables (Awareness, Year Level, Gender), there was no predictor of standard precautions for infection control in terms of handwashing. Year level and gender were significant predictors of safe handling of needles and other sharp devices (Table 6). Together they explained 6.8% of the variance in practices on needles and sharps, of which 3.4% can be explained by each variable.

Table 6. Predictors on Practice in Terms of Safe Handling of Needles and other Sharp Devices

Predictors	<i>R</i> ² Change	UC		SC		<i>p</i>
		<i>B</i>	<i>SE</i>	β	<i>t</i>	
(Constant)		3.24	.24		13.67	.000
Year Level	.034	0.16	.06	.229	2.51	.013
Gender	.034	0.22	.11	.190	2.08	.040

$R = .26$, $R^2 = .07$, $F = 4.33$, $p = .015$

Equation for Practice on Needles and Sharps = $3.24 + .16\text{Year Level} + .22\text{Gender}$

Awareness was a predictor for proper handling and disposal of contaminated materials (Table 7).

Table 7. Predictors on Practice in Terms of Proper Handling and Disposal of Contaminated Materials

Predictors	R ² Change	UC		SC		t	p
		B	SE	β			
(Constant)		4.23	.31			13.69	.000
Awareness	.03	0.13	.06	.18		2.03	.044

R = .18, *F* = 4.13, *p* = .044

Equation for Practice on Proper Handling and Disposal of Contaminated Materials = 4.23 + .13Awareness

Discussion

The results revealed that nursing students studied were very aware of standard precautions for infection control. This may be due to the fact that the respondents were already exposed to clinical practice as required in the nursing curriculum, with the concepts previously learned in class. According to Hammoud et al. (2017), nurses who have high awareness of infection control tend to educate their patients and the family members about these practices. In addition, Iliyasu et al. (2016) mentioned that poor knowledge about transmission of blood-borne pathogens could increase these risks, which may put health care workers at risk of being infected with these pathogens following exposure.

Further, the results indicated that the respondents had excellent handwashing practice in the clinical area. This could be on account of the students being aware of the standard precautions for infection control through knowledge gained in class and in the clinical area. Handwashing is considered very important and one of the most effective and economical method to prevent infection. It is necessary for nurses and patients to wash hands to prevent the spread of microorganisms.

The results also revealed that the respondents displayed very good practices in terms of safe handling of needles and other sharp devices. The knowledge gained by students in the classroom may have contributed to this outcome. All healthcare personnel who give injections should strictly follow to the CDCP recommendations—safe injection practices, which include the following: use of a new needle and syringe every time a medication vial or IV bag is accessed, use of a new needle and syringe with each injection of a client, and use of medication vials for one client only (CDCP, 2017).

Moreover, the respondents had excellent practices in regards to proper handling and disposal of contaminated materials. This might also be an outcome of knowledge gained in class.

The results showed that there was no significant relationship between awareness and practices in terms of handwashing and safe handling of needles and other sharp devices. However, there was a significant relationship between awareness and practices in terms of proper handling and disposal of contaminated materials. Having the knowledge and awareness about standard precautions and practicing them plays a vital role in preventing infections (Acharya et al., 2013). The study by Lee, Park, and Jo (2017) on awareness and performance of standard precaution guidelines—designed to prevent medical-related infections—showed that awareness of infection control was positively correlated with performance of standard precautions.

Hamadah et al.'s (2015) study confirmed that compliance of healthcare workers to universally agreed standards on infection control precautions is an effective tool in controlling and preventing possible occurrence of hospital-acquired infections for patients and healthcare workers. Our results did not show differences among student training levels in the practice of handwashing, proper handling and disposal of contaminated materials, and safe handling and disposing of contaminated materials. This contrasts with the study done by Luo, He, Zhou, and Luo (2010). They showed that student nurses at higher levels of training had greater compliance than those who had received lower levels of exposure.

Year training level and gender were predictors of practices in safe handling of needles and other sharp devices. Further, females tended to have better practices than males. Suliman (2018) concurred that higher education can make a difference in patient safety in many situations. Nurses in

their final year naturally have undertaken more courses, been exposed to more concepts, and had more experience in infection control practices than those in the lower years.

Moreover, awareness is a predictor of proper handling and disposal of contaminated materials. Awareness positively influenced practices of handling and disposal, which implies that those with high awareness are more likely to have better handling and disposal practices. According to Mathur, Dwivedi, and Misra (2012), education is a critical element in the training of all health care workers. Emphasis should be given in training regarding biomedical waste management that will make an impact on practices of appropriate waste disposal. Furthermore, according to these authors, adequate knowledge about the health hazards of hospital waste, proper techniques and methods of handling the waste, and practice of safety measures would be a great help to protect healthcare workers and community members from various adverse effects of hazardous waste.

Conclusions

The study concluded that the nursing students under study were aware of and practice standard precautions for infection control in respect to handwashing, proper handling and disposal of contaminated materials, and safe handling of needles and other sharp devices. The higher the awareness of the students, the better their practical application of safety procedures. Females tended to have better habits of safe handling of needles and other sharp devices than males.

Limitations

Variables such as years of clinical practice, clinical area specialty, and clinical exposure may be explored in future studies in different nursing schools, and among registered nurses in the clinical area. Sampling different demographic profiles and the use a larger sample size would be beneficial. The survey tool used may not have been sufficient to measure the actual awareness and practice variables, because it was totally dependent on the honesty of respondents in answering the questions; thus, another tool might be tested in future investigations. A qualitative study also might be done to gain a deeper understanding of the phenomenon, and to explore what additional factors might contribute to better practice of infection control.

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