Original Article

A

Investigation of Knowledge, Attitudes, and Practice of Nursing, Midwifery, and Surgical Technology Students Regarding Standard Precautions and Self-Protection in the Clinical Setting

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Abstract

Background: Due to the nature of their academic field and clinical training, students of nursing, midwifery, and surgical technology are exposed to the risk of damages due to sharp instruments, blood, and body fluids. This study aimed to assess the knowledge, attitude, and practice of students of nursing, midwifery, and surgical technology about standard precautions and self-protection in the clinical settings.
Methods: This cross-sectional study was conducted at the Nursing and Midwifery School of Kashan University of Medical Sciences, 2018. A total of 300 students were selected through nonprobability quota sampling. A four-part questionnaire was used to collect the data on the students' characteristics, and their knowledge, attitude, and practice regarding the special safety percussions. The data were analyzed with descriptive statistics, Chi-square and Fisher's exact tests, analysis of variance, Pearson's correlation coefficient, and SPSS software version 16.
Results: No significant connection was found between the students' knowledge, attitudes, and practice and their demographic characteristics. Most students had a moderate level of knowledge about self-protection in the clinical setting. None of the students had good knowledge and compliance with safety principles. A significant correlation was found between knowledge and attitudes ($P = 0.01$, $r = 0.14$) and between attitudes and practice ($P = 0.00$, $r = 0.29$). No significant correlation was found between the students' knowledge and practice ($P = 0.52$, $r = 0.037$).
Conclusions: Acquisition of a moderate level of knowledge, attitudes, and practice indicates that the students were familiar with the concepts examined; nonetheless, this level may not suffice for appropriate and safe practice in the clinical setting.

Keywords: Attitude, evidence-based practice, knowledge, nursing, students, universal precautions

Introduction

Health care workers (HCWs) are exposed to damages due to sharp instruments, blood, and body fluids called blood-borne occupational diseases (BBODs).[1-3] Hepatitis B, C, and HIV infections are the most common blood-borne occupational injuries in developing countries.[1,2,4-6] A recent study in Iran reported that from a total of 298 HCWs, 38.3% had a history of injury from needles and sharp instruments in the past 6 months.[7] Due to the nature of their academic field and clinical training, students of nursing, midwifery, and surgical technology are exposed to the risk of BBODs.[8] The frequency of students' exposure to these infections is reported as 53.4% in Iran,[3] while its rate is ranging from 15% to 50.1% in other countries.[9-16] The great number of studies in this field indicates the importance of the issue.

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Although the risk of occupational exposure to BBODs can be diminished by strict compliance with standard precautions (SPs),[17] some studies have indicated that university students are noncompliant in this regard.[18,19] SPs are essential protective measures for managing infections, maintaining health, and reducing occupational hazards.[20] SPs include washing the hands, the use of protective barriers such as gloves, masks, gowns, and safety glasses; and management of sharp instruments.[17] Observing the SPs is a means of self-protection and serves as a factor in controlling nosocomial infections.[21] Students who do not adhere to SPs not only expose themselves to infection but also affect the patients' safety, negatively.[18] Some studies still attribute the students' noncompliance with SPs to the lack of knowledge on infection control and poor attitude toward SPs.[18,19] A review study also introduced insufficient knowledge as one of the most significant causes of the global prevalence of hospital-acquired infections.[21] Students' noncompliance with SPs imposes a heavy psycho-economic burden on the individual and the healthcare system.[8] Therefore, promoting the students and HCWs' knowledge and attitudes towards SPs is the cornerstone of their desirable performance and can halt the spread of damages induced by BBODs.[8,21,22] Despite the importance of the issue and the great number of articles in this field and among the HCWs, little attention has been paid to it by the students of nursing, midwifery, and surgical technology. Given the high frequency of students' exposure to occupational infections and also the necessity of application of SPs to reduce the exposure to hospital-acquired infections and diminish the costs imposed on the healthcare system, this study determined the knowledge, attitudes, and practice of students of nursing, midwifery, and surgical technology regarding compliance with universal SPs in the clinical setting in 2018.

Methods

Study design and population

This cross-sectional study was conducted on nursing, midwifery, and surgical technology students of the School of Nursing and Midwifery of Kashan University of Medical Sciences in 2018. All of the students had passed at least one academic semester and were under clinical training at the hospital.

To select the sample, the number of students of each academic major (nursing, midwifery, and surgical technology) was determined first. Then, the proportion needed for each major was calculated. To do so, first, a list of students of different majors was prepared by the education office and used as a framework for sampling. Then, the required number of students in each major was estimated and the participants were selected conveniently. The inclusion criteria were: passing at least one academic semester, being under clinical training at the hospital, availability of the students and inclination and consent for voluntary participation in the study. Furthermore, incomplete questionnaires were excluded from the study.

Considering the weekly timetable or syllabus of each major and semester, the breaks between classes were used to turn to students and give them the questionnaires to be completed along with some explanation about the completion method. As some of the students in the 7th and 8th semesters were undergoing clinical training at Shahid Beheshti Hospital in Kashan, a number of questionnaires were distributed there to be completed. The students were asked to respond to the questionnaire in a quiet peaceful environment and return it to the researcher during the next 24 h.

Sample size

The sample size was set at 270 using the results of an earlier study with $P = 0.27$[23] and $d = 0.05$; however, considering a possible attrition rate of 10%, the sample size was set at 300.

$$\left(n = \frac{Z_{1-\frac{\alpha}{\gamma}}^{\gamma} P(1-P)}{d^{\gamma}}\right)$$

The participants were selected through nonprobability quota sampling.

Instrument

The instrument consisted of two parts: the first section included demographics such as age, gender, academic major, marital status, accommodation status, immunity against hepatitis B, and passing the educational course of nosocomial infections control. The second section consisted of three separate subsections: (a) questions pertaining to knowledge including 26 items on "nature of infection, transmission method, the source of infection, infection factor, methods of preventing infection, and the role of nurses in infection prevention;" (b) Items pertaining to attitudes including 19 items on "nature of infection, transmission method, the source of infection, infection factor, methods of preventing infection, and the role of nurses in this regard;" (c) Items pertaining to practice including 15 items on health issues and prevention and control of nosocomial infections. All items were scored using a 5-point Liker scale including completely agree = 5, agree = 4, disagree = 3, completely disagree = 2, and indifferent = 1. The knowledge, attitude, and practice were scored separately in each section. The students who obtained <50% of the allocated points were rendered as weak, those who scored from between 50% and 74% were rendered as moderate, and those who scored 75% or more were rendered as good in knowledge, attitude, and practice. This inventory was developed by Abdollahi *et al*. and its validity was established using content validity method.[23] In this study, the reliability coefficient was estimated as $r = 0.90$ using the test-retest method with a 2-week interval.

Ethical considerations

The study proposal was approved by the Committee of Ethics in Human Research at Kashan University of Medical Sciences (Ethical code no.: IR.KAUMS.REC.1395.105). The research goals and procedures were elucidated to the participants and the students were assured about voluntary participation and information confidentiality and anonymity. The questionnaires were kept anonymous to observe the participants' information confidentiality.

Data analysis

The data were analyzed with SPSS software version 16 (SPSS Inc., Chicago, IL, USA). Descriptive statistics such as frequency, percentages, mean, and standard deviation were used to describe the data. Chi-square test, Fisher's exact test, analysis of variance, and Pearson's correlation coefficient were used to analyze the data. $P < 0.05$ were considered statistically significant.

Results

Most of the participating students were female (63.3%), single (73%), lived in the dormitory (54.3%), and were studying nursing (73.3%). Furthermore, 71% of the students had been vaccinated for hepatitis B and 71.3% had passed the course of the nosocomial infections [Table 1]. No significant connection was found between the students' knowledge, attitudes, and practice and variables such as age, gender, marital status, accommodation status, immunity against hepatitis B, and passing the infection control course. There was a significant correlation between students' attitudes and their academic semester; and between students' knowledge and practice and their academic major. However, no significant correlation was found between students' attitudes and their academic major.

Most of the students had a moderate or weak level of knowledge about self-protection in the clinical setting. None of the students had a good knowledge of compliance with safety principles in the clinical setting. A statistically significant difference was found between students' knowledge in various majors (i.e. nursing, midwifery, and surgical technology, $P = 0.001$). Nevertheless, no significant difference was found in the scores of attitudes among students of nursing, midwifery, and surgical technology ($P = 0.064$). Yet, there was a significant difference in practice among the students of different majors ($P = 0.021$) [Table 2].

Our findings demonstrated a significant positive correlation between knowledge and attitudes ($P = 0.01$, $r = 0.14$) and between attitudes and practice ($P = 0.00$, $r = 0.29$) of the students. Nonetheless, no significant correlation was found between the students' knowledge and practice ($P = 0.52$, $r = 0.037$).

Discussion

Our findings revealed that a majority of the students obtained a moderate score of knowledge on nosocomial infection control and SPs in the clinical setting. These results are consistent with the findings of the studies by Shinde and Mohite, and Khubrani *et al*.[24,25] However, the nursing students' score of knowledge was very lower in the two studies conducted in Jordan.[17,19] The authors of the above article attributed the students' low scores to lack of inclusion of the concept in the curriculum or not including the infection control course in the curriculum

Table 1: Frequency distribution of students' demographics and their correlation with their knowledge, attitudes, and practice

Variable	Frequency, *n* (%)	*P*		
		Practice	Attitude	Knowledge
Sex				
Female	190 (63.3)	0.87	0.07	0.7
Male	110 (36.7)			
Marital status				
Married	81 (27)	0.19	0.95	0.07
Single	219 (73)			
Academic major				
Nursing	220 (73.3)	0.19	0.95	0.07
Midwifery	51 (17)			
Surgical technology	29 (9.7)			
Educational year				
1st	40 (13.3)	0.15	0.008	0.003
2nd	70 (23.3)			
3rd	56 (18.7)			
4th	134 (44.7)			
Accommodation status				
Dormitory	163 (54.3)	0.27	0.51	0.14
Nondormitory	137 (45.7)			
Immunity against hepatits B				
Yes	213 (71)	0.29	0.39	0.27
No	87 (19)			
Passing the infection control course				
Yes	86 (28.7)	0.59	0.74	0.18
No	214 (71.3)			

Table 2: Frequency distribution of knowledge and attitudes among students regarding their self-protection

Students' major*	Knowledge		Attitude			Practice		
	Moderate	Weak	Good	Moderate	Weak	Good	Moderate	Weak
Nursing	147 (66.8)	73 (33.2)	19 (8.6)	149 (67.7)	52 (23.6)	4.33 (13)	190 (63.33)	17 (5.6)
Midwifery	43 (84.3)	8 (15.7)	4 (7.8)	43 (84.3)	4 (7.8)	10 (3.33)	37 (12.33)	4 (1.33)
Surgical technology	13 (44.8)	16 (55.2)	2 (6.9)	24 (8.28)	3 (10.3)	2 (0.66)	23 (7.66)	4 (1.33)
Total, *n* (%)	203 (67.66)	97 (32.33)	25 (8.33)	216 (72)	59 (19.66)	25 (8.33)	250 (83.33)	25 (8.33)
P	0.001			0.064			0.021	

*Data presented as, *n* (%)

of nursing in Jordan. However, the concept of infection control is contained in Iran's nursing curriculum. Khubrani *et al*. rendered education through the formal curriculum as the main source of information and the most effective means of increasing knowledge on infection control and SPs.[25] Although in the present study most of the students showed a moderate level of knowledge about infection control and SPs, no significant correlation was found between the students' knowledge and practice. Perhaps, as Darawad and Al-Hussami reported, students' knowledge of SPs is not a predictor of their proper practice in this regard.[18] Perhaps, the students' inappropriate and unsafe practice is a reflection of the HCWs' improper practice since the students mostly tend to simulate the clinical activities performed by the HCWs without having a good judgment of them. Such a manner exposes them to the risk of infection with blood-borne diseases.

Centers for Disease Control and Prevention emphasized that teaching of SPs ought to be performed as a regular program (e.g. annually) to maintain the staff's proper practice.[19] Therefore, any program should be aimed at holding infection control workshops periodically emphasizing both the theoretical and practical aspects of the issue for both nurses and nursing students. On the other hand, our finding along with other studies,[18,19] rings the bell for the nursing education system, and nursing instructors should use the pedagogic approaches such as mentorship and preceptorship in clinical training to shrink this gap and effectively inject the theoretical knowledge into the clinical setting.[26]

In the present study, attitude toward SPs was significantly correlated with safe compliance with it. This finding was consistent with what reported by a number of earlier studies that postulated that health care provider's positive attitude will lead them to greater adherence to infection control guidelines.[18,27,28] Hence, clinical educators should try to promote nursing, midwifery, and surgical technology students' attitudes toward safety practices in clinical settings.

Consistent with a number of previous studies,[8,27] the current study also showed a significant correlation between students' attitude and knowledge on SPs. The present study also showed that the scores of knowledge and practice were greater in nursing students compared to the students of midwifery and surgical technology. However, the scores of attitude were not significantly different among students of various majors. This finding was consistent with a number of earlier studies that compared the nursing and medicine and reported the superiority of nursing students' knowledge, attitude, and practice over that of medical students.[29-31] This superiority may be attributed to the greater emphasis of the issue in the nursing curriculum compared to other majors. The present study also showed a significant correlation between students' attitudes and their academic semester so that students who were in higher semesters possessed greater knowledge and attitude scores and had better practice in observing the SPs. Perhaps, senior students have more frequently exposed to SPs in their classrooms and clinical training which then positively affected their attitude and safe practice in clinical settings.[18,20,32]

Despite all attempts made to improve the external validity of the study, it suffered from some limitations, one of which was the participation of the students of only one university restraining the generalizability of the results to other settings. Finally, this study used a self-reported questionnaire to examine the students' and thus, enhancing the social desirability bias; hence, it is recommended that future studies use observational inventories.

Conclusions

Acquisition of a moderate level of knowledge, attitudes, and practice by the students indicates that the students have got familiar with the concept under study during their study years. Nonetheless, this level may not suffice for appropriate and safe practice in the clinical setting. Given the utmost significance of occupational exposure to blood-borne diseases and infections, the educational authorities are demanded to take some appropriate measures to promote students' knowledge and attitudes and facilitate the appropriate and safe culture of practice. Consequently, it is recommended to revise and operationalize the concept of SPs in the curriculums of nursing, midwifery, and surgical technology. Considering the significant correlation between the students' attitude and knowledge and also between their attitude and practice, it seems that training on SPs should be provided in a way as to change attitudes, ultimately leading to proper practice.

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Conflicts of interest

There are no conflicts of interest.

References

1. Abubakar S, Iliyasu G, Dayyab FM, Inuwa S, Tudun Wada RA, Sadiq NM, *et al.* Post-exposure prophylaxis following occupational exposure to HIV and hepatitis B: An analysis of a 12-year record in a Nigerian tertiary hospital. J Infect Prev 2018;19:184-9.
2. Lee JH, Cho J, Kim YJ, Im SH, Jang ES, Kim JW, *et al.* Occupational blood exposures in health care workers: Incidence, characteristics, and transmission of bloodborne pathogens in South Korea. BMC Public Health 2017;17:827.
3. Shokuhi Sh, Gachkar L, Alavi-Darazam I, Yuhanaee P, Sajadi M. Occupational exposure to blood and body fluids among health care workers in teaching hospitals in Tehran, Iran. Iran Red Crescent Med J 2012;14:402-7.
4. Kaweti G, Abegaz T. Prevalence of percutaneous injuries and associated factors among health care workers in Hawassa referral and adare District hospitals, Hawassa, Ethiopia, January 2014. BMC Public Health 2016;16:8.
5. Reda AA, Fisseha S, Mengistie B, Vandeweerd JM. Standard precautions: occupational exposure and behavior of health care workers in Ethiopia. PLoS One 2010;5:e14420.
6. Bhattarai S, K C S, Pradhan PM, Lama S, Rijal S. Hepatitis B vaccination status and needle-stick and sharps-related injuries among medical school students in Nepal: A cross-sectional study. BMC Res Notes 2014;7:774.
7. Adib-Hajbaghery M, Lotfi MS. Behavior of healthcare workers after injuries from sharp instruments. Trauma Mon 2013;18:75-80.
8. Mansour-Ghanaei R, Joukar F, Souti F, Atrkar-Roushan Z. Knowledge and attitude of medical science students toward hepatitis B and C infections. Int J Clin Exp Med 2013;6:197-205.
9. Unver V, Tastan S, Coskun H. The frequency and causes of occupational injuries among nursing students in Turkey. Arch Environ Occup Health 2012;67:72-7.
10. Yang YH, Wu MT, Ho CK, Chuang HY, Chen L, Yang CY, *et al.* Needlestick/sharps injuries among vocational school nursing students in southern Taiwan. Am J Infect Control 2004;32:431-5.
11. Tarantola A, Koumaré A, Rachline A, Sow PS, Diallo MB, Doumbia S, *et al*. A descriptive, retrospective study of 567 accidental blood exposures in healthcare workers in three West African countries. J Hosp Infect 2005;60:276-82.
12. Venier AG, Vincent A, L›heriteau F, Floret N, Senechal H, Abiteboul D, *et al.* Surveillance of occupational blood and body fluid exposures among French healthcare workers in 2004. Infect Control Hosp Epidemiol 2007;28:1196-201.
13. Yao WX, Yang B, Yao C, Bai PS, Qian YR, Huang CH, *et al.* Needlestick injuries among nursing students in China. Nurse Educ Today 2010;30:435-7.
14. Wang H, Fennie K, He G, Burgess J, Williams AB. A training programme for prevention of occupational exposure to bloodborne pathogens: Impact on knowledge, behaviour and incidence of needle stick injuries among student nurses in Changsha, People›s Republic of China. J Adv Nurs 2003;41:187-94.
15. Souza-Borges FR, Ribeiro LA, Oliveira LC. Occupational exposures to body fluids and behaviors regarding their prevention and post-exposure among medical and nursing students at a Brazilian public university. Rev Inst Med Trop Sao Paulo 2014;56:157-63.
16. Adib-Hajbaghery M, Lotfi MS. In reply to: Comments on behavior of healthcare workers after injuries from sharp instruments. Trauma Mon 2014;19:e17077.
17. Hassan ZM. Improving knowledge and compliance with infection control Standard Precautions among undergraduate nursing students in Jordan. Am J Infect Control 2018;46:297-302.
18. Darawad MW, Al-Hussami M. Jordanian nursing students› knowledge of, attitudes towards, and compliance with infection control precautions. Nurse Educ Today 2013;33:580-3.
19. AL-Rawajfah OM, Tubaishat A. Nursing students› knowledge and practices of standard precautions: A Jordanian web-based survey. Nurse Educ Today 2015;35:1175-80.
20. Xiong P, Zhang J, Wang X, Wu TL, Hall BJ. Effects of a mixed media education intervention program on increasing knowledge, attitude, and compliance with standard precautions among nursing students: A randomized controlled trial. Am J Infect Control 2017;45:389-95.
21. Nasiri A, Balouchi A, Rezaie-Keikhaie K, Bouya S, Sheyback M, Rawajfah OA. Knowledge, attitude, practice, and clinical recommendation toward infection control and prevention standards among nurses: A systematic review. Am J Infect Control 2019;47:827-833.
22. Hinkin J, Cutter J. How do university education and clinical experience influence pre-registration nursing students' infection control practice? A descriptive, cross sectional survey. Nurse Educ Today 2014;34:196-201.
23. Abdollahi A, Rahmani H, Behnampour N. Assessment of level of knowledge, attitude and practice of employed nurses to nosocomial infection in teaching hospitals of Golestan University of Medical Sciences (2000). J Gorgan Univ Med Sci 2003;5:80-6.
24. Shinde MB, Mohite VR. A study to assess knowledge, attitude and practices of five moments of hand hygiene among nursing staff and students at a tertiary care hospital at Karad. Int J Sci Res 2014;3:311-21.
25. Khubrani A, Albesher M, Alkahtani A, Alamri F, Alshamrani M, Masuadi E. Knowledge and information sources on standard precautions and infection control of health sciences students at King Saud bin Abdulaziz University for Health Sciences, Saudi Arabia, Riyadh. J Infect Public Health 2018;11:546-9.
26. McClure E, Black L. The role of the clinical preceptor: An integrative literature review. J Nurs Educ 2013;52:335-41.
27. Kim KM, Oh H. Clinical experiences as related to standard precautions compliance among nursing students: A focus group interview based on the theory of planned behavior. Asian Nurs Res (Korean Soc Nurs Sci) 2015;9:109-14.
28. Rahiman F, Chikte U, Hughes GD. Nursing students' knowledge, attitude and practices of infection prevention and control guidelines at a tertiary institution in the Western Cape: A cross sectional study. Nurse Educ Today 2018;69:20-5.
29. Askarian M, Shiraly R, Aramesh K, McLaws ML. Knowledge, attitude, and practices regarding contact precautions among Iranian physicians. Infect Control Hosp Epidemiol 2006;27:868-72.
30. van de Mortel TF, Apostolopoulou E, Petrikkos G. A comparison of the hand hygiene knowledge, beliefs, and practices of Greek nursing and medical students. Am J Infect Control 2010;38:75-7.
31. Nair SS, Hanumantappa R, Hiremath SG, Siraj MA, Raghunath P. Knowledge, attitude, and practice of hand hygiene among medical and nursing students at a Tertiary Health Care Centre in Raichur, India. ISRN Prev Med 2014;2014:608927.
32. Jeong MH. Survey of exposure to blood and body fluids, knowledge, awareness and performance on standard precautions of infection control in nursing students. J Korea Contents Assoc 2015;15:316-29.