



Status of knowledge on prevention and treatment of exposure to sharp objects among nursing students at Lang Son Medical College

Ho Thi Thu Hang¹, Nguyen Tuyet Thanh², Le Thi My Ngoc¹
¹Yesin University of Dalat, ²Lang Son Medical College

ABSTRACT

Objective: To describe the knowledge on prevention and treatment of exposure to sharp objects among nursing students at Lang Son Medical College. **Methods:** A cross-sectional descriptive study on 120 nursing students at Lang Son Medical College was conducted from January to July 2022. **Results:** 45% of nursing students demonstrated correct knowledge about preventing and treating exposure to sharp objects. Specifically, the percentage of correct knowledge about the causes and risks of injury from sharp objects was 29.2%; the percentage of correct knowledge of the possibility of exposure to hepatitis B and C was higher than that of HIV after being injured from sharp objects was 39.2%; the percentage of correct knowledge about injuries from sharp objects during patient care was 35.8%. **Conclusion:** The study found that the level of knowledge among nursing students at Lang Son Medical College regarding the prevention and management of exposure to sharp objects is moderate. It is essential to identify and address areas of limited knowledge to ensure that students are adequately prepared before undertaking clinical practice in healthcare settings.

Keywords: Knowledge, prevention and treatment of exposure, sharp objects

INTRODUCTION

Injuries from sharp objects are a prevalent health concern among nursing students in clinical practice. Studies indicate that a significant proportion of nursing students, ranging from 11% to 50%, have experienced infections related to sharp trauma during their undergraduate training ^{1, 2, 3}. These injuries can result in the blood-borne transmission of viruses such as human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV) to nursing students ⁴.

Meanwhile, students' knowledge of preventing and handling exposure to sharp objects is lacking. A substantial number of students, 85.9%, either have incomplete knowledge or are unaware of the post-exposure treatment steps, while 35.1% of students underestimate the harmful effects following exposure to pathogens ⁵. In a study conducted in China in 2018, 60.3% of nursing students experienced injuries from sharp objects, with needle injuries accounting for 59.9%, injuries from breaking medicine tubes at 21.9%, and traction-related injuries

at 3.4% ⁶. Similarly, research at Thai Binh School of Medicine and Pharmacy in Vietnam revealed that 89.9% of nursing students had been injured by sharp objects, with 90.3% of these students experiencing injuries 1-4 times and 9.7% more than 4 times. Students with incorrect knowledge and preventive practices had a 1.69 times higher rate of injury from sharp objects than those with correct knowledge ⁷.

At Lang Son Medical College, where 3-year college nursing students are trained, most clinical practice occurs in the 2nd and 3rd years. During the process of taking care of patients at the hospital, performing injections is a routine procedure that students do on patients, that students are at high risk of being exposed to sharp objects during injections and capable of being infected with HBV, HCV and HIV through sharp objects. Given these concerns, it is crucial to assess the current status of knowledge regarding the prevention and management of exposure to sharp objects among nursing students at Lang Son Medical College. Therefore, this study aims to describe the knowledge about prevention and treatment of exposure to sharp objects among nursing students at Lang Son Medical College in 2022.

RESEARCH SUBJECTS AND METHODS

Research participants: Nursing students at Lang Son Medical College

Inclusion criteria: Students have completed the following modules: Basic Nursing; Infection Control. Students voluntarily participate in the study.

Exclusion criteria: Students do not fully participate in any steps of the research process.

Research time and location: The study was conducted at Lang Son Medical College from January to July 2022.

Research design: Cross-sectional descriptive study.

Sampling method: Entire sample of 150 full-time nursing students at Lang Son Medical College. A pilot survey was conducted on 30 students, with a final sample size of 120 students meeting the criteria and agreeing to participate.

Survey toolkit

Measurements: Based on Ministry of Health infection control and safe injection guidelines in 2012 ^{8,9}, and WHO practice guidance in 2010 ¹⁰. After the questionnaire was developed, a pilot survey was conducted on 30 students at Lang Son Medical College who met the sampling criteria (this number of students did not include in the research sample size), confirmed reliability with a Cronbach's alpha coefficient of 0.885.

Assessment of nursing students' knowledge on preventing injuries from sharp objects:

- Knowledge measurement includes 22 questions: Knowledge about the causes and risks of injuries from sharp objects when performing techniques (1 item), Knowledge about diseases that can be transmitted through blood from sharp objects (3 items), Knowledge of safe handling with sharp objects (8 items), Knowledge of risk assessment of exposure to sharp objects (4 items), Knowledge of wound management and reporting after exposure to sharp objects (4 items), Knowledge about post-exposure prophylaxis with sharp objects (2 items). Maximum score for knowledge section: 39 points.

- Evaluate the level of knowledge about prevention and treatment of exposure to microbial infections of nursing students, based on the answers to questions in the investigation questionnaire, according to the scale to calculate points and evaluate whether the knowledge is correct or not. Correct knowledge if scoring 70% (28 points) or more ⁷.

- Data collection: direct interviews with students for about 20 minutes per student, followed the Training Department's

schedule at the lecture hall (10 students per 1 session).

Data analysis: Data cleaning, encryption, and analysis using SPSS 20.0 software. Variables presented in numbers and percentages

Ethical issues of research: The study was approved by the Ethics Council in Biomedical Research of Nam Dinh University of Nursing under number 784/GCN on April 4, 2022.

RESULTS

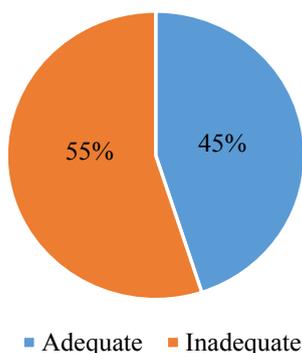


Figure 1. General knowledge about preventing and treating exposure to sharp objects of nursing students (n = 120)

There were 54 students with satisfactory knowledge on prevention and treatment of exposure to sharp objects, accounting for 45.0%; while 66 students had inadequate knowledge on preventing and handling exposure to sharp objects, accounting for 55%.

Table 1. Knowledge about causes and risks of injury from sharp objects technical implementation (n = 120)

Content	Correct answer	
	n	%
Close the needle cap before and after using	84	70.0
Transfer tools from hand to hand during the procedure	53	44.2
The patient's unexpected reaction	54	45.0
Urgency of operation	35	29.2
Lack of attention when operating	84	70.0
Not following the correct procedures	60	50.0
Adequate knowledge about the causes and risks of injury from sharp objects when performing techniques	49	40.8

The percentage of students who knew the causes and risks of injury from sharp objects when performing the needle cap operation before and after using, lack of attention when manipulating accounted for 70%. However, only 29.2% of students recognized the urgency of operations as a cause of sharp objects injuries. The percentage of students understood that moving instruments between hands, unexpected patient reactions, and not following correct procedure were 44.2%, 45.0%; and 50.0%, respectively. Overall knowledge regarding causes and risk of injuries from sharp objects during procedures at 40.8%.

Table 2. Knowledge about diseases that can be transmitted through blood by sharp objects (n = 120)

Content	Correct answer		
	n	%	
Diseases can be transmitted through sharp objects	Hepatitis B	102	85.0
	Hepatitis C	62	51.7
	HIV	102	85.0
Potential exposure to hepatitis B and C compared to HIV after sharp objects damage	47	39.2	
Infectious diseases have vaccines to prevent	73	58.4	
Adequate knowledge about diseases that can be transmitted through blood by sharp objects	66	55	

The percentage of knowledge about diseases that can be transmitted through blood by sharp objects was 55%. Notably, 85% of students correctly identify HIV and hepatitis. B as diseases transmittable through blood. However, only 39.2% of students were aware of the risks of hepatitis B and C compared to HIV after a sharp object injury. Furthermore, only 58.4% of students know that vaccines exist to prevent infectious diseases.

Table 3. Knowledge about safe handling of sharp objects (n = 120)

Content	Correct answer	
	n	%
Prevent injuries caused by sharp objects during patient care	43	35.8
Safe method of breaking medicine tubes	98	81.7
Safe method when moving sharp objects or giving sharp objects to someone else	62	49.6
Focus on operations	63	52.5
Do not put your hand in front of the needle	56	46.7
Ensure the patient's position when performing the technique	98	81.7
Safe handling of sharp objects after injection	46	38.3
Safe needle capping method	43	35.8
Maximum capacity of sharp objects tank/container	71	59.2
Reuse plastic safety boxes	58	48.3
Adequate knowledge of safe handling of sharp objects	50	41.6

Regarding safe handling of sharp objects, 41.6% of students demonstrate knowledge in this domain. Among them, 35.8% correctly answered that injuries from sharp objects can be completely prevented. Additionally, 81.7% of students knew how to wrap cotton or gauze around distilled water pipes before breaking them. However, 49.6% of students knew that they should put the sharp objects in a tray when giving it to others and when moving to another place. When manipulating needles on a patient, you need to concentrate; Do not put your hand in front of the injection; ensure patient posture with a rate of 52.5%; 46.7% and 81.7%, respectively. The percentage of students who know that closing the lid with one hand was the recommended safety method is very low, accounting for 35.8%; and 59.2% of students think that the maximum capacity of a sharp objects container was 3/4. The percentage of students who answered correctly about reusing safe plastic boxes was only 48.3%.

Table 4. Knowledge about assessing the risk of exposure to sharp objects (n = 120)

Content	Correct answer	
	n	%
The method may result in exposure		
Sharp contaminated objects penetrate the skin	64	53.3
The healthcare worker's skin was scratched and exposed to the patient's blood and biological fluids	91	75.8
Direct exposure to high concentrations of hepatitis B, C, and HIV in the laboratory	44	36.7
Risk of exposure to needles contaminated with penetrating blood		
Pathogens	62	51.7
Type of trick	46	38.3
Amount of blood and fluids causing exposure	74	61.7
Disease stage	46	38.3
Risk of illness after exposure		
Pathogens	51	42.5
Exposure route	70	58.3
Post-exposure prophylaxis	56	46.7
The time when the nursing students are at risk of being exposed to sharp objects during infusion		
When breaking the tube to get the medicine into the syringe	61	50.8
While inserting and withdrawing the needle to infuse the patient	77	64.2
When transporting used infusion needles to a safety box	73	60.8
Knowledge of assessing the risk of exposure to sharp objects	49	40.8

Knowledge about methods leading to exposure is highest involving: scratched skin of healthcare workers in contact with the patient blood and biological fluids (75.8%), while direct contact with high concentrations of hepatitis B, C, and HIV in the laboratories accounting for 36.7%. Correct knowledge about the risk of exposure and the risk of disease after exposure is low, ranging from 38.3% to 61.7%. Regarding when nursing students are at risk of exposure to sharp objects during infusion, the percentage of students had correct knowledge ranges from 50% to 60%. Knowledge of assessing the risk of exposure to sharp objects was 40.8%.

Table 5. Knowledge of wound management and reporting after exposure to sharp objects (n = 120)

Content		n	%	
First treatment immediately after injury	Correct	74	61.7	
	Incorrect	Squeeze the blood from the lesion and wash	20	16.7
		Wash with solution sanitize	25	20.8
		Compression bandage	1	0.8
Steps to take after injury	Correct	50	41.7	
	Incorrect	70	58.3	
Report the incident when injured	Not reported	13	10.8	
	Reported	Correct person	93	77.5
		Incorrect person	14	11.7
Knowledge of prophylaxis after exposure to sharp objects	Subjects need to have a blood test after being exposed to a needle from a high-risk patient	90	75.0	
	Prophylaxis of suspected HIV exposure is best administered within 24 hours	59	49.2	
Knowledge of wound management and reporting following exposure to sharp objects		54	45	

Knowledge about wound management and reporting after exposure to sharp objects was at 45%. Notably, 61.7% of students knew how to manage wounds immediately after needles injuries, but only 41.7% correctly identified the steps to take post-injury. After treating the wound, students need to report to the person in charge: head nurse, instructor... to be recognized and had appropriate solutions. 89.2% of students had knowledge about reporting injuries, but up to 13 students (10.8%) did not report. The rate of students reporting to the correct person when they were hurt was 77.5%.

Regarding blood tests after needle exposure, 75% of students who had correct knowledge while only 49.2% of students correctly answered that the best time for preventive treatment for suspected HIV exposure is within 24 hours.

DISCUSSION

In the study involving 120 students, only 45% demonstrated satisfactory knowledge regarding the prevention and management of exposure to sharp objects. This result is similar to Mohsen's (2019) research, where 49% of students having good knowledge about preventing and controlling infections related to injuries caused by needles and sharp objects¹¹. Research by Ellatif Zainb (2018) showed that 50% of students have inadequate knowledge about measures to prevent injuries from sharp objects¹². However, the results are lower than Nguyen Phuong Anh's 2019 research (59.7%)¹³, Nguyen Thi Mai Tho's research on nursing university students (81%)¹⁴, and My Thi Hai's in 2016⁷ with the rate of students having correct general knowledge about preventing injuries from sharp objects (71.9%). This difference may be due to the fact that the studies of Nguyen Phuong Anh, Nguyen Thi Mai Tho, My Thi Hai were conducted on university nursing students, so their awareness is better than that of high-level nurses. Additionally, the above authors' research focused mainly on evaluating the prevention knowledge of 3rd and 4th year students, and in these years, most students have more clinical time, so they can have better knowledge.

Knowledge about the causes and risks of sharp objects injuries during technical operations: The findings revealed that 70.0% of students were aware of the importance of closing the needle cap before and after use. Additionally, 44.2% of students understood the significance of transferring tools between hands, while 45.0% were knowledgeable about handling unexpected patient reactions. Notably, 29.2% attributed unexpected reactions to the urgency of the operation, 70% to lack

of attention during the procedure, and 50% to not following the correct protocol. These results are lower than the research of My Thi Hai (2016), where 88.9% lack attention when doing work; 77.8% did not follow the correct procedure, 59.3% cited urgency as a cause of accidents⁷. The results show that students' understanding of the causes and risk factors in some items is still low such as the urgency of the operation, transferring tools from one hand to another, and the person's unexpected reaction. Due to incomplete understanding of these causes, it may lead to students taking measures to prevent injury from sharp objects inadequately and at the incorrect time.

Knowledge about common diseases that can be transmitted through blood by sharp objects: In terms of knowledge about common bloodborne diseases transmitted through sharp objects, most students demonstrated awareness of HBV (86.6%) and HIV (85%) transmission through blood. However, approximately 50% of students were unaware that the HCV virus could also be transmitted in this manner. This result aligns with the research findings of Nguyen Phuong Anh (2019) and Nguyen Thi Ha (2019) from Hanoi Medical College^{13,15}.

Knowledge about measures to prevent injuries from sharp objects: Regarding preventive measures for injuries caused by sharp objects, only 35.8% of nursing students believed that such injuries could be entirely prevented. This understanding was higher than that reported by Nguyen Phuong Anh, where only 10.7% of students shared this belief¹³. However, this result showed that nursing students had inadequate awareness about injury prevention strategies.

According to the safe injection instructions of the Ministry of Health

(2012), the needle should not be closed after injection but immediately isolated in the sharp container. In case of lack of sharp container, apply the closing method replacement one-handed cover ⁹. The results showed that only 38.3% of students correctly understood this knowledge, and 61.7 % of students incorrectly understood. According to the safe injection guidelines (2012), the maximum allowable capacity of a sharp container is 3/4 instead of 2/3 but a portion of nursing students choose this level of 2/3. This showed that nursing students' knowledge is inadequate.

Knowledge of assessing the risk of exposure to sharp objects: The research findings indicated a low level of correct understanding among students regarding the methods that can lead to exposure. Specifically, only 36.7% of students were aware that they could be directly exposed to high concentrations of hepatitis B, hepatitis C, and HIV in laboratory settings. Additionally, 53.3% of students recognized that exposure could occur through contaminated sharp objects penetrating the skin, while 75.8% identified that exposure could result from a healthcare worker's skin being scratched and coming into contact with a patient's blood and biological fluids. The highest percentage of students who correctly answered the risk of exposure depends on the amount of blood and fluid causing exposure was 61.7%. Furthermore, 51.7% of students know that exposure depends on the pathogen, while only 38.3% of students know that exposure depends on the type of procedure and stage of disease.

The study also revealed that students' accurate knowledge concerning the times when nursing students are at risk of exposure to sharp objects during infusion

was limited. For instance, only 50.8% of students were aware that exposure could occur when breaking a medicine tube to extract medicine into a syringe. Additionally, 64.2% of students believed that exposure could occur while inserting and withdrawing needles during patient infusions, and 60.8% understood the importance of transporting used infusion needles to a safe disposal box. Percentage of students who correctly identify the risk of exposure during inserting and withdrawing intravenous needles and the proper disposal of used needles in safety boxes in this study was lower than the study by Nguyen Thi Ha (2019) where reported at 97.5% and 85.4%, respectively ¹⁵.

Knowledge of handling exposure to sharp objects: According to the Ministry of Health's 2012 standard prevention guidelines for infection prevention in medical facilities, infection prevention ⁸. The study found that 61.7% of students have correct knowledge about how to treat a wound immediately after sustaining an injury. This result represented a 34% higher than the result of Nguyen Thi Ha at Hanoi Medical College ¹⁵. However, the students' understanding in this study was lower than that of nursing students at Vinh Medical University (80%) ¹⁴ and students at Kien Giang Medical College (80.4%) ¹⁶. This difference may be the different in evaluation criteria of Kien Giang Medical College, where correct knowledge is defined as washing and bandaging the wound promptly, without specifying the type of solution for washing. In this study, students must choose to immediately wash the wound with soap under running water as correct and other answers as incorrect. In addition, the study showed that many students choose the treatment action of washing the

wound with antiseptic solution (20.8%), and students even squeeze the blood from the lesion and wash it (16.7%). These findings indicate existing gaps in students' knowledge regarding post-exposure wound management.

Regarding reporting incidents of injuries after completing treatment of injuries from sharp objects, a majority of student (89.2%) believed that it is necessary to report injuries, in which, reporting to the correct person was at 77.5%. There were 11.7% of students reporting to the incorrect person. This reporting rate is similar to Nguyen Thi Ha's study with 86.5% of students knowing the necessity of reporting injuries¹⁵. It was higher than that of students at Kien Giang Medical College with 80.4%¹⁶. This difference may be from the different evaluation criteria. In this study, students who chose to report to the teacher or the nurse in charge were considered as correctly report, unlike other studies only allowed to report to one certain person such as the teacher in charge is considered as correct only.

In terms of assessing the risk of exposure after sustaining an injury from sharp objects, the majority of students (75.0%) acknowledged the potential risk of exposure to needles previously used on patients. They also recognized the need for blood tests for hepatitis B, hepatitis C, and HIV for both the patient and the individual exposed. Although this result falls short compared to the research findings among nursing students at Hanoi Medical College (84%)¹⁵, it surpasses the results from a study of medical students in Nepal in 2014, where over 50% of students failed to identify the condition of patients they were exposed to through trauma¹⁴. These variations could be

attributed to differences in the curriculum and training programs across schools.

The results showed that a considerable proportion of students still lack adequate knowledge regarding the prevention and treatment of exposure to sharp objects (55%). This showed that it is necessary to increase training to deepen students' understanding and filling knowledge gaps. Addressing these deficiencies is crucial to ensure that students can practice safely and effectively. Strategies to prevent injuries caused by sharp objects include education, training, promoting safe needle practices, and fostering effective communication¹⁷.

Limitations of the study: This research was a cross-sectional descriptive study conducted on a convenient sample of 120 students. The evaluation period was brief, which limited the ability to assess the research group's practices through direct observation.

CONCLUSION

The study found that 45% of nursing students have correct knowledge about preventing and treating exposure to sharp objects. Specifically, 29.2% demonstrated correct understanding of the causes and risks associated with injuries from sharp objects, 39.2% recognized the higher likelihood of exposure to hepatitis B and C compared to HIV following such injuries, and 35.8% were aware of preventable injuries during patient care. It is recommended to regularly evaluate nursing students' knowledge on preventing and managing exposure to sharp objects. Identifying areas of limited understanding among students can help consolidate their knowledge before they engage in clinical practice at hospitals.

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