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Clinical Rotations and Safety: How Well Do Our Medical Students Understand Needle Stick Injury? Knowledge and Attitude Aspects

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Abstract

The clinical rotations will increase the medical students' exposure to patient care and the hospital environment. Due to a lack of adequate work experience, they may be at risk of needle stick injuries. This cross-sectional study aims to assess the knowledge and attitudes of medical students at the University of Tabuk regarding these occupational hazards. Results are presented as percentages and means. The T-test and ANOVA are utilized to identify any statistically significant differences. Out of 402 students in the clinical phase, 208 students participated in this study (response rate 51.8%). The response rate for male students was 41.8%, while for female students it was 58.2%. The overall knowledge level of the students was 64.8%, there were no statistically significant differences in knowledge levels based on gender or academic year, with p-values of 0.436 and 0.879, respectively. The overall positive attitude among students was 78.0%. The female students showed statistically significantly more positive attitudes than male students. No statistically significant difference in the level of attitude based on academic years. The students demonstrate a fair level of knowledge and a positive attitude, but their knowledge scores remain below the target. Therefore, we recommend that a review and update of hospital precautions lectures, which include needle stick injuries in our curriculum, would be beneficial to students' knowledge. Moreover, we recommend conducting a larger study to explore the prevalence of needle stick injuries among our students and the associated factors

Keywords: Attitude, Knowledge, Medical Students, Needle Stick Injury.

Introduction

The term, needle stick injury is used to describe an injury caused by needles or other sharp objects inadvertently piercing the skin and introducing blood or hazardous materials into the health worker's body while doing their duties (1). Globally, it is one of the major occupational risks for health workers, and according to the World Health Organization (WHO) reports, there are over 2 million needle stick injury every year among 35 million health workers (2, 3). The global needle stick injury rate of 43%, while the rate is higher in Africa at 51% (4). However, more than 90% of needle stick injury occur in developing countries rather than developed countries (5). Despite the high reported incidence of needle stick injury, evidence suggests that a large number of needle stick injury among health workers go unreported, possibly due to lack of time or lack of awareness of infection transmission (6). A study in Saudi Arabia indicates that 22.2% of healthcare workers experience at least one needle stick injury each year, based on a survey of 361 workers across the country (7). Another study conducted in Abha City, Saudi Arabia, reports a needle stick injury rate of 11.57% among health workers (8). Saudi Arabia's needle stick injury rate is considered low compared with the international rate in these two studies; however, the small sample size makes the results difficult to generalize. There are over 20 pathogens that can potentially be transmitted through needle stick injury, with the most common being hepatitis B virus, hepatitis C virus, and human immunodeficiency virus, which have estimated risks of 37.6%, 1.8%, and 0.3%, respectively (1). There is also a psychological impact associated with needle sticks injury because of the fear of being infected or transmitting the disease to their family (9). Numerous factors, including treating difficult patients, employee exhaustion, increased workload, a lack of sharps containers, ignorance about appropriate sharps disposal, and recapping

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used needles, have been associated with an increased risk of needle stick injury (10). Used syringes injury was the main cause of needle stick injury in nurses, accounting for 58.9% of cases, compared to sharps surgical equipment injuries, which caused 24.9% of incidents in doctors (11). Several preventable measures, such as training on general safety precautions of hospitals, sharps disposal, and injection techniques, can significantly reduce the risk of needle stick injury by 62% (12). In addition to adhering to established guidelines, prophylactic post-exposure measures have also demonstrated a significant reduction in the risk of HIV transmission (13). Post-exposure measures should be taken, after sustaining a needle stick injury, which includes, allowing the wound to bleed, washing the wound with soap and water, and reporting the incident. In addition to laboratory investigations and post-exposure immunoglobulin, prophylaxis is recommended based on the results of serological tests performed on the exposed health worker and patient (14).

The clinical rotations will increase the medical student's exposure to patient care and the hospital environment. Because they lack adequate work experience, they may be more at risk of needle stick injury. Several studies estimate that medical school students are at risk for needle stick injury between 12%, and 50% (15, 16). Therefore, medical students' knowledge and attitude towards needle stick injury are crucial, since following precautionary measures and having a positive attitude will protect them from these occupational hazards. At our institution, in order to mitigate this occupational hazard, students undergo comprehensive laboratory tests to assess their immunity status before beginning their Clinical rotation. If a student experiences a needle stick injury, the institution, adhere to the guidelines set by the Saudi Ministry of Health. These guidelines include proper wound care, reporting the incident, conducting a risk assessment, and following post-exposure prophylaxis protocols. Our study questions, What are the levels of medical student' knowledge and attitude toward needle stick injury as an occupational risk during their clinical rotation? How do our medical students perceive needlestick injuries?

The purpose of this study is to assess medical students' knowledge and attitudes towards needle stick injury. Furthermore, the study's findings can shed light on their knowledge and attitude gaps.

Methodology

This descriptive cross-sectional study investigated medical students' knowledge and attitude regarding needle stick injury during the academic year 2024–2025. Study participants are University of Tabuk medical students in their fourth, fifth, and sixth academic years. The preclinical years (year 1,2,3) and internship students were excluded). According to the number of students in the clinical phase (402) and at a 95% level of confidence with an assumed precision (margin of error) of 5%, the required sample size is 200 students.

The Study Instrument

This study used a self-administered questionnaire developed based on previously validated questionnaires from published studies on needle stick injury (8, 17-19), and the principles of needle stick universal precautions (20). The questionnaire contains 3 domains; the first is personal data including gender and academic year. The second domain of knowledge is comprised of 11 closed-ended questions pertaining to needle stick injury. The third domain of attitude includes 14 five-point Likert scale questions ranging from strongly agree to strongly disagree, exploring students' attitude of needle stick injury. The questionnaire was sent to expert reviewers, three surgeons from the Department of Surgery and one from the Department of Microbiology, whose comments and advice have been considered and revised. A score of ≥60% was considered poor knowledge and attitude, whereas a score of <60% was considered good. However, our target score is greater than 80%. Afterwards, the questionnaire was piloted with 30 students and its Cronbach's alpha coefficient was calculated (0.904).

Data Analysis

Statistical analysis of the data was conducted using IBM Chicago, Illinois' SPSS version 28 software's. Percentages and means are used to describe results. The T-test and ANOVA test are applied to show any statistically significant difference, and a P value (*PV*) of 0.05 is deemed significant.

Results

Response Rate and Demographics

The questionnaire was completed by 208 of the 402 students enrolled in the clinical phase (4th, 5th, and 6th academic years), with a response rate of 51.8%. The male student's response rate was 41.8% and the female student's response rate was 58.2%. One hundred eleven students (53.4%) were from the 4th year, 37 (17.8%) from the 5th year, and 60 (28.8%) from the 6th year, as shown in Table 1.

Levels of Knowledge

The overall knowledge level of the students was 64.8% with an average score of 62.9% for males and 66.2% for females. According to an academic year, knowledge levels were 64.4% for the 4th year, 64.8% for the 5th year, and 65.6% for the 6th year. There were no statistically significant differences in knowledge levels based on gender or academic year, with p-values of 0.436 and 0.879, respectively as shown in Table 1. Among the details of the knowledge variables, we found that 88.0% of our students understand the definition of a needle stick injury. However, only 36% of our students are aware that it is not recommended to recap used needles before disposal. Only 54.3% of respondents were aware of the maximum capacity of the sharp's container. Sixty-seven percent of our students recognized that hepatitis B poses the greatest risk of needle stick injuries, while 64.9% identified the correct number of vaccination doses to administer. The fact that there is no approved vaccine for hepatitis C is known by 58.7% of our students, the details of knowledge per variable are shown in Table 2.

Level of Attitude towards Needle Sticks Injury

The overall positive attitude among students was a notable 78.0%. However, male students demonstrated a positive attitude of 74.0%, while female students showed a substantially higher positivity rate of 80.0%. This difference is statistically significant (*PV* = 0.000).

According to the academic years from fourth to sixth, the attitude levels are 78.8%, 75.4%, and 77.7%, respectively. The difference is not statistically significant (*PV* = 0.166), as presented in Table 1, while Table 3 showed the detailed of attitude per variable.

Results in Summary

The overall knowledge level of the students was 64.8%, there were no statistically significant differences in knowledge levels based on gender or academic year, with p-values of 0.436 and 0.879, respectively. The overall positive attitude among students was 78.0%. The female students showed statistically significantly more positive attitudes than male students. No statistically significant difference in the level of attitude based on academic years. The students demonstrate a fair level of knowledge and a positive attitude, as summarized in Figure 1.

Table 1: Comparison of Demographic Data with Overall Knowledge and Attitude

Variables	Variables	N (%)	Knowledge %	*PV*	Attitude %	*PV*
Gender	Male	87 (41.8%)	62.9%		74.0%	
	Female	121(58.2%)	66.2%	0.436	80.0%	0.000
	4th year	111(53.4%)	64.4%		79.4%	
Academic year	5th year	37 (17.8%)	64.8%	0.879	75.7%	0.166
	6th year	60 (28.8%)	65.6%		77.6%	

Table 2: The Knowledge per Variables, Overall, and Based on the Academic Year

Variables	Overall	4th	5th	6th	*PV*
The term needle stick injury refers to wounds caused by needles or sharp objects that penetrate the skin of a health worker while performing their duties. (yes)	88.0%	88.3%	89.2%	87.6%	0.925
After performing nursing procedures, it is important to recap the needle before discarding? (No)	36.1%	45.9%	21.6%	24.7%	0.005
After performing procedures, sharps should be disposed of in a sharps container to reduce the risk of needlestick injury. (Yes)	97.1%	98.2%	100.0%	95.9%	0.100
Sharp needles should be disposed of in. (Yellow container)	85.1%	83.8%	86.5%	86.6%	0.852
The maximum capacity for the sharps container should be. (75%)	54.3%	55.9%	48.6%	52.6%	0.745
It is recommended to bend the needle after performing nursing procedures to reduce the risk of needle stick injury. (No)	81.7%	83.8%	73.0%	79.4%	0.317

How many doses of vaccine are needed to protect someone against Hepatitis B? (3 doses)	64.9%	57.7%	67.6%	73.2%	0.042
Which of the following diseases has the highest risk of transmission through needle stick or sharp injury? (HBV)	67.8%	66.7%	89.2%	69.1%	0.003
Hepatitis C disease can be prevented by vaccine. (No)	58.7%	55.9%	62.2%	61.9%	0.684
If you suffer a needlestick injury, let the wound bleed. (yes)	54.8%	49.5%	51.4%	60.8%	0.090
When you suffer a sharps/needle stick injury, your immediate action should be to wash with. (Water and soap)	24.5%	22.5%	24.3%	26.8%	0.704

Table 3: The Overall Attitude per Variables

Variables	**SA/A N (%)**	**Neutral N (%)**	**SD/D N (%)**
There is a chance that every healthcare worker will suffer a needle stick injury. (+ve)	148(71.2%)	33(15.9%)	27(13%)
Injuries caused by needle sticks are unavoidable for health care workers. (-ve)	23(11.1%)	48(23.1%)	137(66.9%)
An increase in workload can result in a needle stick injury. (+ve)	144(69.2%)	43(20.7%)	21(10.1%)
A healthcare worker who becomes infected with HIV should resign from their profession. (-ve)	33(15.9%)	56(26.9)	119(57.2%)
Proper handling of sharp objects is always required since improper handling can result in infection. (+ve)	163(78.4%)	33(15.9%)	12(5.8%)
Infections transmitted through needle stick injuries are life-threatening. (+ve)	154(74%)	38(18.3%)	16(7.7%)
Despite the risk of infection, confidence and skillfulness can prevent injury. (+ve)	119(57.2%)	51(24.5%)	38(18.3%)
We haven't learned about the standard precautions for preventing needle stick injuries. (-ve)	45(21.6%)	69(33.2%)	94(45.2%)
In the absence of protective equipment, a person is predisposed to getting needle stick injuries. (+ve)	158(76%)	38(18.3%)	12(5.8%)
Reporting needle stick injuries is not useful. (-ve)	19(9.2%)	23(11.1%)	166(79.9%)
Every health care worker must receive the Hepatitis B vaccine. (+ve)	174(83.7%)	22(10.6%)	12(5.8%)
Educating healthcare workers and students about universal precautions can reduce needle stick injuries among them. (+ve)	169(81.3%)	25(12%)	14(6.7%)
The care of my patients is more important to me than my own safety. (-ve)	20(9.6%)	36(17.3%)	152(73.1%)
I'm worried about getting a needlestick injury. (+ve)	113(54.3%	65(31.3%)	30(14.4%)

Note: * SA= Strongly Agree *A= Agree * SD= Strongly Disagree * D= Disagree, *-ve or +ve= Negative Or Positive Attitude.

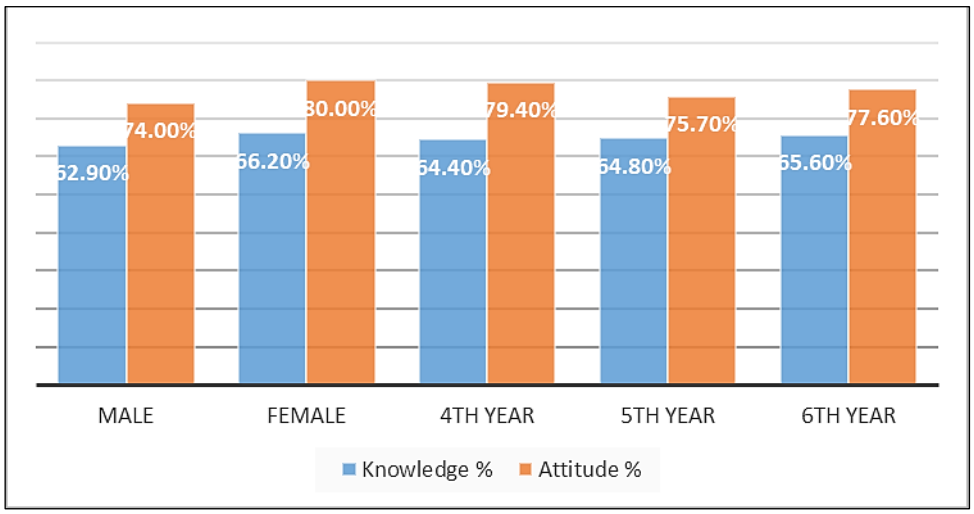

Figure 1: Comparison of the Overall Knowledge and Attitude Based on Gender and Academic Year (X axis- Different genders and academic years, Y axis- Percentage)

Discussion

To reduce the incidence of needle stick injury during clinical rotation, students' knowledge of this occupational hazard must be regularly assessed. Our study revealed that the overall knowledge level of our students regarding needle stick injury was 64.8%. In contrast, a study conducted at King Saud bin Abdulaziz University assessed the knowledge of health sciences students regarding standard precautions and infection control. The students achieved a score of 73.6% in the knowledge domain (21). A similar knowledge score was reported in a Palestinian study evaluating nursing students' knowledge about needlestick injuries, finding that the average score was 7.04 out of 10 (22). As students' progress through their academic years, their levels of knowledge tend to increase, however in our study, we found no statistically significant differences in the knowledge between students in the clinical years, from the fourth to the sixth year ($p = 0.879$). Our results have been contradicted by a study conducted in Birmingham, UK, which found that final year students demonstrated a statistically higher level of knowledge about needle stick injuries compared to first- and third-year students (23). The fact that fourth-year students showed nearly equal knowledge of this occupational health problem to their fifth- and sixth-year counterparts can be explained by their extensive hospital precautions training before starting the clinical rotation, and the knowledge is fresher in their minds. Our study found no statistically significant difference in knowledge between male and female students ($p = 0.436$). This aligns with results of a study conducted in tertiary care hospitals in Pakistan that examined the relationship between gender and knowledge of needle-stick injuries among healthcare workers. The findings indicated that there was no significant difference in the knowledge of male and female healthcare workers regarding needle-stick injuries ($p \geq 0.05$) (24). Contrary to our findings, several studies have found that females are statistically more knowledgeable than males regarding needle stick injury (25, 26). Among the details of the knowledge variables, we found that 88.0% of our students understand the definition of a needle stick injury. Similarly, a study conducted on medical students at Taif University revealed that 80.3% were aware of what a needle stick injury means (25). In comparison, a study conducted in Saudi Arabia evaluating the incidence, knowledge, attitude, and practice of needle stick injury among health care workers in Abha City, the findings revealed that 94.7% of participants understood the definition of a needle stick injury (8). The reason for this can be explained by the fact that health workers usually have a greater understanding of needle stick injury than medical students because of their field experience. Many studies have shown that recapping the used needle is a common cause of needle stick injuries and is considered a dangerous procedure that increases the risk of needle stick injury (27-29). We found that 36.1% of students knew that this procedure was not recommended, which is a low level of knowledge and should be improved. While most our students (97.1%) knew it was recommended to dispose of needles and sharps in a sharps container after performing procedures, only 54.3% of them knew the maximum capacity of the sharp's container. Keeping sharps containers below 75% of their capacity is considered basic knowledge for handling sharps materials safely (30). In fact, the Hepatitis B virus poses the greatest of transmission by needle stick injuries (31), and in order to be fully protect against Hepatitis B virus, individuals must receive three doses of the vaccine (32). Sixty-seven percent of our students knew that hepatitis B poses the greatest risk of needle stick injuries, while 64.9% knew the number of correct vaccination doses to be administered. In comparison to a study among medical students at Sangli's medical college, 32% of students were aware that hepatitis poses the highest risk of transmission via needle stick injury (33). However, 75% of health workers knew the correct doses of hepatitis B in the Indian study (17). Currently, there is no approved vaccine for the hepatitis C virus, and only 58.7% of our students are aware of this fact. In contrast, In a study assessing the knowledge and attitudes of fifth- and sixth-year medical students regarding hepatitis C, it was found that 38% of the medical students were unaware that there is currently no vaccine available to prevent HCV infection, across eight Vietnamese medical colleges (34). As a standard post-exposure measure for needle stick injuries, you should wash your hands under running water with soap and let the wound bleed (35). However,

the first fact is known by 24.5% of our students, and the second is known by 54.8%. According to an Indian study, only 38.8% of health workers reported that their immediate action after sustaining a needle stick injury would be to wash their hands with soap and water (17).

In Taif University, Saudi Arabia, researchers examined the knowledge of medical students about needle stick injuries. Scores of 60% or higher were considered good knowledge, while scores below 60% were considered poor knowledge. According to the study, more than 50.4% of the students had good knowledge of needle stick injury (25). In our study, 141 students (67.8%) scored above 60% regarding their knowledge of needle stick injuries.

Based on the comparison above, we can conclude that our students possess a fair understanding of this significant occupational hazard during their clinical rotations. Nevertheless, this knowledge is not at the level that is desired. We need to update our curriculum in order to enhance our students' understanding.

Based on our study, the overall attitude of our students is 78.0%, which is considered a positive attitude towards these serious occupational hazards, which may indicate that students are aware of these hazards and thus can practice safely. In a similar study, knowledge, attitudes, and practices regarding the prevention of needle stick injuries were evaluated among nursing students in Henan Province, China. The overall positive attitude of the students was found to be 71.3% (36).

Also, in similarly, a study of Saudi Arabian nursing students found that they exhibited a positive attitude towards needle stick injuries (26).

The overall attitude scores of our female students were higher than those of their male counterparts, with 80.0% versus 74.0% (PV 0.000). Several studies have shown that female students exhibit a more positive attitude than male students (26, 33). As opposed to their female counterparts, the Pakistani study found male health workers to have a better attitude than their female counterparts (24).

We found no statistically significant differences in attitude levels based on the academic year. The attitude levels were 79.4%, 75.7%, and 77.6% for the fourth, fifth, and sixth academic years, respectively (PV = 0.166), In contrast, In a study conducted at a private nursing college in Saudi Arabia, it was reported that senior nursing students scored higher in the needle stick attitude domain (26).

Based on our findings regarding students' attitudes toward various variables, most students (78.4%) agree that standard precautions must always be followed when handling sharp objects because improper handling can lead to needle stick injury. As a comparison, a cross-sectional study conducted among clinical students at a tertiary hospital in eastern Uganda found that 93.4% agree that standard precautions when handling sharp objects must always be followed since improper handling can lead to infection (37). The survey found that 45.2 % of participants agreed they learned about needle stick precautions, 21.6 % disagreed, and 33.2 % were uncertain. Even though our curriculum contains lectures about hospital precautions, including needles and sharp objects injury, these lectures typically take place early in the clinical phase, beginning in the fourth year, and standard precautions are an integral part of our portfolio throughout the entire clinical years. A similar study was conducted at Lahore General Hospital, focused on nurses' knowledge and practices regarding needle stick injury. In the study, 30.8% of participants claimed to have not learned about standard precautions for preventing needles tick injury. Furthermore, 34.4% were uncertain about their knowledge, while 34.8% disagreed (38).

In our study, 79.9% of participants believed reporting needle stick injury is much useful. In several studies, most participants agreed that reporting needle stick injury is very beneficial (17, 21, 39). The importance of reporting needle stick injury is essential for addressing this occupational hazard. Despite this, a significant number of these injuries remain unreported. According to study at Taif University, over half of needle stick injuries go unreported (25).

Based on the results of our study and the above comparison, our students score positively on most attitude variables, indicating that occupational hazards are not underestimated during clinical practice.

Conclusion

This study shows that our medical students in the clinical phase are aware of needle stick injuries as occupational hazards. The students demonstrate a fair level of knowledge and a positive attitude, but their knowledge scores remain below the target.

The small sample size of participants especially from the 5th year students, and the fact that the study was conducted at a single institution limit the generalization of the results. Moreover, the study does not assess the magnitude of the problem by evaluating the prevalence and misconceptions relating to needle stick injuries among our students.

Review and update of hospital precautions lectures and hospital precaution training, which include needle stick injuries in our curriculum, would be beneficial to students' knowledge. Moreover, we recommend conducting a larger study to explore the prevalence of needle stick injuries among our students and the associated factors.

Abbreviation

A: Agree, D: Disagree, HCV: Hepititis C Virus, PV: P value, SA: Strongly Agree, SD: Strongly Disagree UK: United Kingdom, WHO: World Health Organization, -ve: Negative Attitude, +ve: Positive Attitude.

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Author Contributions

None.

Conflict of Interest

Nothing to be declared.

Declaration of Artificial Intelligence (AI) Assistance

None.

Ethics Approval

The questionnaire does not contain any personal information that could reveal the identity of the respondents. Contribution to the research is voluntary and involves students answering the questionnaire sent to students via university email. The study was ethically approved, by the Research Ethics Committee of Tabuk University (Approval number: UT-454-253-2024).

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