KNOWLEDGE, ATTITUDE, AND PRACTICE ABOUT NEEDLE STICK INJURY TOWARDS PREVENTION AND MANAGEMENT AMONG CLINICAL STUDENTS AT PRIVATE UNIVERSITY IN CYBERJAYA, MALAYSIA

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ABSTRACT

Introduction: Needle stick injury has been proven to be one of the modes of transmitting blood-borne viruses. Previous studies showed a high prevalence of needle stick injury among medical students during clinical activities due to a lack of knowledge. This study aimed to determine the prevalence of needle stick injury among clinical students and the association between knowledge-attitude and knowledge-practice of needle stick injury. **Methods:** An online descriptive cross-sectional study was conducted among clinical medical students at the University of Cyberjaya and the sample was selected using convenience sampling. **Results:** The majority of the respondents were female (70.9%) and year 4 students (51.7%). Only 8.6% of the respondents experienced needle stick injuries. The tasks performed during injury are mostly disposal of needles (3.3%) and recapping needles (3.3%). The perceived cause of the injury is mostly due to lack of experience (4.6%). The majority of the respondents had a satisfactory level of knowledge (84.1%), and a satisfactory level of attitude (84.8%), and almost half of them had an average or poor level of practice (42.4%). However, there was no significant association between the level of knowledge and level of attitude and level of knowledge and level of practice ($p>0.05$). **Conclusion:** The majority of clinical medical students had a satisfactory level of knowledge and attitude towards needle stick injury whereas the level of practice among them was a matter of concern. Therefore, adequate interventions toward needle stick injury precautions are needed to improve the level of practice among clinical medical students.

Keywords: needle stick injury, knowledge, attitude, practice, clinical students

Introduction:

The definition of needle stick injury (NSI) as described by the Ministry of Health (MOH) Malaysia, is an injury resulting from suture, hollow-bore needles, or other sharp instruments (Hodous et al., 1999). According to the World Health Organisation (WHO), every year, approximately more than three million healthcare workers are unprotected from a sharp object contaminated with Hepatitis B Virus, (HBV), Hepatitis C Virus, (HCV), or Human Immunodeficiency Virus (HIV) (Prüss-Üstün et al., 2003). This corresponds to almost one out of ten healthcare workers. Moreover, the WHO also estimated that NSIs affecting healthcare workers will cause 16,000 HCV infections resulting in 145 early deaths in 2000 until 2030; 261 early deaths by 2030 due to 66,000 HBV infections; and 1000 HIV infections causing 736 deaths by 2030 (Prüss-Üstün et al., 2005). In the MOH National Sharps Injury Surveillance Programme, 1234 NSI cases were recorded indicating 6 injuries per 1000 healthcare workers in general (Ishak et al., 2019).

Medical students are prone to experience at least one injury during their clinical rotation (Bhattarai et al., 2014). Clinical students may be at risk of experiencing needle stick injury due to their poor knowledge of the prevention of needle stick injury (Ibrahim et al., 2021). A positive attitude towards NSI prevention does not ascertain adherence to the practice of NSI protocol (Datar et al., 2022). The most common exposures are during clinical posting at a clinic or hospital, the practice of needle recapping, and the usage of hollow needles (Hamzah et al., 2018). The purpose of this study is to determine the prevalence of needle stick injury and the association between knowledge, attitude, and practice towards prevention and management among clinical students at the University of Cyberjaya.

Methods:

A descriptive study was conducted among clinical medical students at the University of Cyberjaya from September 2022 to June 2023. The respondents were selected through convenience sampling. The inclusion criteria for this study are 3rd, 4^{th,} and 5th year in MBBS and students who were proficient in English. The questionnaire was taken from a study conducted by Bhargava et al in 2013. Written approval had been obtained from the authors prior to initiating this study. This questionnaire was re-validated by a different study done by Azman et al. in 2020. An online questionnaire was distributed through multiple social media platforms. It consisted of five compulsory sections including demographic, prevalence, knowledge, attitude, and practice of NSI, and an additional section regarding tasks performed during injury and perceived caused of injury for respondents who had experienced NSI. Each question carried two marks for the correct answer and zero for the wrong answer, except for questions 5 and 6 under the knowledge section which each carried one mark for the correct answer. Each category carries a maximum of ten marks. Zero to six was poor or average performance; seven and above was good performance (Bhargava et al., 2013). The data was analyzed using JASP. Descriptive statistics were performed on the socio-demographic data, the prevalence of needle stick injury, and knowledge, attitude, and practice of needle stick injury. The association between knowledge attitude and knowledge-practice of needle stick injury was analyzed using the chi-square method. A p-value of <0.05 is considered statistically significant.

Result:

A total of 151 respondents participated in the study with a response rate of 100%. Table 1 shows the respondents were mostly female (70.9%) and year 4 (51.7%).

Table 1: Sociodemographic (n=151)

Characteristics		Number of respondents, n (%)
Gender	Male	44 (29.1%)
	Female	107 (70.9%)
Year of study	3	35 (23.2%)
	4	78 (51.7%)
	5	38 (25.2%)

Table 2: Prevalence of Needle Stick Injury

Event of NSI		Number of respondents, n (%)
Incident	Yes	13 (8.6%)
	No	138 (91.4%)
The task performed during injury	Disposal of needle	5 (38.5%)
	Suturing	3 (23.1%)
	Recapping needles	5 (38.5%)
	Loading needles	2 (15.4%)
	Passing needles	1 (7.7%)
Perceived cause of injury	Time pressure	6 (46.2 %)
	Lack of experience	7 (53.8%)
	Equipment failure	1 (7.7%)
	Fatigue	1 (7.7%)
	Lack of skills	5 (38.5%)
	Patient movements	3 (23.1%)
	Lack of assistance	3 (23.1%)

Table 2 shows a minority of the respondents (8.6%) had experienced NSI. The tasks performed during injury were mostly disposal of needles (38.5%) and recapping needles (38.5%). More than half of the respondents (53.8%) perceived the causes of the injury were mostly due to lack of experience.

Table 3: Knowledge, attitude, and practice of needle stick injury (n=151)

No.	Items	Correct, n (%)	Wrong, n (%)
	Knowledge		
1.	The first action following needle stick injury is washing the site of injury with soap and water.	134 (88.7%)	17 (11.3%)
2.	Is there more possibility of transmitting HBV than HIV?	129 (85.4%)	22 (14.6%)
3.	Needle stick injuries should be reported to Occupation Safety and Health (OSH) unit.	135 (89.4%)	16 (10.6%)
4.	HCV can be transmitted by needle-stick injury?	107 (70.9%)	44 (29.1%)
5.	Hepatitis B Virus (HBV) transmission following needle stick injury (NSI) is 6% to 30%.	133 (88.1%)	18 (11.9%)
6.	Human Immunodeficiency Virus (HIV) transmission following needle stick injury (NSI) is 0.3% to 1%.	125 (82.8%)	26 (17.2%)
	Attitude		
7.	Needles should not be recapped/bent after use	94 (62.3%)	57 (37.7%)
8.	Post-exposure prophylaxis is necessary	131 (86.8%)	20 (13.2%)
9.	Needle-stick injury should be reported	149 (98.7%)	2 (1.3%)
10.	Needles should be discarded immediately after use	151 (100%)	0 (0%)
11.	Gloves provide protection against needle stick injury (NSI)	108 (71.5%)	43 (28.5%)
	Practice		
12.	Do you use a needle cutter/syringe destroyer?	42 (27.8%)	109 (72.2%)
13.	Do you use gloves for phlebotomy procedures?	138 (91.4%)	13 (8.6%)
14.	Have you been vaccinated against HBV?	134 (88.7%)	17 (11.3%)
15.	Do you recap needles after use?	85 (56.3%)	66 (43.7%)
16.	Do you report needle-stick injuries?	140 (92.7%)	11 (7.3%)

Table 3 shows within the category of knowledge items, that most of the respondents (89.4%) correctly answered that needle stick injuries should be reported to the Occupational Safety and Health (OSH) unit. However, the majority of the respondents (29.1%) wrongly answered that HCV cannot be transmitted by needle-stick injury. In the section concerning attitude, the question that had the most incorrect answers (37.7%) was that needles should be recapped/bent after use. All the respondents (100%) agreed that needles should be discarded immediately after using them. Regarding the items

about practice, most respondents (72.2%) did not use a needle cutter or syringe destroyer. The majority of the respondents (92.7%) would report the injury if it ever occurred.

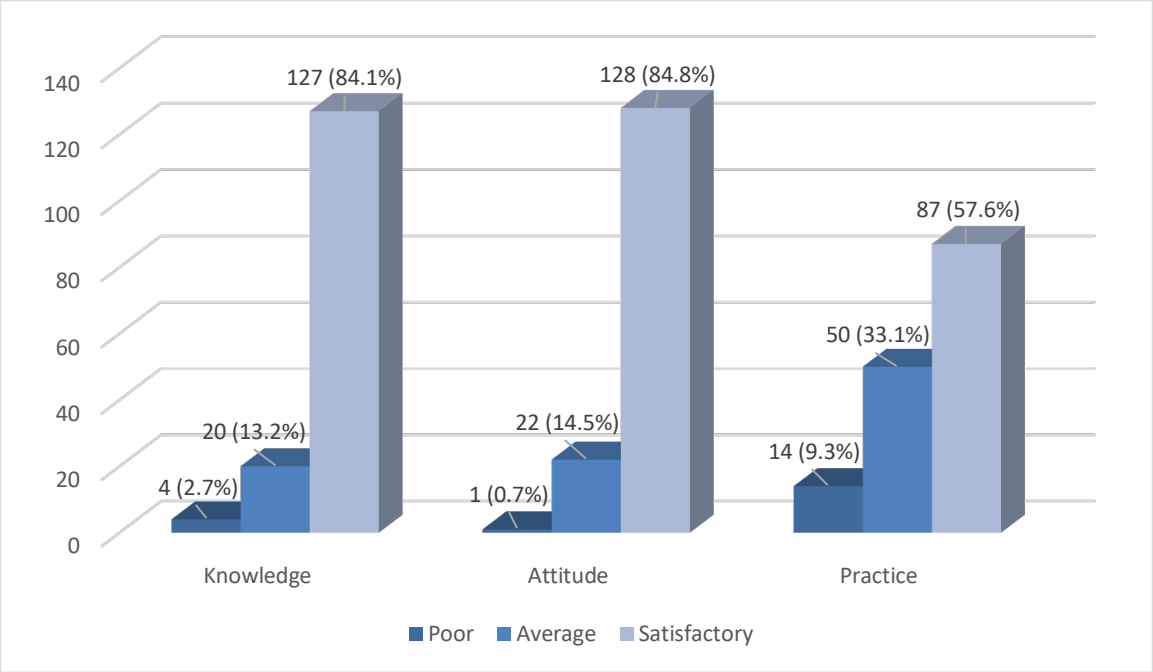

Figure 1: Level of knowledge, attitude, and practice

Figure 1 shows the majority of the respondents had a satisfactory level of knowledge (84.1%) and attitude (84.8%). More than half of the respondents had a satisfactory level of practice (57.6%).

Table 4: Association between level of knowledge and attitude (n=151)

Level of knowledge	Level of attitude		Total, n (%)	X^2(df)	P-value
	Satisfactory n (%)	Poor/Average n (%)			
Satisfactory	110 (86.6%)	17 (13.4%)	127 (84.1%)	2.109 (1)	0.146
Poor/Average	18 (75.0%)	6 (25.0%)	24 (15.9%)		

Table 4 shows the majority of respondents with satisfactory knowledge had a satisfactory level of attitude (86.6%). However, there was no significant association between the level of knowledge and the level of attitude (p>0.05).

Table 5: Association between level of knowledge and practice of NSI (n=151)

Level of knowledge	Level of practice		Total, n (%)	X^2(df)	P-value
	Satisfactory n (%)	Poor/Average n (%)			
Satisfactory	71 (55.9%)	56 (44.1%)	127 (84.1%)	0.957 (1)	0.328
Poor/Average	16 (66.7%)	8 (33.3%)	24 (15.9%)		

Table 5 shows more than half of the respondents (55.9%%) with a satisfactory level of knowledge had a satisfactory level of practice. However, there was no significant association between the level of knowledge and level of practice ($p>0.05$).

Discussion:

From this study, 8.6% of the respondents were found to have experienced needle-stick injury (NSI). According to the study at UKM, Malaysia, the prevalence of NSI was consistent with our study at 8.3% with only a 0.3% difference (Hamzah et al., 2018). Contrarily, in a study done in Malaysia with a total of 316 clinical students, 19.9% of them had suffered NSI (Swe et al., 2014). Similarly, a higher prevalence was found among 224 clinical students in Pakistan with a percentage of 30% (Patterson et al., 2003). Additionally, a study conducted at 17 medical centres reported a higher prevalence where 59% of respondents experienced an NSI during medical school (Sharma et al., 2009). Over and above, the highest prevalence was reported in a study involving 688 medical, dental, nursing and midwifery students where 71.1% of them experienced NSI with a total of 1,336 incidents (Askarian & Malekmakan, 2006). Furthermore, the majority of the students (39.9%) who had experienced NSI had been involved in more than three NSIs (Askarian & Malekmakan, 2006). This could be due to a wider exposure to NSI in the hospital since their studies were conducted before COVID-19's occurrence. Our study was conducted after the COVID-19 pandemic where most clinical students had less exposure to procedures in hospitals.

Based on a study done among healthcare workers in Malaysia, most respondents (99.1%) stated that needle sticks and sharp injuries need to be reported (Rampal et al., 2010). Another study done in 2013 discovered that the vast majority of medical students (95.1%) concurred in reporting NSI incidents that have occurred (Seng et al., 2013). A different study that was carried out in India revealed that most of the participants (67.33%) were in consensus regarding the necessity to report NSI (Maurya et al., 2017). Similarly, a study conducted among nursing students found that all of the second-year students agreed in the importance of promptly reporting NSI cases (Nawafleh et al., 2018). The findings from previous studies align with our findings that most of the respondents (89.4%) correctly answered that NSI should be reported to the Occupational Safety and Health (OSH) unit. This was supported by the National Institute for Occupational Safety and Health (NIOSH) Centre for Disease Control and Prevention (CDC) to report all needle stick and other sharps injuries to ensure appropriate care is received (Hodous et al, 1999). Besides that, 29.1% of our respondents wrongly answered that HCV cannot be transmitted by NSI. In contrast, research conducted in Pakistan showed nearly 90% of their clinical students were

aware that HCV, HBV, and HIV can spread through NSI (Saleem et al., 2010). Likewise, research conducted among nursing students revealed that 91% of the students acknowledged that HBV is transmitted through needle sticks, while 88% affirmed the same for HIV (Nawafleh et al., 2018). Moreover, a study done in 2018 revealed that most of the students (90%) were well-equipped with the knowledge of the viruses that can be transmitted via NSI (Patel et al., 2018). Thus, the differences between the current study and other studies show the cruciality of further improving students' knowledge regarding blood-borne viruses.

In a study conducted among medical students in Malaysia, 49.5% of them perceived that recapping is a normal practice by healthcare workers and 39.5% agreed that recapping needles does not increase the risk of NSIs (Juni et al., 2015). Moreover, a similar trend was observed in a study among healthcare workers in Abha City, Saudi Arabia, where recapping the needle accounted for only 14% of all events analyzed, with handling/passing the device during or after use (Alsabaani et al., 2022). This aligns with our findings, which revealed that 37.7% of respondents incorrectly believed that needles should be recapped or bent after use. A study in India also supports our findings which revealed recapping the needles as an established high-risk practice as the risk of NSI is thrice more to occur than in those who do not recap needles (Datar et al., 2022). Therefore, awareness should be increased among medical students on not recapping and proper disposal of needles to prevent NSI. This is reinforced by a study that suggested that to guarantee hospital care personnel safety, periodic training programs and the display of IEC materials concerning no recapping should be encouraged at work locations (Sharma et al., 2010)

Our study found that the majority of the respondents (72.2%) did not use needle cutters or syringe destroyers to discard the used needles. This finding is inconsistent with a study conducted among dental professionals in Bangalore, India, where more than half of the respondents (54.5%) use needle burners and syringe destroyers (Pavithran et al., 2015). Furthermore, our findings also contradict a study conducted among dentistry students in Raichur, India, which indicated that 44% of the respondents would use a needle destroyer and 15% of the respondents would use a puncture-resistant container containing a disinfectant to destroy the needle (Guruprasad et al., 2011). However, this may be due to the usage of sharp bins being more common than needle cutters and syringe destroyers in Malaysia. This is supported by a study conducted at Serdang Hospital Malaysia where 92.7% of the healthcare workers threw sharps into the sharp bin immediately after using it (Rampal et al., 2010). According to standard precaution guidelines by the Ministry of Health Malaysia, disposal of sharps must be in sharps bins, therefore, future researchers should consider the national health guidelines and make necessary changes to the questionnaire (Hanifah et al., 2002). Therefore, these differences highlight the importance of surrounding factors and regional practices in understanding and addressing students' attitudes toward needle stick injury prevention.

A study done in Malaysia found that nurses who are knowledgeable regarding NSI standard operating procedures (SOP) had a positive attitude towards NSI which agrees with our study where most of the

respondents with satisfactory attitude have satisfactory knowledge level (86.6%) (Yazid et al., 2023). Our study is also consistent with a study done in Ethiopia where nurses who are not trained regarding NSI have a poor or average attitude towards NSI (Berhan et al. 2021). By contrast, participants in the study done in India had a favorable attitude towards NSI prevention, even though total knowledge was not as high as hoped; however, this does not guarantee adherence to universal precaution instructions (Datar et al., 2022). Meanwhile, the majority of the nursing students (81.8%) in Karachi neglected to notify the infection control team about the NSI. This indicates that students generally have a negligent attitude towards NSI and a lack of formal training and emphasis on event reporting. However, a significant risk factor for NSI was found in the study to be the recapping of syringes (60.7%), indicating that young nurses had sufficient understanding of procedures and precaution guidelines during their basic training (Hussain et al., 2016). Therefore, medical students must be properly educated on NSI to protect themselves and their patients (Datar et al., 2022).

Correspondingly, more than half of the respondents who had satisfactory knowledge had satisfactory practice of universal precaution for NSI (55.9%), but there was no significant association between them ($P>0.05$). However, it was found that there is a significant association between the knowledge and practices of prevention of NSI among nurses ($P<0.005$) in studies conducted at Lahore General Hospital Pakistan and also among nurse students at Mansoura University (Zia et al., 2017; Ibrahim et al., 2021). According to a survey conducted among nurses working in public hospitals in Malaysia, 86.5% of participants reported having good practices after completing the course and being aware of the NSI SOP and hospital policies (Yazid et al., 2023). In contrast, a prior study discovered that although NSI-affected nurses had attended NSI training sessions before the incident, their practice was still low (Yunihastuti et al., 2020). Thus, stricter enforcement of the knowledge and practice of universal precaution is needed as 80% of the incidences are preventable (Zaidi et al., 2010).

Lastly, there are a few limitations to this study. First, the results are acquired through questionnaires that need self-reported data, which may contain multiple potential causes of recall bias. In addition, the study was restricted only to clinical medical students at the University of Cyberjaya, which may not represent the whole population since it did not reflect other healthcare professionals from all levels of care. Finally, there were fewer incidences of needle stick injury occurring among year 5 students which may lead to inaccurate results in this study. This may be due to the loss of a year of clinical experience in year 3 from the restriction during the epidemic COVID-19 period.

Conclusion:

Overall, the prevalence of NSI among clinical students is relatively low. However, it remains a source of concern as the implication of the incident may affect the student's health status and career path. Despite having good knowledge and attitude, the level of practice of NSIs among the clinical students is still poor. Nevertheless, there was no significant association found between knowledge, attitude, and practice. Thus, appropriate intervention and improvement on these issues should be emphasized to maximize the level of practice. Prevention of NSI and safety training should be done as part of an essential program at the university. A larger study to include all clinical students from multiple

universities in Malaysia would be more informative and beneficial. Further research on NSIs and health intervention can be done in the future to enhance the limitations of this research. We hope our study can help raise awareness of needle stick injuries in the healthcare sector.

Conflicts of Interest

The authors declare no conflicts of interest.

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