# Needle Sticks Injury among Medical Students during Clinical Training, Malaysia

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## Abstract

**Background:** Needle stick injury (NSIs) is the major transmission source of blood borne infection among health care workers all over the world. Medical students are at a risk of needle stick injury with acquisition of blood-borne infection by pathogens while performing their clinical activities in the hospitals.

**Aim & Objectives:** The study was aim to determine the prevalence of needle stick injuries among medical students in terms of number of cases and episodes of injuries, to identify the factors associated with the needle-stick injuries and to assess the knowledge of universal precaution, risk perception of needle stick injury among these medical students.

**Methods/Study Design:** A cross sectional study was conducted among the undergraduate medical students (3rd year to final year) in Melaka, Malaysia from October to December 2012.

**Results/Findings:** There were total 316 medical students participated in this study, 143 (45.3%) male and 173 (54.7%) female. Among them (76.9%) of students were immunized with Hepatitis B vaccine and 74.4% of them did not have exposure regarding health education to universal precaution. The prevalence of needle stick injury was 63(19.9%) and majority of it occurred at medical ward 51(81%). The cause of injury was mainly due to lack of experience and it was occurred during recapping and during blood withdrawal. 54 (85.7%) of them were wearing the glove during injuries occurred. Most of the injuries were caused by hollow bore needle and only 32(50.8%) of them have taken the immediate post exposure action such as hand washing, encourage bleeding, reporting and immunization.

**Conclusion:** In conclusion, the awareness of the student with regards to needle stick injury and preventive measure and application on their practical training was poor. It would be recommend that the health education program for needle stick injury and prevention measure should be introduced to all the students intensively and encourage them to apply during their daily practice.

**Key words:** Needle sticks injury, perception, medical students, Malaysia

## Introduction

Needle stick injury (NSIs) is major cause of blood borne infections transmitted among health care personals. There are more than 20 types of blood borne pathogens and mainly of hepatitis B; hepatitis C and human immune deficiency (HIV) virus can be transmitted through needle stick injuries. [1, 2] Needle sticks injury is one of the constant threat to health care workers, especially medical students who are at high risk because of their relatively luck of experience during their clinical years. Medical students are at a risk of needle stick injury with the consequent risk of acquisition of blood-borne infection by pathogens such as HIV, Hepatitis B and Hepatitis C while performing their clinical activities in the hospitals. [3-4]According to studies, 11 to 50% of students had history of exposure to infection related to sharp injuries during their undergraduate training period. [5] Administering injection, withdrawing blood, recapping needles, disposing needles, handling of trash and dirty linens and transferring blood or body fluid from syringe to specimen containers are common activities associated with sharp injuries. [6]

The World Health Organization has estimated that in developing regions, 40%–65% of Hepatitis B virus and Hepatitis C virus infections in health care workers are attributable to per-cutaneous occupational exposure. [7]The medical students throughout the world show a similarly high rate of sharp exposures and the study in Malaysia found the high incidence (23.5%) of sharp injuries among medical students over one year. [8] Another study found that 84% of surveyed medical students suffered at least one occupational sharp exposure during their clinical training. [9] Lack of experience and technical expertise is related to risk of needle-stick injuries. [10] This suggested that unskilled students may be at a highest risk during their medical training and this is also related to their risk perception.[11, 12]

According to Jantan et al most of the sharps injuries were due to the absence of sharps bin at the site of the procedure and neglected needles are left in trays, kidney dishes, among drapes and among trash. It also stated that noncompliance or failure to adhere to guidelines can become a contributory factor to needle stick injuries.[31]

Davies et al stated that in the operating theatre, 39% of the injuries were self-inflicted while 61% were inflicted by the surgeon or assistant and the majority of the injuries occurred during transfer of sharps between personnel. Direct hand transfer of needles or scalpel blades on handle.[32]

Melaka Manipal Medical College is situated in Melaka Malaysia. It is the twin medical university with Manipal University, India. The students from Malaysia who are eligible to pursue the medical and dental profession, the first five semesters (two and a half year) have to be studied in Manipal campus India and the second five semesters (two and a half year) are in Melaka campus Malaysia. Total number of students in the year 2012 is 503 students in medicine.

The introduction of health educational programs can produce positive changes in both knowledge and attitudes toward safety protocols[13] and inclusion of blood and body fluid safety precautions in medical college curricula resulted in a more compliant attitude towards safety procedures that protect against accidental blood borne pathogen transmission. [14]

Medical students are the future doctors and they have underlying high intelligent level to learn medical profession. So that rather than given them ordinary health talk, their underlying knowledge were promoted by introducing Melaka Manipal Medical College needle stick injury prevention intervention.

By doing this can promote the students interests on the universal precaution measures on needle sticks injury and that will prevent future transmission of infection through needle stick injuries and from them knowledge and distributed to the future medical students and all health care workers. This study is base line study before introducing health education intervention on needle stick injury prevention and the data from this study will contribute in to find out effectiveness of health education program after intervention.

The objectives are to determine the prevalence of needle stick injuries among medical students in terms of number of cases and episodes of injuries, to identify the factors associated with the needle-stick injuries and to assess the knowledge of universal precaution, risk perception of needle stick injury among these medical students.

## Methods

A cross sectional study was conducted among the undergraduate medical students (3rd year to final year) in Melaka Malaysia from October to December 2012. This study was the base line study before the health education program was carried out. The questionnaires were developed based on the health belief model[15, 17] and AIDE-MEMOIRE for a strategy to protect health workers from infection with blood borne viruses. [8]Sample size was calculated based on the previous similar study in Malaysia with the prevalence of needle stick injury 23.5%.[28] Data was collected in the form of pre-tested self-administered questionnaires. In order to standardize the questionnaires, a pilot study was conducted among the third year medical students; content validity was examined by using cronbach alpha analysis (0.6). The pre-tested structured questionnaires were distributed to all the students during their combine lecture classes. The purpose of the study was explained and informed written consent was obtained. The study was approved by ethical research committee Melaka Manipal Medical College. All the collected data were tabulated and analyzed by using the statistical package for social science, SPSS, version 16.0. Descriptive statistics such as mean, median and range was determined. 95% Confidence Interval was calculated with the level of significance was set at 0.05.

For knowledge and perception variable, several questions concerning about the opinion of the by respondents was asked. The score was given according to the respondent's answer and then the scores were summed up. The knowledge part consists of 24 questions and the score is 1 or 2 for correct answer according to importance and 0 for incorrect or no response or missing value answer. Perception was measured in 5 categories according to the Likert scale (McDowell 2006). The attitude part consists of 13 questions and the questions consist of both negative and positive aspects. For positive questions, the score was given 5 for strongly agree, 4 for agree, 3 for uncertain, 2 for disagree and 1 for strongly disagree. For negative questions, the score will be given 5 for strongly disagree, 4 for disagree, 3 for uncertain, 2 for agree and 1 for strongly agree.

Needle stick injury is defined as per-cutaneous injury caused by the suturing needle and hollow bore needles, that is, the type of needle used for giving injection or drawing of blood which has the bore that the blood can remain inside after use. [16] Prevalence of needle stick injury is period prevalence over past one year. Perception was defined as the way of understanding upon risk factor and precautions of needle stick injury by the students.

## Result

***Base line characteristics of respondents***

There were total 503 students in the academic year belonging to the third year to final year in 2012. Among them 316 respondents (Year 382(25.9%) Year 4- 139(44.0%) final year 95(30.1%)) participated in this study with response rate of 62%. The majority of the students 141 (44.6%) were age of 23years old, mean age was (23) years. Among them, 143 (45.3%) were male and 173 (54.7%) were female. Most of the students, 132 (41.8%) were Malay followed by 108 (34.2%) Chinese, 66 (20.9%) was Indian and others 3.2%.Regarding religion among the respondents, most of the students, 135 (42.7%) were Islam followed by Buddhist 82 (25.9%), Hindu 55(17.4%) and others 13.9%. Regarding the hepatitis B vaccination among the respondents, immunization statuses by the students were increased from (76.9%). Regarding Distribution of exposure to health education about needle sticks injury prevention among the respondents, 79.4% of intervention group, 70.6% of control group and total 74.4% of students do not have exposure to health education about needle sticks injury prevention.

***Prevalence of needle sticks injury***

There were a total of 63(19.9%) reported episodes of needle stick injuries in this study. Every respondent got the needle stick injuries during his or her medical career. Majority of needle stick injuries occurred during Medicine posting 51(81%), followed by family medicine and community medicine posting 10(15.9%). Majority of injuries were due to hollow bore needle 55(87.3%) and 49(77.8%) of injuries were self- inflicted. Among them 54(85.7%) were wearing a glove during the injury. Site of injury revealed that 45(71.4%) of respondents have injuries in the finger. Multiple responses were taken for perceived cause of injury and majority 32(50.8%) due to lack of experience, due to excitement 15(23.8%) and 12(19%) occurred during their hurried procedure. Only 32(50.8%) cases had taken immediate post exposure action after injury, but 31(49.2%) had not taken any appropriate action. The immediate post-exposure action taken was washing the wound, drug consumption, and encouraged bleeding and blood sent for investigation. Majority of those who did not take any immediate action perceived that there was no need to take any action. The information regarding needle stick injury was shown in table (1).

***Knowledge concerning needle stick injury and prevention measure***

Knowledge of smoking was assessed by (23) questionnaires, allowing response with 'True' or 'False' or 'Don't know'. Questions were summarized in order of 4 section such as “Disease transmitted by sharp injury ", Procedure on dealing with syringe" “Standard precaution", "Hepatitis B immunization " and “Post exposure prophylaxis”.

Most of the students had knowledge on the diseases transmitted by contaminated sharp objects e.g. HBV, HCV and HIV. But 148(46.8%) of the students reported that Hepatitis C infection could be prevented by vaccine. Only, 159(50.3%) of students aware that needle should not be recapped after exposure to blood. 124(39.2%) of the students correctly answered that pre-vaccination test was not necessary while 113(43.4%) believed that post vaccination test was necessary regarding to hepatitis B immunization (Table 2).

***Perception of students on needle sticks injury***

Thirteen statements were constructed to detected perception of the students on needle stick injury in following areas; perceived susceptibility, perceived seriousness, perceived threat on risk of needle stick injury, perceived benefit and perceived barrier on risk of needle stick injury. The results were shown in table 3.

## Discussion

***Base line characteristics of respondents***

There were total 503 medical students in the academic year belonging to third year to final year. Among the respondents, (76.9%) were immunized with Hepatitis B vaccine and the immunization status of medical students in other studies was 67.7%, 86.2% and 97% accordingly. [21, 23, 27] In this study, (79.4%) participant had exposure regarding health education to universal precaution. This could be due to the reason that there was no specific topic on needle stick injury and universal precaution in their curriculum.

***Practice of Needle sticks Injury***

There were total of 63(19.9%) of students experienced needle stick injury during their clinical training. However other research on medical students reported higher incidence rates of injuries i.e. 33%, 26.1%, 23%, 30.8% and 39.4% respectively. [8, 19, 28, 32, 34] And lower incidence in these studies 11%, 14.1% and 13.84% respectively. [20, 10, 33] In this study, injuries caused by hollow bore needle were 55(87.3%) and majority was self-inflicted 49(77.8%) [8]. In a study by Talas MS, the injuries due to hollow bore needle were 72.2%[21] and in a study by Shen et al self-inflected injury is (34%). [8]There were 54(85.7%) of students were wearing the glove during injury but in other studies (43%) and (62.2%) respectively. [21, 28]Some students thought that wearing gloves was of no benefit, as the needle would penetrate the glove. Here, majority of incidence of needle sticks injuries occurred at medical ward 51(81%) but a study by Norsayani MY et al, needle stick injuries mainly happened in O& G ward followed by medicine and surgery[10] and in a study by Shen et al, most of the injuries occurred at surgical ward 24(69%) [8]depend on the chance to get clinical exposure by the students.

***Knowledge concerning needle stick injury***

Most of the students had knowledge about the diseases transmitted by contaminated sharp objects. In a study by Norsayani MY et al, most of the student acquired knowledge of blood borne disease mainly from the lectures 98.3%, books 90.8% through informally 81.6%. Almost all of the participants (n = 250, 93%) identified blood as the most infectious body fluid that can transmit infections through occupational exposure. [35] In the study by Deisenhammer S et al, general, students' knowledge about the transmission risks of HIV, hepatitis B and C through a

needle stick injury with a contaminated needle was poor. A study by Saleem T et al, more than 85% students from each class were aware of the possibility of acquisition of Hepatitis B, Hepatitis C and HIV from needle stick injuries. Only 16.4% 3rd year students, 29.5% 4th year students and 36.2% final year students knew the full details of needle stick injury prevention protocols. Curriculum was cited as an important source of information regarding needle stick injuries. [19]The percentage of students who acquired knowledge of universal precaution was 70.3%[10] and in a study by Kulkarni et al ,the knowledge of the study participants was high regarding standard precautions, as 70.5% (n = 189) of the participants were able to identify all of the components[35]. A similar study on health science students in northern china reported that the students displayed a general lack of knowledge of occupational exposure standards.[22] the transmission risk of HIV was rated correctly by only 9% of a first year as compare to 45% of the fifth year students. Similar results were found for hepatitis B and C. Overall, the students tended to overestimate the transmission risks.[28]

***Perception of students on needle sticks injury***

In this study, 47% of students disagree/ Strongly disagree of the statement " If health care workers get infected with HIV infection, they should resign from their profession" and in a study by Lal P et al, majority of the interns (68.3%) perceived themselves to be at a very high/high risk of acquiring HIV infection during their medical career.[29] The common reasons for perceived risk of acquiring HIV infection were due to needle pricks/cuts during surgical procedures (32.4%), frequent exposure to the blood/ secretions of patients (28.5%) and insufficient availability of gloves (17.6%). Some (23.2%) were of the opinion that students in future might lose interest in the medical profession due to the increasing risk of HIV infection and few (3.1%) were even considering to leave the medical profession for the same reason.[29]

In this study 81.1% of students agree/strongly agree to the statement, "Reporting after needle stick injury is not much useful" but in a study by Hanafi MI et al, it was identified that the common reasons for not reporting of NSIs that warrant attention and there is little perceived benefit to reporting occupational exposure, especially when reporting can result in punishment, blame or even job loss. In addition, health workers commonly perceived the risk of the exposure to be low. Barriers to reporting should be appropriately identified and eliminated in order to ensure appropriate counselling and treatment of health workers after exposure. [30]

## Conclusion

In conclusion, this study documented that the prevalence of needle stick injury among the students were quite high. The study revealed that the student's aware of needle stick injury and preventive measure satisfactorily but application on their practical training was poor. It would be recommend that the health education program for needle stick injury and prevention measure should be introduced to all the students intensively and encourage them to apply during their daily practice. Since, medical students were also at the risk of getting infection, they should have been immunized with Hepatitis B vaccine.

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**Conflict of Interest:** None declared

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**Table 1:** Information regarding injuries N=316

| | Needle stick injury | Frequency (%) |
|---|---|---|
| **Total injury** | Yes | 63(19.9%) |
| | No | 253(80.1%) |
| **Posting** | Medicine | 51(81%) |
| | Surgery | 2(3.2%) |
| | Paediatric | 0(0%) |
| | Family medicine and Community medicine, | 10(15.9%) |
| | A&E, OPD | 0(0%) |
| **Instruments** | Solid needle | 8(12.7%) |
| | Hollow needle | 55(87.3%) |
| **Site of injury** | Finger | 45(71.4%) |
| | Hand | 18(28.6%) |
| **Mechanism of injury** | Blood withdrawal | 30(47.6%) |
| | Recapping needle | 17(27%) |
| | IM injection | 8(12.7%) |
| | IV injection | 4(6.3%) |
| | Assist in theatre | 3(1.6%) |
| **Cause of injury** | Self-inflicted | 49(77.8%) |
| | Injured by someone else | 14(22.2%) |
| **Glove intact or not** | Yes | 54(85.7%) |
| | No | 9(14.3%) |
| **Reason of Injury** | Rush | 12(19%) |
| | Lack of experience | 32(50.8%) |
| | Lack of assistant | 1(1.6%) |
| | Excitement | 15(23.8%) |
| | Others | 3(4.8%) |
| **Immediate post exposure action taken** | Yes | 32(50.8%) |
| | No | 31(49.2%) |

**Table 2:** Knowledge concerning needle stick injury among all the students

| Variables | Categories | Frequency | Percent (%) |
|---|---|---|---|
| **Disease transmitted by sharp injury** | Hepatitis A | 175 | 55.4% |
| | Hepatitis B | 298 | 94.3% |
| | Hepatitis C | 248 | 78.5% |
| | Hepatitis E | 145 | 45.9% |
| | HIV | 294 | 93% |
| | **Vaccination can prevent HCV** | 148 | 46.8% |
| **Procedure dealing with syringe** | The used syringes disposed into regular trash can cause needle stick injury | 283 | 89.6% |
| | It is necessary to recap the used syringes before you discarding them away? | 159 | 50.3% |
| | Sharp needle should be discarded into black colour container. | 256 | 81% |
| | Soiled bandage and dressing should be discarded into yellow color bin | 257 | 81.3% |
| **Standard precaution** | Hand washing after direct contact with patient | 267 | 84.5% |
| | Needle recapping | 140 | 44.3% |
| | Safe collection and disposal of sharp | 300 | 94.4% |
| | Wearing glove | 247 | 78.2% |
| | Safe hospital management | 300 | 94.4% |
| **Hepatitis B immunization** | Prevaccination test not necessary | 124 | 39.2% |
| | Schedule 0,1,6 is used | 244 | 77.2% |
| | Post vaccination test necessary | 137 | 43.4% |
| | Not administer booster routinely | 97 | 30.7% |
| **Post exposure prophylaxis** | Hepatitis B immunization | 222 | 70.3% |
| | Wash wound with water | 262 | 82.9% |
| | Put pressure to arrest bleeding | 113 | 35.8% |
| | Test blood of patient | 253 | 80.1% |
| | Maintain confidentiality on injury | 199 | 63% |

**Table 3: Perception on risk of needle sticks injuries and universal precaution**

SA – strongly agree, A- agree, U – uncertain, DA- disagree, SDA- strongly disagree

| Statements | SA/A (%) | U (%) | SDA/ DA (%) |
|---|---|---|---|
| Every health care workers has chance to get needle stick injury | 95.8 | 0.3 | 3.8 |
| needle stick injuries are unavoidable things for health care workers | 51.6 | 15.5 | 32.9 |
| Increase workload can lead to needle stick injury | 78.2 | 14.2 | 7.6 |
| If health care workers get infected with HIV infection, they should resign from their profession? | 23.4 | 29.1 | 47.5 |
| The standard precautions to handle the sharp objects must always follow as improper handling can lead to get the infection | 97.1 | 2.5 | 0.3 |
| The infection transmitted from needle stick injuries are life threatening | 81.1 | 12.3 | 6.7 |
| Although there is a risk of infection, confident and skilfulness can prevent injury | 87 | 6.3 | 6.7 |
| We haven't learned about standard precaution for needle stick injury | 26.6 | 29.1 | 44.3 |
| Unavailability of protective equipment can predispose a person to get needle stick injuries | 86.7 | 8.5 | 4.7 |
| Handle needle without wearing glove is better than wearing glove | 77.9 | 8.9 | 13.3 |
| Reporting after needle stick injury is not much useful | 81.1 | 9.2 | 9.5 |
| Every health care worker should be immunized with Hepatitis B vaccine | 95.3 | 3.1 | 1.5 |
| Health education for universal precaution on NSIs to the students and health care workers can reduce the prevalence of needle stick injuries among them | 89.9 | 7.3 | 2.9 |