Incidence Of Needle Stick Injury Among Proficiency Certificate Level Nursing Students In Kathmandu, Nepal

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Abstract: An academic institution based cross- sectional survey was done to identify the incidence density of needle stick injury among PCL level nursing students. Multi stage sampling method was used to select 407 samples from nursing students studying inside Kathmandu valley. Self administered questionnaire and review the records guideline were used as research tool. Incidence density was calculated by using R software. Out of total participated students, 46.9 % had have needle stick injuries in the past and 44.7% experienced it more than one time. The overall incidence density was found 5.82/person 1000 days exposure. The incidence density in night shift (6.86) and in second year practicum period (6.91) was found higher than day shift (5.41) and first year (4.21) respectively. Out of total 298 injuries, 67.8 % were happened during medication, 41% while drawing medicine, 20% while recapping the needle and 45.1 % at medical ward.   Only 46.6% injuries were reported and prophylaxis was used only in five injuries. However, almost all the students (98.3%) stated that they follow universal precaution but only 28% practicing no-recapping. Although the curriculum focuses on no recapping, there is a common practice of reusing syringes for the same patient in Nepal. Therefore, students must have to recap the needle. So, it is recommended that content in the curriculum and universal precaution training should be revised in the context of Nepal. Thirty one percent students also stated that needle should recap properly by using one hand technique for the prevention of needle stick injury. It is also recommended to develop standard operating procedure for proper post exposure management of needle stick injury.

Key words: Incidence, Needle Stick Injury, Nepal, Nursing Students

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1 INTRODUCTION

The free medical dictionary define needle stick injury as an accidental skin penetrating stab wound from a needle or other sharp object that may result in exposure to blood or other body fluids. These events are of concern because of the risk to transmit blood-borne diseases through the passage of the hepatitis B virus (HBV), the hepatitis C virus (HCV), and the Human Immunodeficiency Virus (HIV)[1],[2]. Needle sticks and sharp injuries (NSSIs) have been recognized as one of the common occupational hazards among health care workers. The study concerning exposures to blood and bodily fluids in health care workers found that on average 93.7 per 1000 health care employees were exposed annually [3]. The majority of the exposures were found to occur in nursing personnel, with 35% of total exposures occurring via needle sticks. The survey conducted among health care workers in Nepal revealed that 74% had a history of needle-stick injuries [4]. Students exposed to invasive procedures with minimal experience therefore they are more prone to have needle stick injury.

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The study conducted on experience of needle stick injury among nursing students found out that of the total 96 sample, nine people reported receiving a needle stick injury. Five out of the nine needle stick injuries were received while in the student role [5]. Another study conducted by Narsayani & Hassim [6] found out that 59 medical students out of 417 had at least one needle stick injury which was an incidence of 14.1%. There are different factors contributing for the needle stick injury. The study conducted among student nurses found out that the majority of injuries (3.1%) occurred on a Medical-Surgical unit [5]. Equipment designs, nature of the procedure, condition of work, staff experience, recapping and disposal have been mentioned in different studies as factors that influence this occurrence. An extensive study have been conducted on needle stick injury and factors contributed to this problem among the health workers but only fewer study have been done among the nursing students [5]. As per the researchers best search in the context of Nepal, only few studies have been conducted in this issue among health workers but the students were not included any of such studies. Therefore, there is an information gap about the incidence of the needle stick injury, reporting system and contributing factors of this problem among Proficiency Certificate Level (PCL) nursing students. In order to fulfill this gap, this study aimed to calculate the incidence and explore contributing factors for needle stick injury among Proficiency Certificate Level Nursing (PCLN) students in Kathmandu valley.

2 METHODOLOGIES

2.1 Research Design:
"Quantitative" research method and "Descriptive Cross Sectional" research design was used for this study to find out the incidence and contributing factors of needle stick injury among PCL nursing students of Kathmandu valley.

2.2 Study Area and Study Population:

All the PCL Nursing colleges affiliated either to CTEVT or Tribhuwan University existing inside the Kathmandu valley were included in the study. All the students studying second year or third year in these nursing colleges were study population. The rationale behind selection of Kathmandu valley was because the density of nursing colleges in Kathmandu is higher in comparison to other part of the country. Besides this, the colleges from Kathmandu valley would represent the colleges outside of the valley in the context of exposure to different kinds of hospitals such as government hospitals, community hospitals, district level hospitals, private hospitals, tertiary level hospitals.

2.3 Sample Size and sampling method

Sample size was calculated based on the formula mentioned below. Total sample size obtained 400 including 10 % non response.

Sample size (n) = [DEFF*Np(1-p)]/ [(d2/Z21-α/2*(N-1)+p*(1-p)]

   Where, N = Population size (Null)

   p = Estimate prevalence of needle stick injury (0.2)

   d = Precision (0.05)

   DEFF = Design effect (1.5)

   Z1-α/2 = 1.96

The multistage sampling method was used for this study. First of all, the name lists of all the colleges were obtained from CTEVT and Tribhuwan University. The colleges were stratified in two groups based on affiliation. There were only two colleges affiliated with TU inside study area that included into the study. Six out of total 27 CTEVT affiliated colleges were selected randomly. Three extra colleges were also selected as an alternative sample. The sampling frame of the study population was prepared from the second and third year students' attendance sheet. The numbers of students in each college were not equal. As sample needed for this study was about 59% of total students from all the college so number of students from each colleges were decided based on proportionate to population size (PPS) and selected randomly by using lottery method.

2.4 Data Collection Tools and Process

The self administered questionnaire was prepared including all the variables under interest and validated by the 3 experts. The pre testing of the tool was also done among 10% of total sample (40 subjects) in similar settings. The tool was finalized based on suggestion and comments from experts and pre-testing results. Review the records guideline was also prepared to collect the information on their total posting days and non-attendance in the clinical period. The sampling frame was developed from the name list of attendance sheet. The students were explained about the purpose of the study and excluded those who are not interested to participate. Selected students were kept in the separate classroom. Questionnaire was distributed and instruction that were written in the questionnaire were explained. The questionnaire was collected from students immediate after completion with in specified time. The completed questionnaire were checked for completeness and consistency before leaving the class room.

2.5 Quality Control of Data and Data Analysis Framework

In order to control the quality of quantitative data, the instrument was pre-tested and reviewed by experts. All the questionnaires were reviewed for completeness and consistency by the researcher and the research supervisors before leaving from the field work. Coding, editing and cleaning data was also done. The data were entered in Epidata and managed and analyzed by using R software. Descriptive statistics were calculated as frequency, percentage and average. The incidence density of needle stick injury was calculated and presented as rate of incidence per person days exposure based on this formula.

$$\text{Incidence density} = \frac{\text{Number of needle stick injuries during clinical practice in the past 12 months}}{\text{Total person days of clinical practice in the past 12 months}} \times 100$$

2.6 Ethical Consideration

Official letter, with detail explanation of objectives and methods of the study, was send to the randomly selected colleges to obtain permission for data collection. Two colleges did not wish to participate so substitute was done by another randomly selected college. Ethical approval was obtained from Ethical Review Board of Nepal Health Research Council (NHRC). Written permission was obtained from the concerned nursing institute and submitted to NHRC. Informed consent was obtained from the participants of this study. Confidentiality of the obtained information and anonymity was maintained.

3 RESULTS AND DISCUSSION

3.1 Results

Socio-demographic Characteristics
Four hundred and seven nursing students from eight nursing institutes residing Kathmandu valley were participated in the study. There was nearly an equal participation of students from both second (47.7%) and third (52.3%) year in the study. However the age of students' ranges between 16 to 32 years, more than half were at the age of 18 and 19 years and mean age 18.99 years with standard deviation 2.03. Almost all (93.3%) of the students were unmarried female. Nearly half (42.8%) students were from Brahman/Chhetri ethnic group followed by Gurung/Magar/Tamang/Sherpa (16.2%) and Newar (14.3%). Nearly half (47.7%) of the students were from Kathmandu, Lalitpur and Bhaktapur districts (Table 1).

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Table 1: Frequency distribution of PCL nursing students studying inside Kathmandu valley by their socio-demographic characteristics

Socio-demographic characteristics	Number	Percentage
Current year of studying	194	47.7
2nd year	213	52.3
3rd year		
Age		
16 & 17 years	65	16.0
18 years	117	28.7
19 years	109	26.8
20 + years	103	25.3
Not mentioned	13	3.2
Marital status		
Married	27	6.7
Unmarried	380	93.3
Ethnicity		
Brahman/Chhetri	174	42.8
Newar	58	14.3
Gurung/Magar/Tamang/ Sherpa	66	16.2
Rai/Limbu/Kirat	13	3.2
Other	26	6.4
not mentioned	70	17.2
Address		
Inside Valley (Kathmandu/lalitpur/Bhaktapur)	194	47.7
Outside Kathmandu valley (all other districts)	213	52.3

Incidence and Post Injury Reporting

The students were asked about NSI occurred ever in the past exposure and during the clinical posting of recently completed academic year. Two hundred and four students (50.1%) had injured ever in the past exposure and one hundred and ninety one students (46.9%) were injured during recently completed academic year. Out of total students (191) who got injured in recently completed academic year, more than half (55.3) had only one injury followed by two injuries among 31.1% students. The number of injuries ranges between one to five times but the mean injury was 1.64±0.867. The incidence density was calculated by dividing the total number of injuries during one academic year clinical posting by total person time exposure during the academic year. The overall incidence density was found 5.82/person 1000 days' exposure. Second year exposure period had higher incidence density (6.91) comparing to first year exposure period (4.21). Night shift had higher incidence density (6.86) comparing to morning + night shift (5.41). However total injuries were 311, thirteen injuries were excluded from further analysis due to incomplete detail information. Out of total 298 injuries included for further analysis, only 46.6% were reported to the concerned person. Out of total reported injuries, more than half (56.1%) were reported to the clinical supervisor.   Only five injuries received prophylaxis in free of cost from hospital among the students studying in Lalitpur Nursing Campus (Table 2).

Table 2: frequency distribution, incidence density, post-injury reporting and prophylaxis status of needle stick injuries among PCL nursing students studying inside Kathmandu valley.

Description	Frequency	Percentage
Have you ever injured by needle stick? (n= 407)		
Yes	204	50.1
Needle stick injury during clinical posting of recently completed academic year?		
Yes	191	46.9
Number of needle stick injuries/ student who had an injury(n=191)		
Only one	105	55.3
Two	59	31.1
Three and more	26	13.7
Have you report injury to the concerned person? (n=298)		
Yes	139	46.6
If reported, whom did you report? (n=139)		
Clinical Supervisor	78	56.1
Ward In-charge/ward staff	61	43.9
Have you received Prophylaxis? (n=139)		
Yes	5	1.7
Mean injury ± SD		1.64± 0.867
Total incidence density rate	5.82/person 1000 days exposure	
Incidence density in first year clinical exposure period	4.21/person 1000 days exposure	
Incidence density in second year clinical exposure period	6.91/person 1000 days exposure	
Incidence density in night shift	6.86/person 1000 days exposure	
Incidence density in morning + evening shift	5.41/person 1000 days exposure	

NSIs by Work and Procedure Related Factors

Out of total 298 injuries, 67.8 % were happened during medication followed by 16.6% during collecting blood sample. The information was also asked about specific activity with needle while occurs injury. Forty one percent injuries were occurred while drawing medicine followed by 32% and 20% while opening the cap from needle and recapping the needle respectively. Nearly half of the injuries were occurred in morning shift (46.8%) and (45.1%) at medical ward (Table 3).

Table 3: frequency distribution of NSIs by work and procedure related factors among PCL nursing students studying inside Kathmandu valley (n=298 injuries)

Descriptions	Frequency	Percentage
Nursing procedure in which injury occurred		
During medication	200	67.8
Drawing blood sample	49	16.6
Opening I/V line	14	4.7
Assist in suturing	6	2.0
Other (bed making, shaving)	26	8.8
Specific activity with needle while occurring injury	122	41.1
Drawing medicine	95	32.0
Opening Cap of needle	61	20.5
Recapping the needle	19	6.4
Others (bed making, pricking to the patients, cleaning equipments at OT, suturing, shaving)		
Area of work where injury occurred	134	45.1
Medical ward	101	34.0
Surgical ward	62	20.9
Other (Emergency, OT, Obstetric, lab, OPD)		
Duty shift in which injury occurred	139	46.8
Morning	125	42.1
Evening	33	11.1
Night		

Practice of Universal Precaution and Vaccination

Almost all (98.3%) students reported that they follow the universal precaution. But only 28% of the students used practice of no recapping. According to their view on preventive measures of NSIs, 31.3% stated that needle should recap properly by using one hand technique or recap by keeping the cap on the table where as 40.6% stated about no recapping and 85.5% stated about proper disposal of needle. Complete trolley setup including preparation for disposal of needle was found only in 10% events out of total NSIs (298) events. Nearly half (44%) students had already completed vaccine against Hepatitis B and 32% of them have not completed yet where as 23% had not started vaccine yet.

3.2 Discussion

Needle stick injuries have been recognized as common occupational hazards among health care workers. This study also revealed that NSIs are common in nursing students. The PCL nursing students usually expose in clinical practicum for 20-30 weeks in one academic year. Out of total students participated in the study, 46.9 % had already experienced NSIs even during this short period of time. This finding is very high comparing to findings among medical students [6] which was only 14.1% and among nursing students was 25.3% in Uganda [7] and 9.4% in Greenwood [5]. Needle stick injury is not a single life time event. Usually health care workers experience it more than once. This study found that nearly half (44.7%) out of those who had an injury, had more than one injuries where as

39% nurses in Pakistan also had more than once[8]. Therefore, the information on proportion of workers having injury may not provide actual information about magnitude of the problem. This study calculated the incidence density of NSIs. The overall incidence density was found 5.82/ person 1000 days exposure. It means 5.8 injuries would be expected if one person exposed for 1000 days. Similar study in India found the occurrence rate of about 3.47% per annum among health care workers [9]. More than 90% of the injuries were occurred in morning and evening shift but in fact night shift had higher incidence density (6.86) comparing to morning + night shift (5.41). Second year had higher incidence density (6.91) comparing to first year (4.21). This can be because second year students assigned to do more invasive procedure than first year students based on their curriculum. Out of total 298 injuries, 67.8 % were happened during medication, drawing medicine (41%) and at medical ward (45.1%). These findings were supported by other similar studies. This also may be because students are more responsible in medication, blood sample collection posted mainly to medical surgical ward. All health science students learn about universal precaution and almost all (98.3%) students of this study also reported that they practice it which includes no recapping of the needle. But in practice re-use of syringe is very common in some countries including Nepal; like in Nigeria 85% of the health facilities recapped the needle. In such a context, students must recap needle for next use. One third of the student of this study mentioned one of the preventive measures as "one hand recapping technique". Therefore it is recommended that universal precaution and the nursing curriculum should include the content on how to recap the needle safely and how to handle used syringe safely. However PEP is very effective and useful in prevention of blood born diseases, the PEP was not used by Ugandan students unless it is being indicated (Hulme P, 2009). Although the reporting of NSIs was 46.6% , only five injuries out of total were found managed with prophylaxis in this study. Unlike this finding, the reporting within one hour was found 94% and PEP against HIV/AIDS was found among one fourth (25%) of the exposed health care workers in Kenya [10] and 7.8% in India [9].

4 CONCLUSIONS and RECOMMENDATIONS

On the basis of analysis and interpretation of the findings, this study concluded that the incidence of needle stick injury was found very high among PCL nursing students studying in Kathmandu valley. The study also found out that students have been involving in recapping needle although it was taught not to recap based on their curriculum. One fifth of the injuries were also occurred during recapping. Therefore it is recommended that universal precaution and the nursing curriculum should include the content on how to recap the needle safely and how to handle used syringe safely. The use of post injury prophylaxis was also found very low. To address the low rate of NSIs reporting and almost no use of post exposure prophylaxis, proper post exposure management by developing Standard Operating Procedure (SOP) is urgently recommended. The SOP should include information on proper reporting system and responsibility of vaccination and post-exposure prophylaxis.

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