Original Article

Needle Sticks Injuries among Health Care Professionals in Tertiary Hospital

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Abstract

Introduction: A needle stick injury (NSI) is a percutaneous piercing wound typically set by a needle point, but possibly also by other sharp instruments or objects commonly encountered by Health Care Professionals (HCP). This is a serious issue of occupational hazard because of the risk to transmitting blood –borne diseases like Hepatitis B Virus (HBV), the Hepatitis C Virus (HCV), and the Human Immunodeficiency Virus (HIV). Hence, the study was conducted to find out the prevalence of NSI among laboratory and nursing staff (HCP).

Methods: A descriptive cross sectional study from 400 Health Care Professionals was investigated by census sampling. A set of self administered questionnaire was used to collect data in the setting of Tribhuvan University Teaching Hospital (TUTH). The data analysis was done in SPSS program with descriptive statistics.

Results: The prevalence of needle stick injury (NSI) was 251(80%). Regarding knowledge response, 193(63%) said needles should not be recapped, 181(58.68%) said gloves should be used for injection all the times, 286 (91%) said HBV, HCV and HIV are transmitted by NSI, 154(50%) mentioned that HBV is a fast transmitting disease. Actions taken for NSI were as follows: 216(75%) washed injured site immediately, only 82(29.5%) said immediately report to authority and 150(54.50%) did nothing after NSI. The common device causing NSI was the syringe and needle 209(73.1%). 291(93.3%) said that they disposed used sharp needles in puncture proof bucket.

Conclusion: NSI is common among HCP in TUTH with 80% prevalence rate. So the health hazards of NSI should be well addressed like transmission of blood borne disease e.g.; HIV, HBV and HCV. Preventive measures should be taken to minimize the health hazards to professionals in health care settings.

Key words: Needle sticks injury, Health Care Professionals.

Introduction

A needle stick injury (NSI) is a percutaneous piercing wound typically set by a needle point, but possibly also by other sharp instruments or objects. It is commonly encountered by people handling needles in the medical setting, and is an occupational hazard in the medical community. NSI among Health Care Professionals (HCP) is a serious issue because of the risk to transmitting blood –borne diseases like Hepatitis B Virus (HBV), the Hepatitis C Virus (HCV), and the Human Immunodeficiency Virus (HIV) through the passage of needle stick. In Nepal, HIV infection rate is 0.3% in adult population between ages of 15-49 (UNAIDS, 2002)[1]. The prevalence of HBV is 1.6% in healthy blood donors[2]. This suggests that every HCP have potential risk of getting infection and they should take special precaution during work. Despite their seriousness as a medical event, NSI have been neglected. Most go unreported and documentation is not available. Use of needle and sharp instruments for injection are unavoidable for HCP and NSI prevention has become the subject of concern in an effort to reduce and eliminate this preventable event.

A study done by Adhikari et al., showed that 53.5% nursing students had history of needle stick injury and only 46.8% had reported to concerned authority, whereas all students were aware of the fact that HIV and HBV is transmitted through needle stick injuries[3]. Approximately 2 billion people globally show serological evidence of HBV infection[3]. 400,000,000 have chronic HBV infection (1 million people die each year from Hepatitis and its complications). This accounts 75% in Asia, 16% in Africa, 3% in Europe and 3% in America. 180 billion people around the world are infected with HCV and 40 million people worldwide were positive for HIV[4].

Health Care Workers (HCW) environment is one of the most vulnerable one due to stress, work complexity, hassle, infectious diseases, sharp instruments, unpredictable incidents and work-related accident rate in Healthcare is 1/3 higher than in other sectors[5]. Independent studies confirm the availability of adequate solutions could help to prevent more than 80% of all NSI. NSI from hollow bore needles – contaminated with blood – constitute a major hazard for HCWs. More than 1 million NSI occurs in Europe each year[5]. Worldwide estimated infections due to NSI among HCW each year shows as it is estimated about 800,000 NSIs and other sharps related injuries occurs per year in the US[6]. 30 NSI with hollow bore needles per 100 hospital beds per year in the US[7]. Annually nearly 100,000 HCWs contact blood-borne infections (HBV, HCV or HIV) worldwide [8]. Up to 90% of all NSIs remain unreported[9]. 66.000 cases of HBV, 16.000 cases of HCV, 5.000 cases of HIV are caused by NSI. Approximately 62% to 88% of the estimated NSI are preventable through technology and training.[10]

Thus it is very important to get the information about NSI happening in the hospital since this has a high risk for HCPs. This study focuses on injuries caused by contaminated sharp instruments which include needles, lancets, scalpels, and other objects. Furthermore, the study also explores the need for intervention strategies to reduce the impact of NSI and analyze to what extent safety devices are a suitable tool in the reduction of NSI and what preventive measures can be implemented by the hospital for prevention.

Methods

A descriptive cross sectional study was conducted. The sample size was determined by census sampling to cover all Nurse and Lab technicians called Health Care Professional (HCP) later on. The HCP of two groups, including 50 laboratory and 350 nursing staff who were working in TUTH were selected as the sample. The study instrument was a set of self administered questionnaire developed in English as participants were able to read and understand it. Relevant information pertaining to NSI was included in the study instruments along with general socio-demographic information.

The validity and reliability of research instrument was maintained by reading the relevant literature, using self experience, reviewing previous study instruments used by other researchers, consultation and discussion among members of infection prevention committee, TUTH. A pilot study was also carried out to assess the applicability and representativeness in a sample of study population. The feedback of the pilot study was incorporated in final study instrument.

Duration of study: The study was conducted from July to December 2012. A seminar was conducted among nursing Supervisors, Incharges, Nurses, and laboratory staffs in the nursing department. The participants were given a brief introduction about the study and its objectives. The investigators followed up the nursing department and the responsible incharges and supervisors, for the return of filled questionnaires. Data management was done by entering the information in SPSS version 11.5 program. In the same program data cleaning was also done. The various data of study variables were re-coded for categorical analysis for better understanding. The data analysis was done with descriptive statistics and cross tab analysis.

Study Setting

This study was done in Tertiary Hospital (TUTH), one of the leading referral hospitals in the country. Varieties of diagnostic and therapeutic invasive procedures are done every day in different service units, including operation theatre, Intensive Care Unit, Coronary Care Unit, Emergency and Out Patient Departments. Intravenous puncturing is one of the most common procedures done in each ward for the medication, insertion of diagnostic dye or for fluid replacement therapy. Prior to study ethical approval was obtained from Institutional Review Board and hospital authority. Informed voluntary consent was obtained from the HCPs. Anonymity of the information and identity of respondents was maintained. The voluntary informed consent format was explained to the participants in a meeting. A set of self administered questionnaire was also read and asked for clarification by the participants and allowed to discuss for better understanding.

Results

The results were described in accordance with stated objectives of the study. The results are presented in tables and figures and interpreted. The total response rate was 78.5% (n=314).

Demographic information: The demographic data showed most of the participants were 20-25 years accounting 106(38%), similarly 303(96.5%) were female, 294(93.6%) were nurses. Among them 69% were staff nurses by position.(Table-1). There was more participation from emergency department (12.1%). (Figure1). The immunization status of participant's showed 208(67%) received anti HCV and HBV vaccination, 12(4%) showed infection to one of organism among HCV, HIV or HBV. (Table -2).

Table 1: Demographic Information

Characteristics	Frequency	Percent
Age (n=277)		
20-25 years	106	38.3
26-30 years	54	19.5
31-35 years	25	9.0
36-40 years	31	11.2
41-> years	61	22.0
Sex (n=314)		
Female	303	96.5
Male	11	3.5
Position of HCW (n=314)		
ANM	4	1.3
Lab technician	20	6.4
Nsg Supervisor	7	2.2
Sister	66	21.0
SN	217	69.1

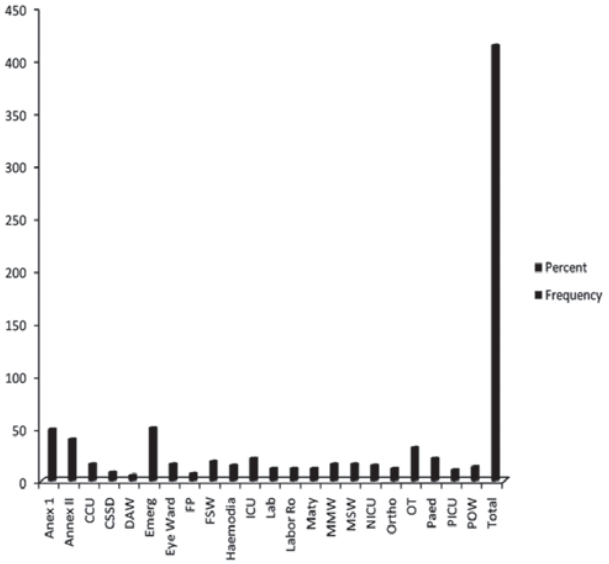

Figure 1: Units of hospital

Table 2 Immunization status

S N	Immunization status of respondents	Frequency	Percent
1.	**Anti HCV vaccination received (n=310)**		
	Yes	208	67.1
	No	102	32.9
2.	**Anti HbsAg vaccination received (n=310)**		
	Yes	208	67.1
	No	102	32.9
3.	**Immune status of HCV, HIV and HbsAg (n= 303)**		
	Negative	197	65.0
	Positive	12	4.0
	Don't know	94	31.0

Prevalence of NSI

The prevalence of NSI among nurses and lab technicians was 251(80%) (ever had NSI) and 62.8(20%) never had. (Figure- 2).

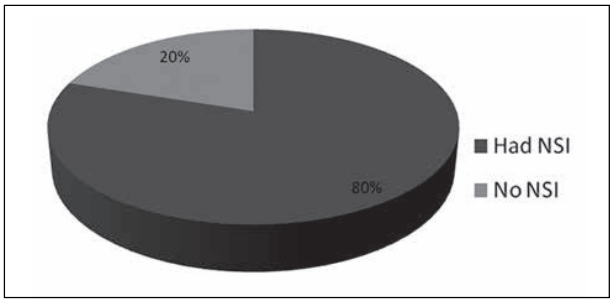

Figure 2 Prevalence of Needle Stick Injury

Knowledge on risk of NSI and actions taken

On the scale of assessing knowledge of risk of NSI among HCPs, there are four items in the questionnaire. The knowledge response was as follows: 193(63%) respondents said needles should not be recapped, 181(58.68%) said gloves should be used for injection all times, 286(91%) said NSI can transmit the HBV, HCV and HIV infections and 154(50%) said HBV is very fast transmitting disease. (Table-3). Similarly there were questions regarding actions taken for NSI in which 216(75%) said they washed injured site immediately, only 82(29.5%) reported immediately to authority, 150(54.50%) did nothing post NSI whereas only 59(21%) went for consultation and counseling. The common device causing NSI is the syringe and needle 209(73.1%). The victims of the NSI were 258(93.8%) nurse and 20(6.2%) laboratory staff, and 111(36.5%) participants know other coworkers having NSI. (Table 3 and 4).

Table 3 Knowledge on risk of NSI

SN	Knowledge on risk of needle stick injuries	Frequency	Percent
1	**Should needle be recapped after use(n=304)**		
	Yes	111	36.5
	No	193	63.5
2	**Use of gloves for injection and vein puncture (n= 308)**		
	Yes all times	107	34.7
	if necessary	181	58.8
	Not at all	16	5.2
	Others	4	1.3
3	**Disease transmitted by NSI* (n-312)**		
	HBV, HCV and HIV	286	91.7
	HIV,HCV and HEV	22	7.1
	Don't know	4	1.3
4	**Very fast transmitting diseases (n=307) that**		
	HBV	154	50.2
	HCV	126	41.0
	HIV	22	7.2
	Others	5	1.6
5	**knowledge of life threatening disease due to NSI (n=304)**		
	yes	64	20.7
	No	241	79.3

Table 4 Actions taken for NSI

S N	Actions taken for needle stick injury	Frequency	Percent
1	**Immediate action taken after needle stick injuries (n=285)**		
	Washed injured site with water	216	75.8
	Squeezed to site and let out the blood	42	14.7
	Did nothing	7	2.5
	Applied antiseptic agent	20	7.0
2	**Reporting of Needle Stick Injury (n=278)**		
	Yes	82	29.5
	No	186	66.9
	If yes, to authority	10	3.6
3	**Needle stick injury causing device (n=286)**		
	IV canula	65	22.7
	Syringe with needle	209	73.1
	CVP catheter	1	.3
	Others	11	3.8
4	**Post Needle stick injury action taken (n=275)**		
	Consultation and counseling	59	21.5
	Took medicine	3	1.1
	id nothing	150	54.5
	Others	63	22.9
5	**Victim of the needle stick injury (n=275)**		
	Nurses and lab technician	258	93.8
	Patient	17	6.2
6	**Known coworkers having needle stick injury (n=304)**		
	Yes	111	36.5
	No	193	63.5

Precautionary practices to prevent NSI: To assess precautionary practices of HCPs on prevention of NSI nine scale multi response questionnaires was used. The participant's response on disposal of used sharp needles in puncture proof bucket was 291(93.3%). Awareness about universal precaution was 294(94%). Similarly 180 (61.2%) had awareness about use of post exposure prophylaxis (PEP) within 24 hours. None had responded on the right dose of anti retroviral therapy (ART) prophylaxis. Knowledge on product which minimizes NSI present on 165(56%) participants, whereas 235(76%) said they are using safety canula as the product which minimizes NSI. (Table 5).

Table 5 Precautionary practice to prevent needle stick injury.

S N	Precautionary practices to prevent NSI	Frequency	Percent
1	**Disposal of used sharp needles (n-312)**		
	Ordinary bucket	18	5.8
	Puncture proof container	291	93.3
	Any others	3	.9
2	**Awareness about universal precaution (n=313)**		
	Yes	294	93.9
	No	19	6.1
3	**Awareness about PEP* (n= 309)**		
	Yes	255	82.5
	No	54	17.5
4	**First dose PEP to be taken(n=294)**		
	Within 24hours	180	61.2
	Within 72 hours	111	37.8
	Any time after exposure	3	1.0
5	**The right dose of ART **prophylaxis (n=0)**		
	Ever took ART**prophylaxis (n=300)		
	Yes	3	1.0
	No	297	99
6	**Knowledge of product which minimize the NSI(n= 293)**		
	Yes	165	56.3
	No	109	37.2
	If yes What? safety Canula	19	6.5
7	**Ever used safety Canula by HCP***(n= 306)**		
	Yes	235	76.8
	No	71	23.2

PEP*= Post Exposure Prophylaxis, ART**= Anti retroviral Therapy, HCP***= Health care professionals

Frequencies and common events of NSI: Regarding the frequency of NSI 103(31.9%) participants had NSI once in last year, 113(39.8%) had NSI once to twice in entire year of service and 128(48%) had NSI within one year. The site of NSI was fingers in 275(96.8%) and occasion of NSI was during preparation of procedure 105(37.5%). The commonest work place was general wards 116 (943%).(Table 6).

Table 6 Frequencies and common events of NSI

S N	Status of needle stick injuries	Frequency	Percent
1	**Occurrence of needle stick injuries in last year (n= 314)**		
	Never occurred	61	18.9
	Once	103	31.9
	Twice	70	21.7
	Three times and more	80	24.8
2	**Needle stick injuries in entire year of service (n=284)**		
	One to two times	113	39.8
	Three to four time	81	28.5
	Five and more	70	24.6
	Never	20	7.0
3	**Common site of needle stick injuries (n= 284)**		
	On arm	6	1.9
	On fingers	275	96.8
	Other parts of body area	3	1.1
4	**Occurrence of needle stick injuries (n=283)**		
	During preparation of procedure	106	37.5
	During injection	74	26.1
	During vein puncture	51	18.0
	During article replacement	52	18.4
6	**Work place of needle stick injuries occurred (n= 267)**		
	Emergency room	61	22.8
	Intensive care unit	50	18.7
	Operation theater	40	15.0
	General wards	116	43.4
7	**When needle stick injuries occurred (n= 267)**		
	Within one week	11	4.2
	Within one month	31	11.7
	Within One year	128	48.5
	Within more than one year	94	35.6

Qualitative analysis

An open ended question posing multiple responses about what should be done to prevent NSI was also administered. Most of the participants answered to this question (n=276) and thirty eight (38) did not answer. The responses are presented in the form of statements given below.

1. Seventy nine (28%) participants said that safety canula should be used to prevent NSIs.
2. Fifty five (19%) participants said that gloves should be used to prevent NSIs.
3. Forty seven (17%) participants said that puncture proof box should be used to dispose needles.
4. Fifty six (20%) participants said that the needle should not be recapped after use.
5. One hundred twenty two (44%) participants said universal precautions should be followed while performing any procedures.

6. One hundred and twenty one (43%) participants said that needles should be handled carefully and disposed properly, including incineration and burning.
7. Forty five (16%) participants pointed out that regular awareness program, health education and in-service training programs should be carried out to prevent NSI.
8. Eleven (3%) participants mentioned that there should be rules and policy guidelines developed and followed with monitoring mechanisms.
9. Nine (3%) participants said the used needle should be destroyed by use of needle destroyer.
10. Five participants (2%) also focused on preventive measures like periodic vaccination against potential transmitting disease as HIV, HCV and HBV to safe guard HCPs from contracting the disease.
11. There was also one contradictory response stated by twenty two (8%) participants who said that the needle should be recapped on firm surface or bed carefully prior to disposal. This response is not appropriate to the standard guideline of infection prevention practices.

Discussion

HCW environment is one of the most dangerous one due to stress, complexity, hassle, infectious diseases, sharp instruments, unpredictable incidents. The work-related accident rate in healthcare is $^{1}/_{3}$ higher than in other sectors[5]. Approximately 62% to 88% of the estimated NSI are preventable through technology and training[10].This study of NSI was done among nurses and lab technicians of TUTH. The total response rate was 78.5%. The prevalence of NSI was 80%, where as Adhikari et al study showed 53.5% nursing students had history of needle stick injury. In this study 683 NSIs occurred in previous year during data collection among 314 participants. This study showed 4% participants had infection to one of organism among HCV, HIV or HBV in some time of their life. Up to 90% of all NSI remain unreported[9]. 29.5% participant's reported NSI to authority in this study whereas 46.8% had reported in a study done by Adhikari et al.[3] This shows TUTH staffs were less concerned about the issue of reporting and are at high risk of transmitting the diseases like HBV, HCV which could be treated with appropriate prophylactic measures.

Knowledge on risk of NSI: 91.7% nurses and lab technicians ware aware of fact that HIV and HBV are transmitted through NSI whereas all students were aware in Adhikari et al study. There was also one contradictory response stated by 22(8%) participants that the needle should be recapped on firm surface or bed carefully prior to disposal. This response is not appropriate to the standard guideline of infection prevention practices, which need to be addressed with proper education.

Precautionary practices: Approximately 62% to 88% of the estimated NSI are preventable through technology and training[10]. This study shows 56% have knowledge that safety canula reduces the risk of NSI where as 78% are using safety device for IV infusion procedures. This shows the HCPs are protected to some extent. Seventy nine (28%) participants said using safety canula prevent NSIs. In the answer to a multiple response open ended question, 44% participants said that the universal precaution practices should be followed while performing any procedures, 43% said used needles should be carefully handled and properly disposed, including incineration and burning and 16% pointed out that regular awareness program, health education and in-service training programs should be carried out. Similarly 20% participants said that the needles should not be recapped after use, 19% participants said that gloves should be used and 17% said that puncture proof box should be used for needle disposal to prevent NSIs.

Frequencies and common NSI events: 103(31.9%) participants had NSI once, 70(21.7%) had twice and 24.8% (80) had trice and more.

Conclusion

In the study eighty percent of participants have had NSI during their practice years. So the health hazards of NSI should be well addressed like transmission of blood borne disease e.g.; HIV, HBV and HCV. Preventive measures should be taken to minimize the health hazards to HCPs.

Recommendations: (a). Ongoing education for staff involved in handling and disposal of sharps instruments through in-service training programs should be carried out to update knowledge about prevention of NSI. e.g. universal precaution practices, careful handling and proper disposal of used needles, including incineration and burning. (b). Prepare the guidelines for universal precaution measures and disseminate among nurses and laboratory staffs for continuous practice in the ward environment with provision of display board in the unit, also develop a mechanism to keep mandatory reporting of all NSI incidents and document. (c). Supply adequate gloves to wear while performing procedure and puncture proof box for needle disposal to prevent NSIs. (d). Provide regular vaccination against HCV and HBV to nurses and laboratory staffs to prevent from contracting disease from NSI and Provision should be made to use safety devices and counseling facility for the NSI affected HCPs in the hospital.

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Conflict of interest

None declared

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