Knowledge, awareness and practices regarding sharp injuries among health care workers of pathology lab in a tertiary care hospital

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Abstract

Introduction: Needle stick injury (NSIs) is the major source for transmission of blood borne infection among health care workers (HCWs). Risk of needle stick/sharp injury with acquisition of blood-borne pathogens is quite common in HCWs of pathology labs while performing their clinical activities. Due to lack of proper knowledge and awareness they are negligent about their own health.
Aim: To assess the knowledge, awareness and practices regarding sharp injuries among the health care workers of Pathology lab.
Materials and Method: This observational cross-sectional study was conducted among 120 volunteer HCWs of pathology lab which included 11 Consultant pathologists, 41 Junior Residents, 44 Lab technicians, 18 Lab attendant and 6 Senior Residents/ Research Assistants. Data was recorded on a pretested structured questionnaire having a full range of response options designed to identify the HCWs knowledge, awareness, practice and incidence regarding needle stick injury.
Result: Among 120 HCWs, 31.67% had history of NSIs in last 6 months and main cause was hollow needle (24.16%) followed by scalpel/blade (6.67%) and broken glass (0.83%). Highest incidence of NSIs were found during blood collection and FNAC (31.58%) followed by grossing/section cutting (18.42%), housekeeping (13.16%) and bone marrow procedure (5.26%).
Conclusion: All HCWs had good knowledge and awareness regarding NSI, follow the universal precautions but less concerned about reporting post-exposure prophylaxis to IC office.

Keywords: Needle stick injury, sharp injury, Health care workers, Pathology lab, blood born pathogen

Introduction

Health care workers (HCWs) of pathology labs have increased risk of infections with blood borne pathogens because of occupational exposure to blood and other body fluids during lab work. Needle stick injuries (NSIs) which is defined as "as par literal introduction into body of health care worker, during the performance of their duties, of blood or other potentially hazardous material by hollow bore needle or sharp instruments, including, but not limited to needles, lancets, scalpels, and contaminated broken glass" constitute a major hazard for the transmission of various blood borne diseases such as Hepatitis-B, Hepatitis-C and HIV.(1) The risk of transmission of these viruses from patient to the healthcare workers are as follows: 30% Hepatitis-B, 3% Hepatitis-C and 0.3% HIV, which depends on the viral load of patient.(2)

The incidence of NSI is considerably higher than current estimates, due to gross under reporting.(3-4) A large multinational study by WHO on global burden of sharps injury estimated the average number of injuries per health care workers was 0.2-4.7 sharps injuries per year.(5) In USA 6,00,000 to 10,00,000 receive NSI from conventional needles and sharps every year, while in UK it is 1,00,000 HCWs/year.(6) In India, authentic data on NSI are scarce. World Health Report 2002 stated that amongst the 35 million health-care workers, two million experiences percutaneous exposure to infectious diseases each year. More than 90% of these infections occur in developing countries but most of these NSIs remain unreported.(7)

The commonest clinical activity to cause the NSIs among health care workers in a tertiary care hospital of India are blood withdrawal, suturing and vaccination.(8) Determinants of NSIs are overuse of injections, recapping of needles after use, used needles left in trays, kidney dishes, among drapes and among trash and lack of supplies of disposable syringes, safer needle devices, sharps-disposal containers, work pressure, long duty hours, passing instruments from hand to hand in the operating suite, lack of awareness of hazard, noncompliance or failure to adhere to guidelines and lack of training among HCWs.(9-12)

With rapid advancement of health care delivery system, there is significant increase in number as well as variety of investigations, which are necessary for diagnosis and treatment of the patients. Pathology labs deal with heavy load of investigations daily where laboratory workers are directly exposed to hazardous chemical and infectious material like blood, body fluids, sputum, stool, urine etc. Hence, health care workers of pathology lab have potential risk of needle stick /sharp injuries during their routine lab procedure like blood collection, bone marrow, fine needle aspirations (FNAC), grossing, fixing, and section cutting of diseased body parts/biopsy tissues sent for histopathology. Depending on availability, type and timings of tests patient have single to multiple pricks for blood sampling

and multiple pricks for cytological test like fine needle aspiration (FNA), further enhances the chances of NSI.

Laboratory workers are often lenient about application of universal precautions, reporting of NSIs and post exposure prophylaxis. There is very scarce data about incidence, knowledge, awareness, attitude and practices among laboratory workers of pathology lab. The introduction of health educational programs can produce positive changes in both knowledge and awareness toward safety protocols and inclusion of blood and body fluid safety precautions in lab workers resulted in a more compliant attitude towards safety procedures that protect against accidental blood borne pathogen transmission.[13-14] Therefore, the purpose of this study was to assess the knowledge, awareness and practices regarding sharp injuries amongst health care workers of Pathology lab in a Tertiary Care Hospital U.P India.

Materials and Method

This observational cross-sectional study was conducted among 120 HCWs of pathology lab which included 11 Consultant pathologists, 41 Junior Residents, 44 Lab technicians, 18 Lab attendants and 6 Senior Residents/ Research Assistants (Table 1) at King George's Medical University Lucknow, Uttar Pradesh, India. All subjects voluntarily participated in the study and were fully informed about the design and purpose of the study. Written informed consent was obtained from each participant. Data was recorded on a structured questionnaire distributed among the HCWs which consisted of questions to assess the knowledge and awareness towards sharp injuries. The recorded data was consisted of two parts: first part included to assess the statement regarding knowledge and awareness; and second part for practice and incidence of sharp injuries. The recorded data were tabulated in number (N) and percentages (%).

Table 1: Health Care workers (HCWs) involved in the study

S. No.	Category of Participant	Number (N)	Percentages (%)
1.	Consultant Pathologist	11	9%
2.	Junior Resident	41	34%
3.	Lab Technician	44	37%
4.	Lab Attendant	18	15%
5.	Senior resident/Research Assistant	6	5%

Results

An interpretation of collected data from questionnaires was summarized as follows (Table 1, 2): Among 120 HCWs, 67.5% (81) were received BMW training. 31.67% had history of NSIs in last 6 months and highest percentage NSI was found in lab technicians 36.36% followed by 34.14% in junior residents. Maximum number of NSIs in same person over last six month was found in lab technician which was 1-3 injuries. Main cause of NSIs among HCWs was hollow needle 24.16% followed by scalpel/blade 6.67% and least by broken glass 0.83%. All HCWs had knowledge of universal precaution and they washed injury with soap and water after NSIs. 91.67% HCWs knew about post exposure prophylaxis (PEP) but only 47.37% notified IC office. 95% knew that NSIs can transmit hepatitis-B, Hepatitis-C and HIV disease. 80% HCWs had received hepatitis-B vaccine. In practice 100% HCWs washed hand and used gloves during handling of sharps. 82.50% had knowledge of segregation of sharps for disposal. After procedure 35.83% HCWs recapped needle while 8.33% used needle destroyer before discarding the syringe and 88.33% HCWs used sharp disposal containers for disposing sharps (Table 2, 3).

Table 2: Knowledge, Awareness and Practice regarding Sharp/Needle stick injury among overall Health care workers

Questions regarding Knowledge, Awareness and Practice	Health Care Workers (HCWs) (N=120)	
	Number (N)	Percentage (%)
History of NSIs in last 6 months	38	31.67
Cause of NSIs		
Hollow needle	29	24.16
Scalpel/ blade	8	6.67
Broken glass	1	0.83
Procedure at which get NSIs		
Blood Collection	12	10.00
FNAC	12	10.00
Bone Marrow	2	1.67
Grossing /section cutting	7	5.83
House Keeping	5	4.17
Measures taken after NSIs		
Washed injury with soap and water	38	100
Notified IC office within 24 hours for PEP	18	47.37

Knowledge		
Diseases that NSI can transmit Hepatitis B, Hepatitis C and HIV	114	95.00
Post exposure prophylaxis	110	91.67
Universal precaution	120	100.00
Segregation of sharps for disposal	99	82.50
Practices		
Received hepatitis B vaccine	96	80.00
Received BMW training	81	67.50
Use gloves	120	100.00
Wash hand	120	100.00
After procedure recap needle	43	35.83
Use needle destroyer before discarding syringe	10	8.33
Use sharp disposal containers	106	88.33

Table 3: Knowledge, Awareness and Practice regarding Sharp / Needle stick injury in different categories of Health care workers

Questions regarding Knowledge, Awareness and Practice	Consultant Pathologists (N=11)		Residents (n=41)		Lab Technician (N=44)		Lab Attendant (N=18)		Sr. Resident / Research assistant (N=6)	
	N	%	N	%	N	%	N	%	N	%
History of NSIs in last 6 months										
Yes	2	18.18	14	34.14	16	36.36	5	27.78	1	16.67
Number of NSI in last 6 months	1-3	-	1-3	-	1-3	-	1-3	-	1-3	-
Cause of NSIs										
Hollow Needle	1	9.09	12	29.27	12	27.27	4	22.22	1	16.67
Scalpel/ Blade	1	9.09	2	4.88	4	9.09	0	0.00	0	0
Broken glass	0	0.00	0	0.00	0	0.00	1	5.55	0	0.00
Procedure at which get NSIs										
Blood Collection	0	0.00	0	0.00	12	27.27	0	0.00	0	0.00
FNAC	1	9.09	10	24.39	0	0.00	0	0.00	1	16.67
Bone Marrow	0	0.00	2	4.88	0	0.00	0	0.00	0	0.00
Grossing /Section cutting	1	9.09	2	4.88	4	9.09	0	0.00	0	0.00
House keeping	0	0.00	0	0.00	0	0.00	5	27.78	0	0.00
Measures taken after NSIs										
Washed injury with soap and water	2	100	14	100	16	100	5	100	1	100
Notified IC office within 24 hours for PEP	2	100	7	50.00	6	37.50	2	40.00	1	100
Knowledge										
Diseases that NSI can transmit Hepatitis B, Hepatitis C and HIV	11	100	41	100	44	100	12	66.67	6	100
Post exposure prophylaxis	11	100	41	100	44	100	8	44.44	6	100
Universal precaution	11	100	41	100	44	100	18	100	6	100
Segregation of sharps for disposal	11	100	41	100	39	88.64	7	38.89	1	16.67
Practices										
Received hepatitis B vaccine	11	100	40	97.56	30	68.18	9	50.00	6	100
Received BMW training	11	100	41	100	17	38.63	6	33.33	6	100
Use gloves	11	100	41	100	44	100	18	100	6	100
Wash hand	11	100	41	100	44	100	18	100	6	100
After procedure recap needle	0	0.00	10	24.39	18	40.91	9	50.00	6	100
Use needle destroyer before discarding syringe	0	0.00	10	24.39	0	0.00	0	0.00	0	0.00
Use sharp disposal containers	11	100	41	100	40	90.91	8	44.44	6	100

Highest incidence of NSIs were found during blood collection (31.58%) and FNAC (31.58%) followed by grossing/ section cutting (18.42), housekeeping (13.16%) and bone marrow procedure (5.26%) (Table 4). Highest incidence of NSIs among consultant pathologists was during FNAC (50%) and grossing (50%) while in residents FNAC (71.43%), in lab technicians it was blood collection (75%) and in lab attendants house-keeping (100%). (Table 5).

Table 4: Cause of Sharp/ Needle stick injuries among HCWs

Cause of Injury	Consultant Pathologists (N=2)		Residents (N=14)		Lab Technician (N=16)		Lab Attendant (N=5)		Sr resident /research Assistant (N=1)		Total (N=38)	
	N	%	N	%	N	%	N	%	N	%	N	%
Hollow Needle	1	50.00	12	85.71	12	75.00	3	60.00	1	100.00	**29**	**76.32**
Scalpel/ Blade	1	50.00	2	14.29	4	25.00	1	20.00	0	0.00	**8**	**21.05**
Broken Glass	0	0.00	0	0.00	0	0.00	1	20.00	0	0.00	**1**	**2.63**

Table 5: Sharp/ Needle stick injury among Health Care Workers (HCWs) during various lab procedures

Lab procedure	Consultant Pathologists (N=2)		Residents (N=14)		Lab Technician (N=16)		Lab Attendant (N=5)		Sr Residents/ Research Assistant (N=1)		Total (N=38)	
	N	%	N	%	N	%	N	%	N	%	N	%
Blood Collection	0	0.00	0	0.00	12	75.00	0	0.00	0	0.00	12	31.58
FNAC	1	50.00	10	71.43	0	0.00	0	0.00	1	100.00	12	31.58
Bone Marrow	0	0.00	2	14.29	0	0.00	0	0.00	0	0.00	2	5.26
Grossing/ Section Cutting	1	50.00	2	14.29	4	25.00	0	0.00	0	0.00	7	18.42
Housekeeping	0	0.00	0	0.00	0	0.00	5	100.00	0	0.00	5	13.16

Discussion

Although pathology lab workers are daily expose to infected body fluids, blood, blood products, and needle stick injuries (NSIs) during sample withdrawal or other laboratory procedures. But they are most negligent as far as their own health is concerned. They are at highest risk for acquiring lethal blood born infections. The level of risk depends on the number of patients with type of viral infection, viral load and the precautions taken by the HCWs while dealing these patients. Needle stick/sharp injuries are mostly accidental and contributory factors are unwilling patients, obese, low light, excessive work load etc. In present study 31.58% HCWs get NSIs and maximum frequency was 1-3 NSIs in last six months. The main cause of NSIs was hollow needle followed by scalpel/blade and broken glass. *Garima M et al*[15] reported 43%, *Askarian et al*[16] 72.2% and *Nee et al*[17] 62.2% prevalence of NSIs in their studies. In another study conducted by *Sharma et al*[18] found that 79.5% of HCWs reported one or more NSIs in their career and *Verma Y et al*[11] found prevalence of 75.7% needle stick injury among HCWs in the past one year. Whereas, *Gupta et al*[12] showed that the prevalence of NSIs among HCWs was 52.6% and frequency was two or more in the same person. *Sharma et al*[18] *observed* that patient overload and fatigue due to long hours of working was the commonest reason for causing the needle stick injury.

In the present study, highest incidence of NSIs were found in lab technicians (36.3%) followed by junior residents (34.1%) and the most common procedure causing NSIs in lab worker are blood collection (31.8%) and FNAC (31.8%) followed by grossing/section cutting, housekeeping and during bone marrow procedure. Junior residents had highest percentage of NSI during fine needle aspiration cytology (FNAC) procedure while lab technician got maximum NSI during blood sampling. Highest incidence of NSIs in lab technician and residents were may be due to their maximum involvement in sample collection, section cutting, grossing and FNA respectively. During fine needle aspiration patient may undergo multiple pricks at site of lesion, due to pain or uncooperative patient or children move the site during procedure, hence performer often get needle pricks. NSIs are also more common during initial phase of learning new procedures like first year junior residents, lab technicians etc. *Verma et al*[11] found the highest rates of NSI amongst the junior residents and nurses followed by senior residents, laboratory technicians and undergraduate students and

the most common activities causing NSI were found during recapping of the needles and blood sampling across all groups of HCWs. *Muralidhar et al*[8] in their study found highest percentage of NSIs in nurses, followed by junior residents and nursing students, laboratory technicians, interns and undergraduate students and also showed that the commonest clinical activity responsible for NSI was blood withdrawal, followed by suturing and vaccination. *Gupta et al*[12] also observed that the majority of needle stick injury occurred in lab technicians followed by nursing staff, nursing students, OT technicians, interns and resident doctors and needle of disposable syringe was the most common source of NSIs followed by suture needle and re-usable needle.

In the present study, all HCWs (100%) had knowledge of universal precaution, 95% knew that NSIs can transmit hepatitis-B, Hepatitis-C and HIV disease, 91.67% HCWs know about post exposure prophylaxis. All HCWs washed injuries with soap and water but only 47.37% were reported to IC office within 24 hours for PEP. *Sharma et al*[18] reported in their study that 60.9% HCWs washed the site of injury with water and soap and only 7.8% HCWs took PEP against HIV/AIDS after NSIs. In a study conducted by *Verma et al*[11] found that the action taken by HCWs after NSIs included washing the site with soap and water, applying alcohol/betadine/antiseptics, expressing blood from NSI site, applying pressure, tying the part. *Gichki et al*[19] found that 99% respondents believed that the injury should be reported, 91% agreed that the post exposure prophylaxis should be initiated within one hour of injury.

In our study, when we assessed knowledge regarding NSIs in different categories of HCWs, we found that all had good knowledge. Residents and faculty opt for PEP after sharp injury and do not recap the needle, but due to low literacy and negligence, lab attendant and lab technicians still doing wrong practices like recapping of needles, wrong disposal of sharps, ignore needle pricks /sharp injury and not taken PEP.

To prevent NSIs in our hospital, training in biomedical waste management had started, in which 100% faculty and residents, 38.6% lab technicians and 33.3% lab attendants got trained. 80% HCWs were vaccinated for hepatitis-B. In practice, all HCWs were encouraged to wash hands and use gloves during handling of sharps. Needle cutter has been provided to all procedure rooms to destroy the used needles. After procedure, 35.83% HCWs recapped needles while 8.33% used needle destroyer before discarding the syringe and 88.33% HCWs used sharp disposal containers for disposing sharps. In present study, among all health care workers only residents used needle destroyer before discarding syringe. 50% lab attendant, 40.91% lab technician and 24.39% residents recapped needle after use.

Muralidhar et al[8] stated that although HBV exposure pose the highest risk for infection, but had an effective vaccine for it. Number of HCWs vaccinated for Hepatitis-B varied in different studies, *Garima et al*[15] showed 64.3% students, *Wicker S et al*[21] reported an average of 78.2% and *Radha et al*[22] reported range between 83% in doctors and 8% in nurses for HBV vaccination.

Hence, an effective and multifaceted management plan must be prepared for prevention and management of needle stick injuries in HCWs in all hospitals. After an occupational exposure, the HCW should be counseled about the degree of risk associated with the type of exposure.

Conclusion

NSIs remains a major health hazard in Indian hospitals especially the ones which deal with high patient load. Hence, education to improve the knowledge, awareness and practice of preventive measures should be implemented by HCWs in hospitals. Elimination of unnecessary injections, prohibition of recapping of needle, proper disposal and careful handling of sharps are effective measures of preventing NSIs. Importance of reporting NSIs and the possibility of prophylactic measures is also quite necessary. Setting up an NSI management center in hospital wards, as well as follow up of the injured individuals are recommended. Regular monitoring of safety practices should be an on-going activity in hospital.

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