March 2010

Needle stick injuries among health care workers of public sector tertiary care hospitals of Karachi

Mubashir Aslam
Aga Khan University

Tahir Taj
Aga Khan University

Arif Ali
Aga Khan University

Waseem Mirza
Aga Khan University

Hammad Ali

See next page for additional authors

Authors
Mubashir Aslam, Tahir Taj, Arif Ali, Waseem Mirza, Hammad Ali, Mudassir Iqbal Dar, and Nasira Badar

ORIGINAL ARTICLE

Needle Stick Injuries Among Health Care Workers of Public Sector Tertiary Care Hospitals of Karachi

Mubashir Aslam[1], Tahir Taj[1], Arif Ali[1], Waseem Mirza[2], Hammad Ali[3] and Mudassir Iqbal Dar[4]

ABSTRACT

Objective: To estimate the frequency of needle stick injuries (NSI) among health care workers (nurses, student nurses and paramedical staff) in public hospitals of Karachi.

Study Design: Cross sectional, observational.

Place and Duration of Study: This study was conducted in three public tertiary care hospitals of Karachi, from November 2007 to January 2008.

Methodology: Data was collected by structured interview-based questionnaires in Urdu and English language. Questionnaire was designed to obtain information regarding demography, work experience, hepatitis vaccination status, and occurrence of needle stick injuries with associated factors. Needle stick injury that occurred in the previous month was the defined outcome. Data was entered in Epi Data and analyzed in SPSS version 15.

Results: A total of 417 health care workers participated in the study. Mean age of the participants was 24±11 years. Estimated proportion of participants with history of at least one time NSI was found in 66%. Around 13% (n=54) had one or more NSI in the previous one month at work and half of them were affected by non-sterile needle. None of them sought medical care. Almost 90% of them were not wearing gloves or taking any other protective measures at the time of injury.

Conclusion: There can be serious consequences of needle stick injuries in public hospitals as large proportion of injuries involve non-sterile used needles and health care workers do not take appropriate measures of protection.

Key words: *Needle stick injury. Hospital injuries. Health care workers. Needle stick injuries. Occupational injuries. Public sector.*

INTRODUCTION

Blood borne diseases are transmitted either vertically from mother to fetus or horizontally, which involve several transmission modes including injuries by affected needle, blade or other instrument, blood transfusion, sexual transmission etc. Several diseases have blood-borne route of transmission but most common in our region is hepatitis B, hepatitis C and HIV/AIDS.

Needle stick injury (NSI) is frequently responsible for the transmission of blood borne disease and health care workers are at highest risk of such injuries.[1] It is estimated that half of the injections infused in developing countries are unsafe for both patient and heath care provider.[2] There are different causes of needle stick injuries but recapping of syringe after use has been considered as the most frequent factor responsible for NSI. Therefore, victims in such injuries are more likely to be injured by used needle rather than sterile and hence they are at higher risk of acquiring blood borne disease. In Pakistan, hepatitis B and C are the two major diseases that may transmit through affected needles and probability of hepatitis B transmission is 20-40% after a prick by contaminated equipment or needle. The issue of needle stick injury is worrisome worldwide as frequency of needle stick injuries is high, ranging from 35% in Egypt to as high as 58% in Pakistan.[3,4]

Global estimates revealed that 33% of new cases of hepatitis B, 42% of hepatitis C and 2% of new cases of HIV occurred due to unsafe injection practices,[5] like negligence of workers about wearing gloves, recapping of needles etc. or it may involve negligence by the administration as increased workload on staff is of the most common reason for occurrence of NSI.

Studies reported that frequency of needle stick injuries is highest in nursing staff among health care providers.[6] Phlebotomy or intravenous infusions are the most common causes of injury in hospital ward.[7] Little information is available regarding the estimations of needle stick injuries in nursing and para medical staff in public sector hospitals to determine the actual burden of this problem in Pakistan. Therefore, the aim of this project was to estimate the frequency of needle stick

[1] *Department of Community Health Science, the Aga Khan University Hospital, Karachi.*
[2] *Department of Radiology, the Aga Khan University Hospital, Karachi.*
[3] *Department of Public Health, University of Bangor, Wales, United Kingdom.*
[4] *Department of Cardiac Surgery, Dow University of Health Sciences, Karachi.*

Correspondence: *Dr. Mudassir Iqbal Dar, Department of Cardiac Surgery, Dow University of Health Sciences/Civil Hospital, Karachi.*
E-mail: mudassirdar@hotmail.com

Received April 15, 2008; accepted October 27, 2009.

injuries and associated factors among nursing students, nursing professionals and paramedical staff in public sector tertiary care hospitals of Karachi.

METHODOLOGY

This cross-sectional survey was conducted in three Government hospitals namely Civil Hospital, Jinnah Postgraduate Medical Centre (JMPC) and Abbasi Shaheed Hospital, Karachi, from November 2007 to January 2008. Nurses and para medical staff of either gender and nursing students in these three hospitals were included in the study. Those with less than a year of experience in their occupation were excluded. Structured questionnaire was made in English by the authors and was also translated into Urdu language. Author did pilot testing on 35 nurses in a government tertiary care hospital and appropriate changes were made accordingly (unpublished data). Questionnaire obtained information regarding demography, work experience, hepatitis vaccination status, and occurrence of needle stick injuries with associated factors. Needle stick injury was defined as injury by hollow bore needle which is used in the hospital settings for infusions and blood drawing. Data collectors belonged to same occupation and one day training was given regarding data collection methods before pilot testing. Permission was obtained from the in-charge staff in different medical, surgical and allied specialties wards, nurses and para medics found near the nursing counter who were invited to participate in the study. Interviews were offered in either Urdu or English language according to the convenience of the participants. Informed oral consent was taken from each participant after explaining study purpose and rights of the participants. Those participants who were identified to have recent accident of needle stick injury were informed about the expected consequences and were referred for appropriate biomarkers. Data was entered in Epi Data version 3.1, analyses was done in SPSS version 15. Data was presented in mean and standard deviation for variables with normally distributed data and median with inter-cortile range for skewed data.

RESULTS

A total of 417 nurses and para medical staff from three hospitals participated (JPMC, n=243; Civil Hospital, n=131; Abbasi Shaheed Hospital, n=43) in the study (response rate above 90%). Mean age of the participants was 24 years with standard deviation of 11 years. Education was intermediate or less of most of the participants (78%), however, more than half participants were still students in the affiliated nursing school (54%). Most of the participants had morning duties in the previous one month. Median number of injections administered per day by each participant was 20 (IQR=20). Around 70% of participants were vaccinated for hepatitis B, nevertheless only 70% of them received recommended number of vaccination doses (Table I).

Table I: Demographic, occupational characteristic and incidence of NSI of nursing and para medical staff in tertiary care hospitals (n=417).

	*Incidence of NSI in a month	
	n (Percentage)	n (Percentage)
Sex		
Male	208 (50.4)	27 (34)
Female	205 (49.6)	52 (66)
Age in years Mean (SD)	24 (11)	
Education		
Metric	124 (31)	35 (45)
Inter	184 (47)	33 (44)
Bachelor of nursing	55 (14)	6 (7)
Diploma nursing	24 (6)	4 (5)
Masters	7 (2)	0
Designation		
Paramedic	10 (3)	5 (6)
Nursing student	223 (54)	40 (49)
Nurse	179 (43)	36 (45)
Work experience in years median (IQR)	3 (4)	
Duty in the last month		
Day	263 (63)	48 (55)
Evening	77 (18.5)	21 (24)
Night	77 (18.5)	18 (21)
Number of injection infusion median (IQR)	20 (16)	
Vaccination status		
Vaccinated for hepatitis B	294 (69)	61 (73)
Not vaccinated	130 (31)	22 (27)
History of needle stick injury occurred during this occupation		
Yes	281 (66)	
No	143 (34)	
One month history of needle stick injury		
Yes	54 (13)	
No	370 (87)	

Percentages are given in parenthesis, otherwise mentioned.

**Total for each variable in incidence column may be more than total count (n=54) as one person may be exposed to NSI multiple times.*

Overall 66% (n=281) of participants had at least one time history of needle stick injury during hospital-related occupation, among them 45% (n=126) were nursing students and 55% (n=155) were professionals. Around 13% of participants (n=54) reported one or more needle stick injuries in their previous month at hospital work. A total of 83 needle stick injury cases occurred in one month in the given sample, rise to an estimation of 2.8 numbers of injuries everyday. Out of 54 injury reported participants, 23 were from JPMC, 18 from Abbasi Shaheed Hospital and only 13 from Civil Hospital, Karachi.

Half of the individuals were injured by used needle (non-sterilized), among them 22% (n=6 out of 54) of participants did not know the disease of patient's contaminated needle and around 34% (n=34) of cases reported to be injured by needles contaminated with blood or fluid of hepatitis B or C patient. A large proportion of participants (33%; n=18) claimed that over work was the reason for their injury. Recapping (19%; n=10) was also found as an important factor, which was responsible for the occurrence of needle stick injuries in

nursing and para medical staff. Blood squeezing was performed by most of the participants (87%; n=47) after the occurrence of their injury. As high as 90% of participants with reported injury were not wearing glove or any other protection at the time of occurrence of NSI. None of them looked for medical care or reported their injury to any occupational injury unit (Table II).

Table II: Information about cases giving history of needle stick injury during the past one month (n=54).

	n (Percentage)
Needle was used	
Used	27 (50)
Sterilized	27 (50)
Name of disease (n=27)	
Surgical case	6 (22)
Not infectious disease	6 (22)
Hepatitis B or C	9 (34)
Don't know	6 (22)
Patient status	
Conscious at the time of injections	44 (82)
Not conscious	10 (18)
Light appropriate at bed side	
Yes	41 (76)
No	13 (24)
Reason for the needle stick injury	
Workload	18 (33)
Recapping	10 (19)
Drawing blood	8 (15)
Quickness	7 (13)
Patient not co-operative	5 (9)
Missing	6 (11)
Management after NSI	
Squeezed blood	47 (87)
Washed with disinfectant	5 (9)
Washed with water	2 (4)
Location of NSI occurred	
Ward	40 (74)
ICU	8 (15)
Emergency	3 (6)
Blood bank	2 (3)
Operation theatre	1 (2)
Wearing glove at the time of needle stick injury	
Yes	4 (7)
No	50 (93)
Injury occurred by	
Self	52 (96)
Medical student	1 (2)
Nursing staff	1 (2)

DISCUSSION

Needle stick injuries remain a potential source of transmission of blood borne infection in health care workers. It is the most frequently occurring occupational injury responsible for exposure to infectious body fluids.[8] The result of this study highlighted that the frequency of needle stick injury in one-month period was extremely high among nurses and para medical staff in hospitals (13% of individuals had one or more incidence of needle stick injury). Nearly 3 cases of needle stick injuries occurred each day according to these estimates of one month in the given sample. Nurses and para medical staff are more exposed to hollow bore needle, which is used for infusion and injection for medicine, as compared to doctors, hence they are at higher risk of getting such injuries.[9,10] On the other hand, one study indicated that in private hospitals needle stick injuries are more common in doctors as nurses strictly follow protection protocols, however, the study had a limitation of small sample size and being confined to one tertiary care hospital only.[11] Other studies have also shown higher prevalence of needle stick injuries in residents and junior doctors.[12] Poor knowledge about blood borne diseases and their transmission mode is considered as an important factor responsible for high number of needle stick injuries. The situation is even worse in primary and secondary health care centres where health care workers and providers do not have sufficient knowledge about occupational precautions.[13] Re-use of syringes has been observed as a common practice particularly in primary care settings.[14] This study showed that 34% of participants with needle stick injury were exposed to needles which were contaminated with fluid of hepatitis B or C patient, which is alarming because it has been observed that large number of hepatitis infection occur as a result of needle stick injury.[15] Though one prospective study showed no transmission of hepatitis C infection in the health care workers after needle stick injury,[16] yet risk of virus transmission cannot be ruled out.[17] Talaat *et al.* estimated that around 24000 hepatitis C and 8617 hepatitis B infections occur in Egypt each year due to exposure in health care environment.[3]

It was observed that increased workload on staff is responsible for high incidence of NSI as shown in the results of this study, which is consistent with other study in Pakistan.[11] In addition, more proportion of injuries in the morning staff also suggests the same phenomenon, as workload is greater during morning hours in hospitals.

Finally, it was noteworthy that very few health care workers used gloves and other precautionary measures for the prevention of occupational hazards. This points out towards the immediate need of new policy implementation for protection of the employees in health care providing institutes. Recapping of needle is prohibited according to the new guidelines by Occupation Safety and Health Administration (OSHA),[18] yet a large proportion of needle stick injuries occur as a result of attempted needle re-capping.

This paper tended to identify and quantify the burden of needle stick injuries among nursing and paramedical staff, however, the study had limitation of recall bias about the number of injuries, nevertheless it was tried to minimize it by inquiring for only one month history in detail. Selection bias could also be a potential problem in this study, yet representations from all three public hospitals, all three working shifts and from multiple medical and surgical wards, would reduce any selection bias. In future, longitudinal and interventional studies

can determine the effectiveness of educational and training programs for the reduction of occupational injuries in health care providers. There is a need to strengthen the existing policy and guidelines stringently. In addition, this is a serious reminder for policy makers regarding the immediate need for the refresher training programs at regular intervals for hospital staff about the knowledge of the consequences of needle stick injuries and the methods of prevention.

CONCLUSION

A very high proportion of nurses and para medical staff of the concerned hospitals had history of needle stick injury. It exposed them to risk of further injuries, which may amplify the risk of acquiring blood borne disease as NSI commonly involve used needles.

REFERENCES

1. Leliopoulou C, Waterman H, Chakrabarty S. Nurses' failure to appreciate the risks of infection due to needle stick accidents: a hospital based survey. *J Hosp Infect* 1999; **42**:53-9.
2. WHO. Injection Safety, Quality of Immunization Services [QIS]. Geneva: *WHO*; 1998.
3. Talaat M, Kandeel A, El-Shoubary W, Bodenschatz C, Khairy I, Oun S, *et al.* Occupational exposure to needle stick injuries and hepatitis B vaccination coverage among health care workers in Egypt. *Am J Infect Control* 2003; **31**:469-74.
4. Mujeeb SA, Khatri Y, Khanani R. Frequency of parenteral exposure and seroprevalence of HBV, HCV, and HIV among operation room personnel. *J Hosp Infect* 1998; **38**:133-7.
5. WHO; Safe Injection Global Network (SIGN). Injection safety: first do no harm. Geneva: *WHO*; 2001.
6. Prüss-Üstün A, Rapiti E, Hutin Y. Sharps injuries: global burden of disease from sharps injuries to health-care workers. Geneva: *WHO*; 2003.
7. Elmiyeh B, Whitaker IS, James MJ, Chahal CAA, Galea A, Alshafi K. Needle-stick injuries in the National Health Service: a culture of silence. *J R Soc Med* 2004; **97**:326-7.
8. Hsieh W, Chiu N, Lee C, Huang F. Occupational blood and infectious body fluid exposures in a teaching hospital: a three-year review. *J Microbiol Immunol Infect* 2006; **39**:321-7.
9. Mercier C. Reducing the incidence of sharps injuries. *Br J Nurs* 1994; **3**:897-8.
10. Gillen M, McNary J, Lewis J, Davis M, Boyd A, Schuller M, *et al.* Sharps related injuries in California healthcare facilities: pilot study results from the Sharps Injury Surveillance Registry. *Infect Control Hosp Epidemiol* 2003; **24**:113-21.
11. Zafar A, Aslam N, Nasir N, Meraj R, Mehraj V. Knowledge, attitudes and practices of health care workers regarding needle stick injuries at a tertiary care hospital in Pakistan. *J Pak Med Assoc* 2008; **58**:57-60.
12. Brasel KJ, Mol C, Kolker A, Weigelt JA. Needle sticks and surgical residents: who is most at risk? *J Surg Educ* 2007; **64**: 395-8.
13. Janjua NZ, Razaq M, Chandir S, Rozi S, Mahmood B. Poor knowledge: predictor of non-adherence to universal precautions for blood borne pathogens at first level care facilities in Pakistan. *BMC Infect Dis* 2007; **7**:81.
14. Khan AJ, Luby SP, Fikree F, Karim A, Obaid S, Dellawala S, *et al.* Unsafe injections and the transmission of hepatitis B and C in a periurban community in Pakistan. *Bull World Health Organ* 2000; **78**:956-63.
15. Alter MJ. Epidemiology of hepatitis C in the west. *Semin Liver Dis* 1995; **15**:5-14.
16. Hernandez ME, Bruguera M, Puyuelo T, Barrera JM, Tapias JMS, Rodes J. Risk of needle-stick injuries in the transmission of hepatitis C virus in hospital personnel. *J Hepatol* 1993; **16**:56-8.
17. Hamid SS, Farooqui B, Rizvi Q, Sultana T, Siddiqui AA. Risk of transmission and features of hepatitis C after needle stick injuries. *Infect Control Hosp Epidemiol* 1999; **20**:63-4.
18. Occupational Safety and Health Administration: final rule on occupational exposure to blood borne pathogens. *Fed Regist* 1991; **56**:64004.