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Original Article

Occupational Exposure to Blood and other Bodily Fluids among Laboratory Technicians: An Underestimated Risk Factor

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Abstract

Introduction: *The aim of this study was to evaluate risk of Needle stick and Sharp Injuries (NSI) and exposure to blood borne pathogens, among laboratory technicians.*
Methods: *213 self-reporting questionnaires were distributed among the laboratory technicians who were working at three educational hospitals in Tehran. A total of 193 laboratory personnel completed the questionnaire.*
Results: *69.9% of participants were females. 94 (43.5%) of participants had a history of needle stick injury and 70 (36.3%) had splash injury during their work life. The prevalence of one year (last year) exposure was 25.4% and 17.1% respectively. In 58 out of 94 cases, recapping was the mechanism of injury. 151 laboratory personnel (78.2%) had been immunized against Hepatitis B Virus (HBV). 79.8% of the laboratory personnel usually eat, drink or smoke at workplace. 175 (91%) of the study sample used personal protective equipment such as glove in laboratory environment.*
Conclusion: *In this study, a high frequency of NSI and splash were observed among laboratory technicians in the research context, which was not related to some variables such as age, sex, duration of employment, the HBV vaccination status, participating in workshop of education and training for injury prevention.*

Keywords: Needle stick, Splash, Blood and body fluid exposure, Laboratory technician, Iran.
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Introduction

Needle stick, sharp injuries (NSI) and occupational exposure related to blood and body fluids (BBF) have become one of the most important professional hazards among health care workers (HCWs) (1). Needle stick injuries and splashes are the accidental events that result in the transmission of various blood-borne diseases such as hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) (2).

The World Health Organization (WHO) has estimated that in the worldwide three million people suffer accidental needle stick injuries each year (3). The U.S. Centers for Disease Control and Prevention (CDC) estimates that more than half a million sharps injuries occur in the United States annually, and approximately half of them (nearly 1,000 per day) occur in hospitals (4).

In spite of awareness of the risk, these kinds of accidental exposures are common (2). Inadequate staff, lack of experience, insufficient training, and duty overloads and fatigue may lead to occupational sharp injuries (4,5).

Needle stick injuries are not limited to nurses and doctors, but also affect paramedics, lab staff, ambulance drivers and others (6). Laboratory technicians who use and are exposed to needles are at an increased risk of needle stick injuries (7). Data from the Centers for Disease Control and Prevention were shown the firs rank is belong nurses among health care workers who acquire HIV on their occupational exposures. The second rank is composed of a group-clinical lab employees which accounting for a surprising 28% of cases. Most of these cases involved phlebotomists injured by blood drawing needles-injuries that are most likely to result in blood borne pathogen transmission (8).

The risk of occupational exposure to blood borne pathogens via sharp injuries is well known such as needle stick injuries (NSIs) among health care workers, especially dental, nursing and midwifery students (6), medical students (7), pharmacists and Pharmacy Chain Staff (8).

However, among laboratory technicians this is unknown and the actual risk was not probably sufficiently reported (3,4). It seems the most serious exposure risk to clinical lab workers is from needles used to draw or transfer blood in order to collect and store blood (11). The lack of safer equipment designed for lab applications often forces workers to use needles for unintended purposes and puts them at unnecessary injury risk (12).

Health care workers, especially laboratory staff, often do not report their occupational exposures because of fear of losing job, insurance and employment. Also there is a tendency to deny professional risk (3). Rapid reporting of needle sticks injuries and splashes (5,6) leads to a substantial reduction in transmission of numerous infection elements such as HBV,

HCV and HIV. Prevention of needle stick injuries and blood exposures is an important step to stop continuing the transmission of blood-borne pathogens to health care workers. None of the few studies conducted has specific information related to the risk factors of needle stick injuries among the laboratory personnel (1,7). The aim of this study was to evaluate the prevalence and risk factors of needle stick and sharp injuries (7) among laboratory personnel in Iran.

Materials and Methods

This study was a descriptive cross-sectional survey for determining the frequency of needle stick injuries or splashes among the laboratory personnel at three large educational hospitals in Tehran, the capital city of Iran. We conducted the study from March to May 2010. The target population was all of laboratory personnel who were presented at clinical laboratory in the hospitals. An anonymous, self-reporting questionnaire was administered for laboratory personnel by the researchers. The questionnaire was pre-tested on a random sample of participants to ensure the practicability, validity and interpretation of responses. All of laboratory personnel in three hospitals were recruited as samples. 213 questionnaires were distributed among participants by a trained researcher. The questionnaire was collected after half an hour, though it needs no more than 15 minutes to complete. Each questionnaire contained 18 items in three sections including: (1) Demographic items covering age, sex, duration of employment, HBV vaccination status, and training course passing for occupational injury prevention; (2) respondents' knowledge about blood-borne diseases including HIV/AIDS, Hepatitis B, Hepatitis C and universal precautions; (3) occurrence of occupational exposure to blood and body fluids (BBF) during their work and in the past 12 months, also other questions like kind of device causing the injury, procedure being performed, recapping, use of personal protective equipment such as gowns, gloves and use eye goggles during clinical laboratory process, hand washing after handling patient, proper disinfection and sterilization, and information on working habits (eating or smoking at work). Needle stick and sharp injuries (NSI) were defined as any contact with infected body fluid through needles, sharp instruments and blood spatters on mucus or impaired skin. The protocol of study was approved by the ethical committee of Tehran University of Medical Sciences. Purpose of survey was explained to each respondent before distribution of the questionnaire and confidentiality of the information assured. All participants were informed about the survey's objectives and gave oral informed consent before completing the questionnaire. Outcome assessment was based on answers to the questions on the number of needle stick and sharp injuries or splashes that the participants had experienced during the year or had ever sustained.

Descriptive statistics were used to show prevalence and overall numbers of needle stick injuries and blood and body fluid (BBF) exposure events. The factors explored as potential predictors of needle stick injuries included age (<30 years, ≥30 years and ≤40 years, >40 years), gender (male, female), duration of employment (<5 years, ≥5 years and ≤10 years, >10 years), on-job training at work on needle stick injuries (workshop) (yes; no), the HBV vaccination status (yes, no and unknown), use of personal protective equipment while handling sharp instruments (always; usually, sometimes and never), level of education (less than bachelor of science, equal to or more than bachelor of science) and doing recapping of the needles after injection (always, usually, sometimes and never). We used Chi-square test for association between two categorical variables, and t-test to compare the means. Then we used multiple logistic regressions to evaluate predictors of needle stick injury among this group of health care workers. P value less than 0.05 (two-tailed) were considered as statistically significant.

Results

The survey was completed by 193 laboratory personnel (Response rate of 90.6 %). Table 1 and 2describe the socio-demographic characteristics of the respondents including the distribution of age, gender, duration of employment, HBV vaccination status, and compare the incidence of exposure to BBF and needle stick injury in the work life and during the last year among laboratory personnel. The mean (SD) age of respondents was 33.13(8.54) years; 69.9% of participants were females (Table 1). Only 151 laboratory personnel (78.2%) had been immunized against Hepatitis B virus (HBV), as opposed to 29 (15.0%) which had not. Also, 13 (6.7%) laboratory personnel could not remember the immunization. Among the participants, 33 (17.1%) reported having experienced at least one time needle stick injury in the last year. The prevalence of sharp injury in laboratory personnel was 43.5% during their employment, while 109 (56.5%) had not experienced any sharp injury at the same time. From total of 193 staff, 49 (25.4%) were reported at least one splash experience in the previous year. The prevalence of splash experience was obtained about 36.3% in work life of participants, while 123 (63.7%) had not experienced any exposure splash. The source of injuries in 69% was needle recapping. A total of 193 laboratory personnel, 25 (13%) reported to have never recapped needles. They always use a sharp objects container. 83% (160.193) of participants washed their hand with clean water and disinfectant solutions after patient handling. The use rate of personal protective equipment in laboratory environment was different during various practices. Gloves 175 (90%), aprons or gowns 171 (88%), protective eyewear 18 (9%), rubber boots 7 (3%), face shield 2 (1%) and scarf 20 (10%) were used by staff during their work. A high proportion (79.8%) of the laboratory personnel always eat, drink or smoke in the workplace and almost one-fifth (20.2%) of respondents never do that. Among all personnel, 28 (14.5%) reported using a special clothes during work. Frequency of prompt exposure reporting to regional safety coordinators among laboratory staff was 48 (57.1%), for needle stick injury and 20 (28.6%) for splash exposure.

There was no statistically significant difference in the frequency of sharp injuries between participants based on gender, work experience (years), training course and levels of education. In multiple logistic regression analysis we realized that none of measured variables (age, gender, work experience, training course, level of education and status of HBV vaccination) are predictors of needle stick injury of splash among this group.

Discussion

This is the first survey of needle stick and sharp object injuries (NSIs) in laboratory technicians in Iran. In the present study, we showed high frequency of NSI, splash and level exposure to BBFs was observed among laboratory technicians in three educational hospitals in Tehran. This finding is similar to the results of other studies among other health care workers (HCWs) (4,7-9). Prevalence of NSI, splash and exposure, during the employee's work life was determined 44%, 36% and 55%, respectively. More than 17% of the study population had experienced at least one time needle stick injury in the previous year. The prevalence of NSI among laboratory technicians in other studies were slightly higher, for example in Tehran (20.6%) (8), northeast China (32.2%) (10), sub-Saharan Africa (57%) (7), West Indies (74%) (11), Taiwan (78.3%) (9), Fars Province, Southern Iran (79%) (4). In contrast, needle or sharp injuries among laboratory personnel during one year, were lower from what we seen (9).

25.4% of the study sample had experienced at least one splash in the last year. The prevalence of splashes among the laboratory technicians in our study was lower than that of similar studies conducted in Canada (91.5%) (1), Australian educational hospitals (57%) (12) and higher than that in Canada (11%) (13) and was similar to the study conducted in China (24%) (14). These differences could be explained by this fact that our study sample had included only laboratory personnel, while in other studies; all health care workers had participated.

Our study demonstrated that 78.2% of laboratory personnel, had received a full course of hepatitis B vaccination, which similar was found in a previous study among health care workers in London (78%) (5) and was lower than similar studies conducted in Turkish HCWS (81.3%) (15), in Tehran University of Medical Sciences (87.5%) (8) and higher than in Kabul hospital staff (27.9%) (16), in northeast China (28%) (10), in a general hospital, China (68.3%) (14) and in nurses of Fars province, Southern Iran (65%) (4).

There is not any policy concerning precautions to prevent transmission of infections and there are no guidelines that included hand washing after patient contact, use of personal protective equipment, (such as gloves, goggles, face shields, aprons, gowns) minimization of manipulation of sharp objects and safe disposal of used sharp devices in these hospitals. However, a high proportion of laboratory personnel (69.4%) in our study were not present at training course about needle stick injuries. This information was lower than that of similar studies conducted in sub-Saharan Africa (75%) (7) and higher than in a general hospital, in China (35%) (14). Also reveals insufficient training at the workplace and suggests mandatory course for personnel. Unfortunately, Tehran educational hospitals do not have any official post exposure prophylaxis protocols to assist laboratory personnel to receive appropriate care. This information emphasizes the necessity to continue a plan on standard practice for infection control in developing countries (7). Preventive activities relating infection control play a major role in augmentation of knowledge and safe behavior of HCWS (17). Nineteen percent of the study populations were used with personal protective equipment such as gloves in laboratory environment. Our observations were higher than those of similar studies conducted in a general hospital, in China (47%) (14), Tehran (48.9%) (8), UK hospitals (29.9%) (18) and Abeokuta metropolis, Nigeria (63.8%) (19).

Wearing gloves could decrease risk of transmission of blood borne disease via skin. This experience and training among health care workers may lead to the decline of prevalence of NSI during the study (20).

Our study has several limitations. First, a retrospective survey is subject to recall and participation bias. Our high response rate of 90% (193/213) minimizes the effects of participation bias. Second, data were collected from a small sample of educational hospital health workers. Our study design did not allow us to determine detailed potential risk factors of NSI, splash and BBFS exposures; therefore, we actually needed a more comprehensive study, a large sample of HCWS to calculate the proportion of blood exposure events. Some study recommend that occupational blood exposure among laboratory personnel could be reduced through increased use of safety devices and personal protective equipment and increased compliance with universal precautions but there is little documentation to show the cost-benefit implications (21).

42.9% of needle stick injuries had not been reported by health care workers. The same finding was also found for splash injuries (71.4%) (22). Underreporting

Needle stick injuries may result in underestimation of needle stick risk in health care workers. It may be considered as one of the factors which lead to unknown prevalence of NSI among laboratory workers.

In our study, a high rate of NSI, splash and level of exposure to BBFS were observed among laboratory technicians in three educational hospitals in Tehran. Also this finding was not related to some variables such as age, sex, duration of employment, the HBV vaccination status, participating in workshop of education and training for injury prevention.

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Conflict of interest

The authors declare that they have no conflict of interest.

References

1. Alamgir H, Cvitkovich Y, Astrakianakis G, Yu S, Yassi A. Needlestick and other potential blood and body fluid exposures among health care workers in British Columbia, Canada. Am J Infect Control. 2008 Feb;36(1):12-21.
2. Naghavi SH, Sanati KA. Accidental blood and body fluid exposure among doctors. Occup Med (Lond). 2009 Mar;59(2):101-6.
3. Osborn EH, Papadakis MA, Gerberding JL. Occupational exposures to body fluids among medical students. A seven-year longitudinal study. Ann Intern Med. 1999 Jan 5;130(1):45-51.
4. Askarian M, Shaghaghian S, Gillen M, Assadian O. Body fluid exposure in nurses of Fars province, Southern Iran. Arch Iran Med. 2008 Sep;11(5):515-21.

5. Gyawali P, Rice PS, Tilzey AJ. Exposure to blood borne viruses and the hepatitis B vaccination status among healthcare workers in inner London. Occup Environ Med. 1998 Aug;55(8):570-2.

6. Ferguson TJ. Needle-stick injuries among health care professionals. West J Med. 1992 Apr;156(4):409.

7. Nsubuga FM, Jaakkola MS. Needle stick injuries among nurses in sub-Saharan Africa. Trop Med Int Health. 2005 Aug;10(8):773-81.

8. Shariati B, Shahidzadeh-Mahani A, Oveysi T, Akhlaghi H. Accidental exposure to blood in medical interns of Tehran University of Medical Sciences. J Occup Health. 2007 Jul;49(4):317-21.

9. Guo YL, Shiao J, Chuang YC, Huang KY. Needlestick and sharps injuries among health-care workers in Taiwan. Epidemiol Infect. 1999 Apr;122(2):259-65.

10. Zhang Z, Moji K, Cai G, Ikemoto J, Kuroiwa C. Risk of sharps exposure among health science students in northeast China. Biosci Trends. 2008 Jun;2(3):105-11.

11. Vaz K, McGrowder D, Crawford T, Alexander-Lindo RL, Irving R. Prevalence of injuries and reporting of accidents among health care workers at the University Hospital of the West Indies. Int J Occup Med Environ Health. 2010;23(2):133-43.

12. Bi P, Tully PJ, Pearce S, Hiller JE. Occupational blood and body fluid exposure in an Australian teaching hospital. Epidemiol Infect. 2006 Jun;134(3):465-71.

13. Occupational exposure to the human immunodeficiency virus among health care workers in Canada. CMAJ. 1989 Mar 1;140(5):503-5.

14. Zhang M, Wang H, Miao J, Du X, Li T, Wu Z. Occupational exposure to blood and body fluids among health care workers in a general hospital, China. Am J Ind Med. 2009 Feb;52(2):89-98.

15. Kosgeroglu N, Ayranci U, Vardareli E, Dincer S. Occupational exposure to hepatitis infection among Turkish nurses: frequency of needle exposure, sharps injuries and vaccination. Epidemiol Infect. 2004 Jan;132(1):27-33.16. Salehi AS, Garner P. Occupational injury history and universal precautions awareness: a survey in Kabul hospital staff. BMC Infect Dis. 2010;10:19.

17. Zafar A, Habib F, Hadwani R, Ejaz M, Khowaja K, Khowaja R, et al. Impact of infection control activities on the rate of needle stick injuries at a tertiary care hospital of Pakistan over a period of six years: an observational study. BMC Infect Dis. 2009;9:78.

18. Kerr HL, Stewart N, Pace A, Elsayed S. Sharps injury reporting amongst surgeons. Ann R Coll Surg Engl. 2009 Jul;91(5):430-2.

19. Sadoh WE, Fawole AO, Sadoh AE, Oladimeji AO, Sotiloye OS. Practice of universal precautions among healthcare workers. J Natl Med Assoc. 2006 May;98(5):722-6.

20. Falagas ME, Karydis I, Kostogiannou I. Percutaneous exposure incidents of the health care personnel in a newly founded tertiary hospital: a prospective study. PLoS One. 2007;2(2):e194.

21. Stock SR, Gafni A, Bloch RF. Universal precautions to prevent HIV transmission to health care workers: an economic analysis. CMAJ. 1990 May 1;142(9):937-46.

22. Hamory B H. Underreporting of needlestick injuries in a university hospital. Am J Infect Control. 1983;11:174-177.