

Prevalence and determinant factors for sharp injuries among Addis Ababa hospitals health professionals

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Abstract: Background: Sharp piercing injuries to medical personnel are a piercing body trauma caused by sharp medical equipment used to screen, diagnose, treat or follow up patients' conditions. More than 50 pathogens can be transmitted by sharp injury. There is no previous study conducted among Addis Ababa hospitals that has addressed the prevalence and associated risk factors for sharp injury. Objective: The objective of this study was to assess the prevalence and determinant factors for sharp injuries among health professionals working in Addis Ababa hospitals. Methodology: Cross sectional study was conducted in Addis Ababa from January to June 2012. A total of 645 study participants were obtained using 95 % confidence interval, 25.7% Proportion, margin of error 5%, design effect of 2 and non response rate of 10%. Using multi stage sampling techniques 11 hospitals and 645 health professionals were selected. The data was collected using self administered questionnaire. Pre-test was performed in Yekatit 12 hospital. Crude *and adjusted* odds ratios were used to identify the associated factor. Result: A total of 631 health professionals were included with a response rate of 97.83%. The mean age of the respondents was 29.85 years, 57.8% of the respondents were female. The prevalence of sharp injury was 66.6%. Sharp injury was associated with work load (AOR= 15.576, 95% CI: 7.795, 31.125), working in private hospitals (AOR= 3.033, 95%CI: 1.731, 5.314), disassembling of syringe and needle (AOR= 5.380, 95% CI: 2.684, 10.785), over use of injection (AOR= 5.654, 95% CI: 2.404, 13.298), Universal precaution (AOR= 0.382, 95% CI: 0.222, 0.659), injection safety training (AOR= 0.521, 95%CI: 0.320, 0.849), infection prevention training (AOR= 0.299, 95% CI: 0.177, 0.504), availability of safety box (AOR= 0.036, 95% CI: 0.013, 0.1). Conclusion: High prevalence of sharp injuries was observed. Sharp injuries were associated with workload, working in private hospitals, disassembling of syringe and needle, over use of injection, application of universal precautions, injection safety training and infection prevention training. A lot of health professionals are suffering from blood borne pathogens.

Keywords: Sharp Injuries, Determinant Factors, Addis Ababa

1. Introduction

Sharp injuries are a piercing body trauma caused by sharp medical equipment that were used to screen, diagnose, treat or follow the patient disease conditions. Types of sharp medical equipment includes suture needle, hypodermic needle, disposable needle, blood sugar lance, surgical scalpel ,trocar puncture needle, vacuum tube blood collection needle, broken vial preparation(vials or ampoules), razors, scissors etc(1). Every day health professionals suffer from sharp injuries, and these injuries were often considered as part of the job (2). More than 50 pathogens can be transmitted by sharp injuries. Health professional can acquire the following disease by sharp

injuries: Blast mycosis, Crypto mycosis, Diphtheria , Ebola , Gonorrhoea , Hepatitis B, Hepatitis C, HIV/AIDS, Strep pyogens, Tetanus , Herpes , Malaria , Tuberculosis, Syphilis , Toxoplasmosis, Leptospirosis, Rocky mountain ,Spotted fever, Scrup typhus, Staphylococcal infection, streptococcal infection (2-5). Among these disease Hepatitis B, Hepatitis C, and HIV/AIDS are the most dangerous disease(2, 6). The risks of acquiring those diseases after accidental sharp injuries were 30% for Hepatitis B, 3% for Hepatitis C, and 0.3% for HIV/AIDS(2, 3). The average risk of HIV transmission after mucocutaneous exposure of potentially hazardous body fluids were 0.09% (7). About 30% of Hepatitis B infected person demonstrate no symptom(2). That means they act as good

source of transmitting infection to other people including their family because Hepatitis B can also be transmitted by sexual intercourse or contact with any other body fluids(8).

The global burden of Hepatitis B disease was 350 million, Hepatitis C 150 million and HIV/AIDS 33 million(9). Hepatitis C virus was not identified until 1989 and before that it was referred to as non A, non B, Hepatitis(2, 10). In healthy blood donors the rate Hepatitis C of infection was about 0.02% in northern Europe, 6% in Africa and as high as 19% in Egypt and parts of Africa(10). The burden of Hepatitis B virus infection was four folds than the general population with prevalence of 5.9%(9, 11). In developing countries, 40-60% of HBV infection in health care workers were attributed to professional hazard while in developed countries the attributed fraction were less than 10% due to vaccination coverage(9) .

Occupational sharp injuries affects the quality of health care services in addition to the health of care providers (12). Health care workers experience severe emotional distress, fear, anxiety which leads them to occupational and behavioral changes(13, 14). Health care workers in sub Saharan Africa are underpaid, overworked and ill protected (15, 16).

At a country level the number of health professionals that suffer from sharp injuries remains unknown, but a few studies have conducted in Awassa, Sidama and eastern part of Ethiopia.

Even if the numbers of private and governmental hospitals were increasing dramatically in the Addis Ababa there is no previously conducted research that shows the prevalence of sharp injuries and its determinants in the study area.

This study was conducted to determine the prevalence and determinant factors of sharp injuries in order to maintain the health of medical professionals. The research will enable decision makers to make better decisions about prevention strategies. Also this paper updates the information for further study

2. Methodology

Hospital based cross sectional study was conducted. The study was conducted in Addis Ababa. Addis Ababa is the capital of Ethiopia and the capital of Africa. It is the largest city in Ethiopia, with a population of 3,384,569 according to the 2007 population census (17). There are 51 hospitals in Addis Ababa out of which 17 are governmental hospitals the rest 34 hospitals are run by private investors and nonprofit organizations. The study period comprises of January 2012-June 2012. The sample size was calculated based on 95 % confidence interval, Prevalence of sharp injuries based on 2010 study in eastern part of Ethiopia 25.7%(18), Margin of error 5%, $n = z^2 * p * (1-p) / w^2 = 293$. By considering the design effect of 2 the total sample size was 586 health professionals. After 10% increments of none response rate the final sample size was 645. Multi stage sampling was used. First from 51 hospitals found in Addis

Ababa 11 hospitals was selected by simple random sampling, then from these 11 hospitals using proportional allocation ratio all the 645 health professionals was selected, from each of the selected 11 hospitals by using the monthly payroll as sampling frame simple random sampling was used to select the study participants. The data was collected using self administered questionnaire. Six data collectors (diploma nurses) and 2 supervisors (BSc nurses) were assigned for data collection. Pre-test was conducted in Yekatite 12 hospital health professionals, and necessary correction was taken after the pre-test on questionnaire. The data collector and supervisor received 2 days training on how to collect the data, before the respondent respond to the questionnaire orientation was given to fill the questionnaire. The collected data was checked by the principal investigator and the supervisors for its completeness. Sharp injuries: a piercing body trauma occurred to health professionals during screening, diagnosis, treatment; follow up of patient condition by any sharp medical equipment

Unsafe injection practice: intraparental administration of medication that harm the patient, providers, health care waste handlers and the community. The data was entered to the computer using Epi info version 3.3.2, and analyzed using spss version 16. Bivariate analysis was performed before multivariate analysis. A p value of 0.2 cut points was taken as a reference to go to the multivariate analysis. P-value of less than 0.05 cut points and 95% confidence interval was taken to predict determinant factors for sharp injuries. Ethical clearance was obtained from the Ethical Committee of Institution of Public Health CMHS University of Gondar. Official letters was given to the Ministry of Health, Addis Ababa city administration office and the selected hospitals. Permission was obtained from each studied hospitals respectively. The purpose and importance of this study was explained for each study participants, verbal informed consent was taken from each study participant before they fill the questionnaire, and participant involvement was assured on voluntary bases. Name was not written on the questionnaire the confidentiality of the data was kept at all level of the study.

3. Result

A total of 631 health professionals were included in the study with a response rate of 97.83 %. Governmental hospitals contribute 413 (65.5%) of study subjects. The mean age of the respondents was 29.8542 years with standard deviation of 8.39 years. Female constitute 365 (57.8%) of the respondents. The life time prevalence of sharp injuries among health professionals working in Addis Ababa hospitals were 66.6%. Around 271 (64.52%) of sharp injuries were attributed by needle, followed by surgical blade 69 (16.43%). Injection and suturing contribute to the sharp injuries in 40% of the situation. Most health professionals (71.66%) do not report the injuries. Only 73 (11.6%) of the study subjects were

vaccinated for Hepatitis B vaccine.

Table 1. Socio-demographic characteristic of health professionals working in Addis Ababa hospitals (n=631)

| Variables | Total study subjects | |
|-------------------------------------|----------------------|------------|
| | Number | Percentage |
| Age (in years) | | |
| 19-28 | 357 | 56.6 |
| 29-38 | 174 | 27.6 |
| 39-48 | 71 | 11.3 |
| 49+ | 29 | 4.6 |
| Marital status | | |
| Married | 293 | 46.4 |
| Single | 324 | 51.3 |
| Divorced | 8 | 1.3 |
| Widowed | 6 | 1 |
| Religion | | |
| Orthodox | 479 | 75.9 |
| Protestant | 91 | 14.4 |
| Muslim | 53 | 8.4 |
| Others | 8 | 1.3 |
| Ethnicity | | |
| Amhara | 315 | 49.9 |
| Oromo | 158 | 25 |
| Tigray | 85 | 13.5 |
| Guragie | 31 | 4.9 |
| Haddiya | 14 | 2.2 |
| Others | 28 | 4.4 |
| Educational status | | |
| Diploma | 216 | 34.2 |
| Bachelor degree | 261 | 41.4 |
| General practitioner | 93 | 14.7 |
| Specialist | 57 | 9 |
| Others | 4 | 0.6 |
| Professions | | |
| Laboratory technicians/technologist | 69 | 10.9 |
| General practitioner | 89 | 14.1 |
| Anesthetist | 7 | 1.1 |
| Gyn/obstetricians | 23 | 3.6 |
| Clinical/bsc nurse | 339 | 53.7 |
| Midwife nurse | 27 | 4.3 |
| Health officer | 17 | 2.7 |
| Internist | 17 | 2.7 |
| Pediatrician | 9 | 1.4 |
| Surgeon | 13 | 2.1 |
| Others | 21 | 3.3 |

Injection safety training, over use of injections, infection prevention training, work load, recap, availability of safety box, disassembling of syringe and needles, universal precaution and working in private hospitals were significant predictors of sharp injuries.

Injection safety training was protective from sharp injuries. If health professionals take injection safety training the risk of getting sharp injuries decreased by 47.9% as compared to those health professionals who do not take injection safety training (AOR= 0.52, 95% CI: 0.32, 0.84) keeping other variables constant.

Over use of injection 5.65 times increase the risk of sharp injuries (AOR= 5.65, 95% CI: 2.4, 13.3).

Infection prevention training protects from sharp injuries. if health professionals take infection prevention training they protect themselves from sharp injuries in 70% of the cases as compared to those health professionals that do not take infection prevention training (AOR= 0.3,95% CI: 0.18, 0.5).

Work loaded health professionals have 15.58 times susceptible for sharp injuries than health professionals with no work load (AOR=15.58, 95% CI: 7.78, 31.13).

Recap increase the risk of health professional to sharp injuries. If health professionals never recap they protect themselves from sharp injuries in 61.6% of the cases (AOR=0.38, 95% CI: 0.18, 0.81) keeping other variables constant.

The presence of safety box decrease the risk of sharp injuries by 96%, (AOR= 0.04, 95% CI: 0.013, 0.1)

If health professionals properly apply universal precaution in their daily activity, the risk of sharp injuries will decrease by 61.8% as compared to those health professionals that do not properly apply universal precaution keeping other variables constant (AOR= 0.38, 95% CI: 0.22, 0.66).

Workings in private hospitals were risky for sharp injuries. The risk of sharp injuries to private hospital health professionals were 3.03 times higher than those health professionals working in government hospitals (AOR=3.03, 95% CI: 1.73, 5.31).

The risk of sharp injuries to those health professionals that disassemble needle and syringe was 5.38 times higher than those health professionals that didn't disassemble needle and syringe (AOR= 5.38, 95% CI: 2.68, 10.76).

Table 2. Determinant factors for sharp injuries among health professionals working in Addis Ababa hospitals 2012, (n=631).

| Variables | Sharp injuries | | Crude OR with 95% CI | Adjusted OR with 95% CI | p-value |
|--------------------------------------|----------------|-----|----------------------|-------------------------|------------------|
| | yes | no | | | |
| Injection safety training | | | | | |
| Yes | 227 | 138 | .62(.44-.89) | .52(.32-.85) | 0.009* |
| No | 193 | 73 | 1 | 1 | 1 |
| Over use of injection | | | | | |
| Yes | 13 | 55 | 0.09(0.05-0.18) | 5.65(2.4-13.3) | <.001* |
| No | 407 | 156 | 1 | 1 | 1 |
| Infection prevention training | | | | | |
| Yes | 335 | 104 | 4.05(2.79-5.91) | .3(.18-.5) | <.001* |
| No | 85 | 107 | 1 | 1 | 1 |

| Variables | Sharp injuries | | Crude OR with 95% CI | Adjusted OR with 95% CI | p-value |
|---|----------------|-----|----------------------|-------------------------|---------|
| | yes | no | | | |
| Work load | | | | | |
| Yes | 268 | 186 | 0.24(0.15-0.38) | 15.58(7.8-31.13) | <.001* |
| No | 152 | 25 | 1 | 1 | 1 |
| Recap | | | | | |
| All of the time | 43 | 46 | 1 | 1 | 1 |
| Most of the times | 94 | 24 | .24(.13-.44) | .35(.16-.77) | .010* |
| Some times | 202 | 70 | .74(.44-1.25) | .82(.41-1.62) | .559 |
| Never | 81 | 71 | .29 (.17-.51) | .38 (.18-.81) | 0.012* |
| Availability of safety box | | | | | |
| Yes | 13 | 31 | 0.19(0.1-.38) | .04(.01-0.1) | <.001* |
| No | 407 | 180 | 1 | 1 | 1 |
| Universal precaution | | | | | |
| Yes | 67 | 73 | .36(.24-.54) | .38(.22-.66) | .001* |
| No | 353 | 138 | 1 | 1 | 1 |
| Type of hospital | | | | | |
| Private | 183 | 35 | 3.89(2.58-5.86) | 3.03(1.73-5.31) | <.001* |
| Governmental | 237 | 176 | 1 | 1 | 1 |
| Dis Assembling of needle and syringe | | | | | |
| Yes | 36 | 62 | 0.04(0.02-0.06) | 5.38(2.68-10.79) | <.001* |
| No | 384 | 149 | 1 | 1 | 1 |

*=statistically significant at p-value less than 0.05 level

4. Discussion

The life time prevalence of sharp injuries among health professionals working in Addis Ababa hospitals were 66.6%. The prevalence was higher than a study done in eastern part of Ethiopia in 2010 that resulted the life time prevalence of sharp injuries 25.7%(18). This difference is due to the fact that in eastern part of Ethiopia the study was conducted by mixing health professionals from hospitals, health centers and clinics so that the number of screening, diagnostic, follow up and other intervention procedures that uses sharp medical equipments were less in health center and clinics as compared to hospitals. The other possible reason is that work load in hospitals were higher than those in health center and clinics that predispose health professionals for sharp injuries.

Infection prevention training decreases the risk of sharp injuries by 70% keeping other variables constant (AOR= 0.3, 95% CI: 0.18, 0.5). Injection safety training decreases the risk of sharp injuries by 47.1% keeping other variables constant AOR= 0.52, 95%CI: 0.32, 0.85). Infection prevention training is a wide training that incorporate injection safety training, injection safety training mainly focused on injection so that narrower than infection prevention so that protective percentage was less than infection prevention training. If the health professionals trained for injection safety or infection prevention they can form their relationship with the sharp medical equipments safer. This result was the same with that of eastern part of Ethiopia finding in 2010(18).

Keeping other variables constant over use of injection 5.65 times increases the risk of sharp injuries (AOR= 5.65, 95% CI: 2.4, 13.3). This is due to the reason that over use of injection impose extra burden to health professionals, health professionals easily tired and became negligent as a result they easily suffer from sharp injuries.

If health professionals never recap they protect themselves from sharp injuries in 61.6% of the cases (AOR=0.38, 95% CI: 0.18, 0.81) keeping other variables constant. If health professionals recap there is additional time they spent in handling needle and cup which make them vulnerable for sharp injuries. A 2010 eastern part of Ethiopia cross sectional study also strength this fact (18)

Disassembling of needle and syringe increases the risk of sharp Injuries (AOR= 5.38, 95% CI: 2.68, 10.79). If the number of time health professionals spent in handling sharp increases the chance of getting sharp injuries also increases. A 2009 Pretoria Witbank finding also support that unsafe injection practice increase the chance of sharp injuries. (19)

Work load significantly increases the risk of sharp injuries, AOR= 15.58: 95% CI: 7.8-31.13). Work load makes health professionals to be stressed and loss their ability to concentrate, became fatigue finally predisposing for sharp injuries.

Those health professionals that apply universal precaution on daily and proper ways prevent themselves from sharp injuries. Keeping other variables constant if health professionals apply universal precaution on daily and proper ways they protect themselves from sharp injuries in 61.8% of the situations with AOR= 0.38: 95%CI: 0.22, 0.66). Universal precaution makes the relationship of sharp medical equipments and health professionals safer.

Availability of safety box decreases the risk of sharp injuries. Keeping other variables constant lack of safety box predisposes health professionals in 96.4% of the cases with AOR=0.036, 95% CI: 0.013, 0.1). Safety box collects sharp medical equipments in one place protecting their exposure to health professionals that makes the working environments free from sharp injuries.

Keeping other variables constant the risk of sharp injuries to private hospital health professionals were 3.03 times higher than those health professionals working in

government hospitals (AOR=3.03, 95% CI: 1.73, 5.31). This is due to the reason that in private hospitals usually work load is higher than governmental hospitals, Coverage of injection safety training in governmental and private hospitals was 37.6% and 20.3% respectively, and the coverage of infection prevention training in governmental and private hospitals were 42.6% and 26.9% respectively. This contributes to the difference in acquiring sharp injuries.

The paper represents the first large study in the local hospital and also numbers proposed are relevant from the statistical point of view. Recall bias may decrease the prevalence of sharp injury but to minimize recall bias those health professional on administrative position of the hospitals were excluded.

5. Conclusions and Recommendation

High prevalence of sharp injuries was observed among health professionals working in Addis Ababa hospitals. Sharp injuries were associated with over use of injection, workload, recap, disassembling of needle and syringe, working in private hospitals, taking infection prevention training, taking injection safety training and availability of safety box. A significant number of health professionals were infected by blood borne pathogens. I recommend the Addis Ababa city administration health office to equally distribute infection prevention and injection safety training to private and governmental hospitals, adequate number of hospitals staff recruitment. I also recommend the health professionals to apply properly and regularly universal precaution on daily activities. Scholars should contribute a lot by considering longitudinal study design for sharp injuries.

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