# SHARPS INJURIES AMONG HEALTHCARE PROVIDERS IN UYO, SOUTHERN NIGERIA

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## Abstract

***Introduction:*** Healthcare workers are at risk of exposures to blood and body fluids through splashes and sharps injuries while working in health facilities. This study was conducted to assess the level of sharps injuries and contact with patients' body fluid among health workers in Uyo, Nigeria.

***Method:*** This was a comparative study among healthcare workers. A total of 360 individuals comprising 240 (66.7%) in public facilities and 120 (33.3%) in private facilities were interviewed via a self-administered questionnaire. Data was analysed using SPSS version 11.

***Result:*** A higher proportion of respondents, 98 (81.7%), from the private compared to 133 (55.4%) from the public hospitals had sustained injury by sharps at their health facilities ($p < 0.05$).Out of this, up to 91.8% in the private facilities compared to 70.6% in the public had sustained injuries within the 12 months prior to the study ($p < 0.05$). Ninety two (93.9%) in the private facilities, and 99 (74.4%) in the public facilities, ($p < 0.05$) did not report the last sharps injuries to relevant authorities in their facilities. A higher proportion of the respondents in the private hospitals, 92 (76.6%), had ever had accidental splash of blood or other body fluids compared to 126 (52.5%) in the public hospitals ($p < 0.05$). Only 113 (53.3%), in the public and 28 (40.6%) in the private facilities, were aware of policies about practice of Universal Precautions in their facilities.

***Conclusion:*** There was a high rate of sharps injuries among health workers. Adequate practice of universal precautions should be ensured in these facilities.

***Key words:*** sharps injury, accidental splash, universal precautions, blood borne pathogens.

## Introduction

In the course of discharging their duties, health workers in both public and private institutions are exposed to blood and body fluids through splashes and injuries from sharps. These further expose such workers to blood borne pathogens, the commonest being Hepatitis B and C and human immune deficiency virus (HIV). The World Health Organization reports that among the 35 million health workers worldwide, about 3 million sustain percutaneous exposures to blood borne pathogens each year[1]. Unlike developed countries, both public and private health facilities in developing countries like Nigeria may lack well established infection control protocols for appropriate actions to be taken in the event of such exposures.

The high rate of occupational injuries reported in several studies [2-5] coupled with the increasing prevalence of blood-borne pathogens necessitated that this study be carried out to assess the level of sharps injuries and contact with patients' body fluid among health workers in Uyo, Nigeria, with the intention of making the findings available to management of these facilities, for appropriate policies including surveillance systems to be developed and effectively implemented.

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## Methods

*Study Area*

This study was carried out among health workers in public and private health facilities in Uyo, the capital of Akwa Ibom State in southern Nigeria between July and August 2008. The estimated population of Uyo metropolis as at 2006 was 304,000.[6] The three functional public health facilities in Uyo metropolis as at the time of the study, made up of one primary health centre, one secondary and one tertiary facility were used for the study. All private health facilities in Uyo metropolis, totalling 20 were involved in the study. Most of these facilities were owned by general practitioners with just a few specialist clinics. All the private facilities have laboratory services with laboratory scientists, and nurses including midwives.

*Study Population*

The study population was health workers commonly found in both public and private health facilities. These were doctors, nurses, midwives and laboratory scientists/ technicians. This was in order to ensure comparability between the health workers in the public and private facilities. The total number of eligible

health workers in the public and private facilities was 480 and 120 respectively.

*Study Design*

This was a cross sectional comparative study which was conducted in public and private hospitals in Uyo, Nigeria.

*Sample size estimation*

The sample size formula for comparison of 2 independent group proportions was used.

$$N = \frac{2 (Z\alpha + Z_\beta)^2 \Pi (1 - \Pi)}{D^2}$$

Where N = estimated sample size per group

$Z\alpha$ = standard normal deviate corresponding to the probability of making a type I error ($\alpha$), 0.05 (5%)

= 1.96

$Z_\beta$ = standard normal deviate corresponding to the probability of making a type II error ($\beta$), 20% i.e. power = 80% = 0.84

P1 = proportion of those who had percutaneous injuries / splash on open wounds and mucosal lining in the public institutions. A value of 43.5% was used[3].

P2 = proportion of those who had percutaneous injuries / splash on open wounds and mucosal lining in the private institution assuming a minimum arithmetic difference of 20% was to be detected between the two proportions, P2 = 43.5% + 20% = 63.5%

D = Minimum arithmetic difference to be detected between the two proportions = 20% = 0.2

$\Pi$ = Average of the 2 proportions = $\frac{0.435 + 0.635}{2}$

= 0.535

$1 - \Pi$ = 0.465

$$\text{Minimum n/group} = \frac{2 (1.96 + 0.84)^2 \, 0.535(0.465)}{(0.2)^2}$$

= 97.5

= 97.5 (+10% non-response rate)

= 97.5 + 9.7 =107.2

The minimum sample size per group was rounded up to 120.

*Sampling Technique*

All eligible health workers in the private facilities who agreed to participate in the study, totalling 120 were enlisted in the study. In view of the large proportion of health workers in the public health facilities, the sample size of that group was increased to 240. Multistage sampling method was used to select the required number of health workers from the public facilities. The health workers in the public institutions were first categorised into comparable groups as those found in the private facilities. Respondents were selected from each category by simple random sampling. A total of 240 health workers were enlisted in the study from the public institutions. This therefore made the private to public hospital ratio 1:2. The selections were as shown in table 1.

**Table 1:** Selection of health workers from the private and public facilities

| Category of eligible health worker/ years of practice | Total in facilities | | Selected no. in public facilities N=240 |
|---|---|---|---|
| | Private N=120 | Public N=480 | |
| **Doctors (years)** | | | |
| 1-5 | 22 | 64 | 44 |
| 6-15 | 20 | 83 | 40 |
| >15 | 2 | 18 | 4 |
| **Total** | **44** | **165** | **88** |
| **Nurses (years)** | | | |
| 1-5 | 16 | 73 | 32 |
| 6-15 | 47 | 177 | 94 |
| >15 | 3 | 30 | 6 |
| **Total** | **66** | **280** | **132** |
| **Laboratory scientists (years)** | | | |
| 1-5 | 4 | 17 | 8 |
| 6-15 | 6 | 16 | 12 |
| >15 | 0 | 2 | 0 |
| **Total** | **10** | **35** | **20** |

*Data Collection Instrument*

A semi-structured questionnaire was developed and used to obtain information from the health workers. Such information included socio-demographic characteristics, history of injuries from sharps, actions taken after injuries, occurrence of accidental splashes of body fluid, and hepatitis B vaccination status.

*Data collection procedure and analysis*

The purpose, content and significance of the study were explained to the subjects and written informed consent was obtained. Ten fourth year medical students were trained as research assistants by the investigator, to distribute and retrieve the self-administered questionnaires from participants. Data was collected over a period of three weeks. All questionnaires were filled and successfully retrieved. Data obtained was analysed using the Statistical Package for the Social Sciences (SPSS) version 11. Frequencies were generated and the Chi-square test was used to test for associations.

**Table 2:** Distribution of respondents by injury sustained from sharp item

| | Facility | | Statistics $\chi^2$ | p-value |
|---|---|---|---|---|
| | Public | Private | | |
| Sustained injury by sharp objects | N=240 n (%) | N=120 n (%) | | |
| Yes | 133 (55.4) | 98 (81.7) | 23.97 | *0.00 |
| No | 107 (44.6) | 22 (18.3) | | |
| Injury in past 12 months | N=133 | N=98 | | |
| Yes | 94 (70.6) | 90 (91.8) | 15.59 | *0.00 |
| No | 39 (29.4) | 8 (8.2) | | |
| Number of sharp injury | N=94 | N=90 | | |
| 1-2 | 80 (85.1) | 67 (74.4) | 3.25 | 0.07 |
| >3 | 14 (14.9) | 23 (25.6) | | |

* = statistically significant

*Ethical Considerations*

Ethical approval to carry out the study was obtained from the State Ministry of Health and the ethical committee of the Teaching Hospital. In addition, permission to carry out the study was obtained from the heads of the individual facilities involved in the study. Written informed consent was also obtained from respondents and they were told that participation was voluntary and they would not suffer any consequences if they chose not to participate.

*Limitation*

The issue of self-reporting was a limitation in this study since there could have been a possibility of recall bias among the respondents while trying to remember events which occurred one year prior to the study.

## Results

A total of 231 (64.2%) respondents in both public and private hospitals had sustained injury by sharps in the course of performing their duties at the health facilities. However, a significantly higher proportion of respondents from the private hospitals, 98 (81.7%), reported sustaining injuries compared to 133 (55.4%) from the public hospitals ($\chi2=23.97$, $p = 0.00$).A higher proportion of health workers in the private facilities, (91.8%), compared to public, (70.6%), had sustained injuries within the 12 months period preceding the study ($\chi2=15.59$, $p<0.05$). Majority of respondents in both private and public hospitals sustained 1-2 injuries within that period with a greater proportion from the public (85.1%) than the private facilities (74.4%). However a higher proportion of those who sustained >3 injuries were from the private, (25.6%), compared to public facilities, (14.9%) (Table 2).

Injury was significantly more frequent among doctors in both facilities, public, 62 (70.5%) ($\chi2=10.75$, $p=0.005$), private 39 (88.6%) ($\chi2=8.13$, $p=0.02$)(Table 3).

Logistic regression of the factors associated with the occurrence of sharps injury among the respondents showed that the predictors of sharps injury in the population were (a) sex: males had a higher risk of sustaining injuries than females [OR: 2.04; $p < 0.01$], (b) profession: doctors had a higher risk of sustaining injuries than other profession [OR: 1.95; $p < 0.01$], (c) health facility: those working in the private facility had a higher risk of injuries compared to those in the public facility [OR: 5.53; $p < 0.001$] (Table 4).

After sustaining injuries, the first form of treatment most commonly applied to a wound as shown on Table 5 was spirit, public facilities, 67 (50.4%), private facilities, 46 (47.0%) respectively. Overall, majority of respondents in all health facilities did not report the last sharps injury they sustained to relevant authorities in their health facilities. This was higher among respondents in the private facilities, 92 (93.9%) compared to the public facilities, 99 (74.4%), ($\chi2=14.90$, $p< 0.05$).The commonest reason given for not reporting was that the wound was minor, public 82 (82.8%) and private facilities 77 (83.7%) respectively.

**Table 3:** Categories of health workers and sustaining of injuries

| Facility | Profession | Injury | No injury | Total | Statistics $\chi2$ | p-value |
|---|---|---|---|---|---|---|
| Public | Doctor | 62 (70.5) | 26 (29.5) | 88 | | |
| | Nurse | 67 (50.8) | 65 (49.2) | 132 | 10.75 | *0.005 |
| | Lab scientist | 4 (20.0) | 16 (80.0) | 20 | | |
| Private | Doctor | 39 (88.6) | 5 (11.4) | 44 | | |
| | Nurse | 54 (81.8) | 12 (18.2) | 66 | 8.13 | *0.02 |
| | Lab scientist | 5 (50.0) | 5 (50.0) | 10 | | |

* = statistically significant

A higher proportion of the respondents in the private hospitals, 92 (76.6%), had accidental splash compared to 126 (52.5%) in the public hospitals ($\chi 2$ =19.56, p< 0.05) as shown on Table 6.

**Table 4:** Logistic regression analysis of the factors associated with the occurrence of sharps injury

| Factors | Odds ratio | p-value | 95% CI |
|---|---|---|---|
| Sex<br>*Male*<br>*Female* | <br>2.04<br>1.00 | <br>0.003 | <br>1.28-3.24 |
| Profession<br>*Doctor*<br>*Lab Scientist*<br>*Nurse* | <br>1.95<br>0.43<br>1.00 | <br>0.007<br>0.037 | <br>0.20-3.17<br>0.20-0.95 |
| Health Facility<br>*Private*<br>*Public* | <br>5.53<br>1.00 | <br>0.000 | <br>3.27-9.39 |

**Table 5:** Measures taken by health workers after injury, reporting of last injury/ reasons for not reporting

| Variable | Facility | | Statistic $\chi^2$ | p-value |
|---|---|---|---|---|
| | Public N=133 n (%) | Private N=98 n (%) | | |
| Measures taken | | | 8.72 | *0.03 |
| Applied spirit | 67 (50.4) | 46 (47.0) | | |
| Used chlorhexidine/ chlorine solution | 4 (3.0) | 10 (10.2) | | |
| Washed with water | 36 (27.1) | 32 (32.6) | | |
| No response | 26 (19.5) | 10 (10.2) | | |
| Reporting | | | | |
| Reported | 34 (25.6) | 6 (6.1) | 14.90 | *0.00 |
| Did not report | 99 (74.4) | 92 (93.9) | | |
| Reasons for not reporting | | | | |
| Wound was minor | 82 (82.8) | 77 (83.7) | 0.95 | 0.6 |
| Lack of time | 6 (6.1) | 3 (3.3) | | |
| Not sure of who to report to | 11 (11.1) | 12 (13.0) | | |

* = statistically significant

Among respondents who had heard of universal precautions (UP), a total of 141 (50.2%) were aware of specific policies about practice of UP. Awareness was not significantly higher in the public, 113 (53.3%), than in the private facilities, 28 (40.6%), ($\chi 2$=3.37, p=0.06). Majority of the respondents had received hepatitis B vaccination in both the public, 201 (83.8%), and private facilities, 95 (79.2%), respectively.

## Discussion

A significant proportion of the health workers in this study were at risk of exposure to blood borne pathogens at their workplaces as up to two thirds admitted to ever sustaining injuries while carrying out their duties in their workplaces. The higher risk reported among health workers in the private facilities may have been due to less application of UP among workers in the private compared to the public facilities. Also, the provision of UP materials for the health workers by the owners of the private facilities may not have been optimal since such facilities in Nigeria are mainly profit oriented.

**Table 6:** Accidental splash of blood or other body fluid on skin or mucus membrane of health workers

| Accidental splash of blood or other body fluid | Facility | | Statistics $\chi^2$ | p-value |
|---|---|---|---|---|
| | Private (%) | Public (%) | | |
| Yes | 126 (52.5) | 92 (76.6) | 19.56 | *0.00 |
| No | 114 (47.5) | 28 (23.4) | | |
| Total | 240 (100) | 120 (100) | | |

* = statistically significant

Several studies in different parts of the world have also reported injuries among health workers. In a study carried out in Northern Italy on 28,000 health care workers in 47 out of 56 public hospitals over a 3year period, 5174 percutaneous injuries were recorded.[2] In Nigeria, a study carried out in Ibadan among 271 resident doctors reported that 80% of those exposed to blood one year preceding the survey had percutaneous injuries.[3] Also, a study among surgeons in training at 17 medical centres in England reported that 582 (83%) out of 699 respondents had had a needle stick injury during training,[4] while 65 out of 72(90.3%) of gynaecologists interviewed in a cross-sectional study conducted in Nigeria in 2005 had also experienced needlestick injuries in the workplace. [5]

It is therefore very important to ensure that UP recommendations are adequately adhered to by health workers in order to reduce their exposure to blood and

other body fluids and thus minimize their risk of exposure to blood borne pathogens. Compliance with universal precautions has been shown to reduce the risk of exposure to blood and other body fluids among health workers.[7] Nigeria has its own policy which establishes the minimum standard of universal precautions to be observed by health workers in line with CDC recommendations.[8]

Those who sustained >3 injuries within the 12 months preceding the study obviously experienced greater risk of exposure to blood borne pathogens and were a cause for concern. A study among surgeons in sub-Saharan Africa reported that during the year preceding the study, the surgeons sustained a mean of 3.1 percutaneous injuries.[9] A high rate of needlestick injuries was also reported among nurses and midwives in a cross-sectional study in Kampala, Uganda, where the rate of needlestick injuries was reported to be 4.2 per person-years.[10]

Doctors had a higher risk of sustaining injuries than other professions in this study. A possible reason may be because they were more involved in invasive procedures or probably paid less attention to the practice of UP compared to the other groups of health workers. A study in France also reported a high injury rate among doctors. Out of 151 surgeons, 55 said they had sustained a total of 96 needle stick injuries during the month preceding the survey.[11] This is however in contrast to findings in a study carried out in United States of America among health workers exposed to blood borne pathogens, where registered nurses accounted for the highest exposures of 36%, followed by clinical laboratory technologists and technicians (33%) and physicians (17%).[12]

Majority of respondents who had injuries in this study did not apply the right treatment after such injuries. Ideally, wounds and skin sites that have been in contact with blood or body fluids should be washed with soap and water and mucous membranes should be flushed with water.[13] Such practice was reported in a tertiary hospital in India where immediate action following potential exposure to blood and body fluid included washing the wound with soap and water.[14] The application of caustic agents (e.g., bleach) or the injection of antiseptics or disinfectants into the wound is not recommended.[15]

The low reporting of injuries in this study is similar to findings documented in some other studies.[5,16,17] It has been estimated that as many as 40% -70% of all needlestick injuries (NSI) are unreported.[18] Accurate information on rate of injuries may have led to positive steps by the management of these institutions to reduce future occurrences. One of the consequences of not reporting injuries with documentation is that compensation benefits could be denied a worker if found later to have been infected with these common blood borne pathogens following previous splashes or injuries. Though the commonest reason given for not reporting the last injury was the wound being minor, up to half of the respondents admitted to being unaware of policies concerning UP in their facilities. This may have contributed to the low rate of reporting. Lack of time was the most common reason given for not reporting injuries among respondents in two studies in England. [4,19] In all instances the health workers made very wrong assumptions which could endanger their lives.

The frequent occurrence of splash among health workers in this study suggests that the application of UP measures by them was less than optimal. However, the high rate of hepatitis B vaccination among respondents in all facilities was impressive. This is in contrast with another study in Enugu, Nigeria where vaccination was reportedly low.[20] Health workers in Nigeria are particularly at increased risk of contracting hepatitis B virus in their work place because Nigeria is a holo-endemic area. Hepatitis B vaccination virtually eliminates this risk. A possible reason for much higher vaccination coverage in this study may be due to intensive immunization campaigns going on in the study area on all vaccine preventable diseases. In addition to hepatitis B, poor use of UP materials exposes the health workers to the risk of acquiring hepatitis C and HIV.

## Conclusion

Sustaining of injuries was generally common among health workers in this study and significantly more so in the private compared to the public facilities. The rate of reporting injuries by health workers to management of their facilities in both the private and public facilities was found to be low.

## Recommendations

It is recommended that health workers should be adequately trained on Universal Precautions recommendations of CDC and that all the necessary personal protective equipment should be adequately provided by the management of different health facilities in order to reduce risk of exposure of healthworkers to patient's blood and other body fluids.

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