

Needlestick injuries among health care workers in Ondo State, Nigeria

Abstract

Introduction: Health care workers (HCWs) are at risk of needlestick injuries (NSIs) due to the environment in which they work. Prevention is associated with the combination of availability of special retractable needle syringes, safety boxes, educational intervention, as well as supporting policy. This report is a part of a larger study which assessed the level of multifocused intervention for NSI and prevalence of NSIs among HCWs in State Specialist Hospitals, Ondo State of Nigeria. **Materials and Methods:** This cross-sectional study was conducted among 642 HCWs comprising doctors, nurses, laboratory workers, and health attendants in selected hospitals. The study utilized structured questionnaire to assess experiences of NSIs, associated activities with injury and documentation. **Results:** Five hundred and twenty questionnaires retrieved were adequate for analysis NSIs were reported by 290 (55.8%) of the HCWs made up of 77.6% doctors, 68.3% nurses, 51.4% laboratory workers, and 30.0% health attendants. Syringe needles were responsible for 68.5% of all injuries. Activities associated with most injuries were the administration of intramuscular injections (52.4%). About half (51.4%) of injuries occurred during use while 23.4% of injuries were disposal related. Ninety-three (32.1%) of the devices causing injury had been previously used. Only 25% of those injured reported the injury to appropriate authority. **Conclusion:** These findings implicate the need for a multifocused intervention to disabuse reuse of devices and encourage reporting of injuries.

Key words: Doctors, health attendants, laboratory workers, needlestick injury, nurses, sharps

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INTRODUCTION

Health care workers (HCWs) who are in contact with needles and other sharps during their clinical activities can be exposed to blood and other body fluids through needlestick injuries (NSIs), which may lead to serious fatal infections such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV).^[1,2] NSIs are therefore one of the potential occupational hazards for HCWs. Transmission of at least twenty different pathogens by injuries due to sharps instruments and needlesticks has been reported in the literature.^[1,3] Globally, more than 35 million HCWs face the risk of sustaining a percutaneous injury with a contaminated object every year.^[4] American health workers suffer 800,000 to 1 million NSIs annually excluding those that go unreported.^[3,5,6] More than 100,000 NSIs occur in UK hospitals each year.^[6,7] An HCW's chance of contracting HIV after an HIV-infected accidental NSI is one in 250, while the chance of contracting HBV after an accidental NSI is one in 20 while the chances of contracting HCV after exposure to an HCV-contaminated needlestick is 3.5 in 100.^[8] Although lower transmission rate is found for HIV <0.3%,^[4] about 1000 HIV infections mostly

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in developing countries could occur every year worldwide among HCWs due to exposure to percutaneous injuries. This occupational acquisition of HIV represents a serious consequence of NSIs.^[4] HCWs also suffer from significant anxiety and emotional distress following an NSI.^[4,9]

HCWs are at risk of the deadly Ebola virus disease which is an emerging infectious disease contracted through exposure to blood and body fluid of infected patients which may be through NSIs.^[10] The same is true of Lassa fever.^[11] The risk of NSIs among the HCWs in Nigeria is 45%.^[12] This is reasonably high considering the risk of contracting life-threatening infections. Various studies in other countries have also examined NSIs among HCWs.^[13,14] Although doctors may have higher rates of NSIs, nurses generally experience these hazards most frequently due to the frequency with which they handle hollow-bore needles.^[3,15] In Ondo State, the problem of exposure to NSIs among HCWs has not been documented. Therefore, the aim of this study was to determine the prevalence of NSIs among HCWs in the state specialist hospitals, Ondo State as well as identify factors associated with NSIs.

MATERIALS AND METHODS

The study was a cross-sectional descriptive survey conducted among 642 HCWs. The HCWs studied were doctors, nurses, laboratory workers, and health attendants. Two specialist hospitals with a high population of HCWs were purposively selected out of four public specialist hospitals in the state. Data were collected using a structured questionnaire with sections that assessed the demographic characteristics, devices resulting in NSIs, how the injuries occurred and whether they were officially reported to appropriate authority. The workers were asked to indicate whether they had ever experienced NSIs on their job and occurrence on their current job. Face and content validity of the instrument were assessed by experts in the field of study. The instrument was pretested at the State Specialist Hospital, Ikare for construct validity. A test-retest method was used to ascertain the reliability and correlation coefficient was computed which was 0.87.

Ethical approval was obtained from the Ethical Review Board of the Ministry of Health, Akure. Administrative permission to carry out the study was also obtained from the management of the hospitals. Written consent was obtained from the participants before participating in the study. Participation in the study was voluntary. Copies of the questionnaire were administered to all the eligible 642 HCWs that are those who had spent a minimum of 6 months in the employment of the hospital. NSI in this study was defined as percutaneous injuries caused by hollow-bore needles, suture needles, scalpel blades, lancets, broken pipettes, medication vials/ampoules, and specimen/capillary tubes. Cases of NSIs were the number of HCWs who had at least one experience of NSI.

Data were analyzed using descriptive and inferential statistics. Mean and standard deviation for continuous variables and frequencies and

percentages for categorical variables were computed. Results were summarized and presented in tables. Associations were assessed using Chi-square analysis. Multiple logistic regression models were used to know the strength of effects with $P < 0.05$ considered as statistically significant.

RESULTS

Of 642 questionnaires given to HCWs, 520 (81%) were adequate for analysis. There were 249 (47.9%) nurses, 49 (9.4%) doctors, 72 (13.9%) laboratory workers, and 150 (28.8%) health assistants. Female workers accounted for 83.8% of all respondents and male (16.2%). The overall mean age \pm was 40.2 ± 9.9 years, with a minimum age of 21 years and a maximum of 62 years. The modal age group was >46 years (32.1%). The result showed that 41% of workers had worked for 1–10 years.

Prevalence of needlestick injury

Two hundred and ninety HCWs (55.8%) had ever had NSIs during the course of their work. Of these workers, 32.4% had suffered one injury, 27.6% suffered two injuries, and 23.1% sustained more than two injuries while 16.9% HCWs could not recall the number of injuries suffered. Of the 290 HCWs that had NSIs, 253 (87.2%) had sustained the injury on their current job. Among participants that had ever had NSIs 58.6% were nurses. Thirty-eight (13.1%) were doctors, 37 (12.8%) were laboratory workers, and 45 (15.5%) were health attendants. However, within the occupational groups, 38 (77.6%) of doctors, 170 (68.3%) of nurses, 37 (51.4%) of laboratory workers, and 45 (30.0%) of health attendants had sustained NSIs. The distribution of injuries was summarized in Figure 1. The most common cause of NSIs was hollow-bore needles 213 (68.5%) which was followed by suture needles 33 (10.6%).

The occurrence of NSIs varied according to the procedure: Administration of injection constituted the greatest risk for NSIs (52.4%), followed by collection of samples (15.2%) and disposal of sharps (9.3%). Of 290 NSIs ever sustained, 93 (32.1%) injuries

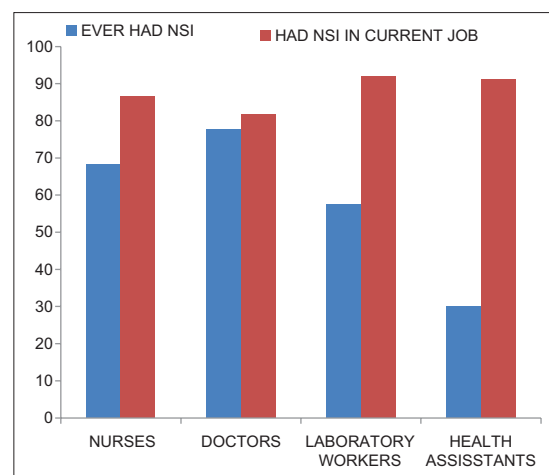


Figure 1: Experience of needlestick injuries within professional groups

were caused by devices that had been previously used on a patient. The part of the body that was commonly involved in the NSIs was the finger 187 (64.5%). One hundred and sixteen (45.8%) of 253 NSIs occurred during the morning shift, 24.5% occurred during the afternoon shift, and 16.6% occurred during the night shift. Of the 290 HCWs that had NSIs, only 73 (25.2%) reported the injury to the appropriate authority. The rate of exposure of respondents to NSIs in the last 6 months was 38.7% and 15.8% in the last one month preceding data collection.

Thirty-five (87.5%) of respondents within the age group 25 years and below had sustained at least one NSI while five (12.5%) did not sustain any injury. Eighty-nine (53.3%) respondents within the age group 46 years and above sustained at least one NSIs while 78 (46.7%) did not. Fifty-nine (70.2%) of male and 231 (53.0%) female respondents sustained NSIs. Twenty-eight (48.3%) respondents with primary education had NSIs, while thirty (51.7%) did not sustain NSIs. One hundred and sixty (65.3%) of respondents with diploma education sustained NSIs, sixty (63.2%) respondents with bachelor's degree had sustained NSIs, and 27 (69.2%) of respondents with postgraduate degree sustained NSIs.

Factors associated with needlestick injuries

There was statistical significant association between age of respondents and NSIs ($\chi^2 = 23.93, P = 0.000$), sex of respondents and NSIs ($\chi^2 = 8.50, P = 0.004$), educational status and NSIs ($\chi^2 = 63.53, P = 0.000$), and job category/cadre of respondents and NSIs ($\chi^2 = 66.15, P = 0.000$). There was no statistical association between marital status and NSIs ($P = 0.12$), current department of practice ($P = 0.25$) and years of experience on the job ($P = 0.15$). Multiple logistic regression of the four variables that were significantly associated with the occurrence of NSIs showed that three predictors of NSIs in the study population were:

- Age: HCWs in age group 25 years and below are likely to sustain more NSIs than those in age group 46 years and above (odds ratio [OR] = 6.745, 95% confidence interval [CI] = 1.951–23.322)
- Sex: Male workers are likely to sustain more NSIs than female workers (OR = 1.987, 95% CI = 1.061–3.721)
- Job category: Doctors and nurses are likely to sustain more NSIs than health attendants (OR = 8.442, 95% CI = 1.907–37.371 and OR = 6.124, 95% CI = 1.805–20.773, respectively) Table 1.

DISCUSSION AND CONCLUSION

Findings showed that HCWs were exposed to the risks of exposure to blood-borne diseases such as HBV, HCV, and HIV^[6] through NSIs.^[10] NSIs are one of the hidden problems in HCWs.^[2,17,18] The prevalence of NSIs in our study (55.8%) was higher than the findings of other studies^[1,4,12,19] but lower than that of Askarian and Malekmakan^[18] in medical, dental, nursing, and midwifery students in Shiraz, Iran, and those reported in Nigeria and other

Table 1: Factors associated with needlestick injuries among health care workers

Sociodemographic variables	Exp(B) or OR	P	95% CI
Age group (years)			
≤25	6.745	0.003	1.951-23.322
26-30	1.352	0.513	0.548-3.335
31-35	1.308	0.530	0.565-3.025
36-40	1.280	0.479	0.646-2.533
41-45	0.939	0.863	0.460-1.917
≥46	Reference	Reference	Reference
Sex			
Male	1.987	0.032	1.061-3.721
Female	Reference	Reference	Reference
Job category			
Doctor	8.442	0.005	1.907-37.371
Nurses	6.124	0.004	1.805-20.773
Laboratory workers	2.767	0.124	0.756-10.125
Health attendants	Reference	Reference	Reference

OR = Odds ratio, CI = Confidence interval

countries.^[2,5,9,17,20-24] In the present study, most of the injuries (68, 5%) were from hollow-bore needles which were similar to the findings of Sharma *et al.* among HCWs in Delhi India where 70% of injuries were caused by hollow-bore needles.^[9] Our findings on NSIs were higher than findings of the previous study in Alexandria Hospitals, Egypt.^[5] This study revealed that administration of injection is the most common procedure involving handling of hollow-bore needles that resulted to NSIs in about half of cases. This was consistent with the findings from past studies in Shahrood, Iran, and Buraidah, Saudi Arabia.^[2,8]

About half of the study population reported that the injury occurred during use which was higher than that reported in other studies in India^[9] and Saudi Arabia.^[8] Most of the injuries (116/253, 45.8%) occurred in the morning shift which supports the findings of other studies.^[2,5] The morning shift is often considered to be very busy with a lot of activities and patient flow to hospitals. Majority of the activities are offered in the morning shifts.^[1,2,5] One-quarter (25.2%) of respondents reported having NSIs to appropriate authority which was consistent with the findings of Wicker *et al.*,^[4] Askarian and Malekmakan,^[18] and Sharma *et al.*^[9] This finding is in contrast to the finding of Nwankwo and Aniebue in Enugu, South Eastern Nigeria^[23] where a larger proportion (63.6%) of respondents reported NSIs. The low report in this study might be due to lack of awareness of the risk factors of NSIs and absence of policy on NSIs. It might also be due to fear of getting into trouble or rebuke from supervisors for being careless^[1] and ignorance about the reporting mechanism of the hospital.^[18] Male respondents had higher exposure rate of 70.2% than females 53.0% which was consistent with the findings in Enugu by Nwankwo and Aniebue^[23] but in contrast to a previous study where females sustained more NSIs than males.^[8]

Nurses in this study were the most commonly injured group of workers which constituted 58.6% of all injuries reported.

This is similar to the findings of previous studies in Alexandria and Buraidah.^[5,8] NSIs occurring in nursing staff is a common feature of studies around the world. In two major funded studies in the USA, nurses accounted for 40% of victims of NSIs and physicians for 28%. Laboratory workers, technicians, and housekeeping staff comprised another major group (17%) of NSIs.^[8] This study revealed that the percentage of reported incidents by doctors (13.1%) is lower than other studies which varied from 10% to 28%. However, the prevalence of NSIs in doctors in this study contrasts the finding of Wicker *et al.*^[4] where physicians had the highest risk of being injured by needlesticks (55.1%), followed by nurses with 22.0% NSIs. This study revealed that most 41% of HCWs had worked for 1–10 years. This is similar to the findings in Egypt^[5] and lower than the finding in Iran.^[2] This study also revealed that 87.5% HCWs within the age group 25 and below had NSIs. Health workers within this age group are young nurses who might be in a hurry to perform procedures which might result in accidental NSIs. They appear to indulge in risky behaviors. The findings in this study showed that NSIs reduced with age which is similar to the findings of Hanafi *et al.*^[5] HCWs above 40 years of age had sustained less NSIs. The workers tend to be more focused and careful in doing things.

The prevalence of NSIs increased with the level of education in this study. Those with postgraduate education have the highest incidence rate (69.2%) NSIs followed by diploma education while those with qualifications below diploma education had low prevalence rates. This might be because workers with higher educational qualification belong to occupations that are directly involved in the care of patients, and they handle more of the devices than those with lower educational qualifications.

This study has demonstrated the statistical relationship between NSIs and professional cadre of HCWs and their age which agreed with the findings of Rampal, Zakaria, Sook, and Zain in Serdang, Malaysia.^[25] NSI had been regarded as an occupational hazard for HCWs. Although not all NSIs are preventable, research had shown that almost 83% of injuries from hollow-bore needles can be prevented.^[8] This study concluded that occurrence of NSIs injuries was high in Ondo State. Prevention of NSI is the best way to prevent several diseases among HCWs. It should therefore be an integral part of the prevention program in the workplace and training of HCWs should be a continuous program in the hospital. It is recommended that every hospital should develop a multifocused strategy to deal with needlestick injuries among HCWs in Ondo state.

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Conflicts of interest

There are no conflicts of interest.

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