Original Article

Prevalence of Needlestick Injuries Among Healthcare Workers in the Accident and Emergency Department of a Teaching Hospital in Nigeria

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Abstract

Background: Healthcare workers (HCWs) are continually exposed to hazards from contact with blood and body fluids of patients in the healthcare setting. **Aim:** To determine the prevalence of needlestick injuries (NSIs) and associated factors among HCWs in the Accident and Emergency Department of the University of Benin Teaching Hospital (UBTH), Benin City, Nigeria. **Subjects and Methods:** This was a cross-sectional study. Data were collected using a structured, self-administered questionnaire and analyzed using IBM SPSS version 20. Univariate, bivariate, and binary logistic regression analyses were done. The level of significance was set at $P < 0.05$. **Results:** The prevalence of NSIs 12 months preceding the study was 51.0% (50/98). Doctors 8/10 (80.0%) and nurses 28/40 (70.0%) had the highest occurrence. Recapping of needles 19/50 (38.0%) and patient aggression 13/50 (26.0%) were responsible for most injuries. The majority 31/50 (62.0%) of the injuries were not reported. The uptake of postexposure prophylaxis (PEP) was low 11/50 (22.0%). The factors that were significantly associated with NSI include age 30 years and above (odds ratio [OR] =0.28, confidence interval [CI] = 0.11–0.70), work duration of three years and above (OR = 0.29, CI = 0.11–0.75), and being a nurse (OR = 3.38, CI = 1.49–9.93) or a paramedic (OR = 0.18, CI = 0.06–0.52). **Conclusion:** The high prevalence of NSIs among the HCWs, especially in doctors and nurses is an indication that HCWs in UBTH are at great risk of contracting blood-borne infections. Efforts should be made to ensure that injuries are reported and appropriate PEP undertaken following NSIs.

Keywords: Healthcare workers, Needlestick injuries, Postexposure prophylaxis

Introduction

Healthcare workers (HCWs) are continually exposed to hazards from contact with blood and body fluids of patients in the course of their activities in the healthcare setting. The World Health Organization (WHO) in 2002 reported that 2 million HCWs experience percutaneous exposure to infectious diseases and 37.6% of hepatitis B virus (HBV), 39% of hepatitis C virus (HCV), and 4.4% of HIV/AIDS in HCWs around the world are due to needlestick injuries (NSIs).[1] The National Institute for Occupational Safety and Health defines NSIs as "injuries caused by needles such as hypodermic needles, blood collection needles, intravenous (IV) stylets, and needles used to connect part of IV delivery system."[2]

HCWs are exposed to NSI from unsafe practices such as recapping of needles, manipulating used needles such as bending, breaking, or cutting hypodermic needles, and passing of needles from one HCW to another. The risk of exposure to

Access this article online	
Quick Response Code:	Website: www.amhsr.org
	DOI: *****

How to cite this article: ???

NSI by HCWs varies in different section of the hospital and from one type of procedure to the other. A cross-sectional study of HCWs in New Delhi, India revealed that the most common clinical activity to cause the NSI was blood withdrawal followed by suturing and vaccination.[3] Mbaisi *et al*.[4] in Kenya reported that stitching was the most common procedure during which injuries occurred, followed by blood specimen collection and handling of IV lines while Erhabor *et al*. in Port Harcourt, Nigeria showed in their study that exposures were more in the Pediatric Unit followed by the Phlebotomy Section of the Laboratory Unit and Surgery Unit.[5]

Several previous studies focusing on HCWs in all sections of the hospital both in our environment and other parts of Nigeria have demonstrated a high prevalence of NSI and a corresponding low reporting of injuries to the relevant authorities and low uptake of postexposure prophylaxis (PEP).[5,6-11] This situation, if appropriate and effective interventions are not put in place to prevent it, portends serious danger for the healthcare workforce in Nigeria in particular and sub-Saharan Africa in general where there exist a weak healthcare delivery system.

As a result of the beehive of activities that takes place in the Accident and Emergency (A and E) Departments of most hospitals in Nigeria, we hypothesize that HCWs working in the A and E Department may experience a higher incidence of NSIs. Thus, our study focused on HCWs in the A and E Department of University of Benin Teaching Hospital (UBTH), Benin City, Nigeria with the aim of determining the prevalence and factors associated with NSIs among them.

Subjects and Methods

This cross-sectional study was carried in the A and E Department of UBTH, Benin City, Nigeria from 1st to 31st of August, 2014. The study was approved by the Ethics and Research Committee of the University of Benin Teaching Hospital. Informed written consent was also obtained from the HCWs and only those who gave consent completed the questionnaire [Appendix].

This was a total population study. There were 122 HCWs working in the A and E Department of UBTH as at the time of this study. All the HCWs comprising doctors, nurses, paramedics, porters, and housekeepers were included in the study because of the relatively small size. Thus, the sample size was not calculated. The HCWs were interviewed consecutively for the period of data collection.

Data collection was by done using a structured, self-administered questionnaire. The questionnaire was pretested among HCWs in other sections of the hospital, and appropriate adjustment was made before the commencement of the study. The questionnaire contained information on the demographic characteristics of the HCWs, the NSIs they sustained 12 months prior to the study, the circumstances under which they sustained the injuries, the factors associated with the injuries, and the actions taken by the HCWs following the NSIs.

The questionnaires retrieved from the HCWs were screened for completeness, coded and analyzed using IBM SPSS Statistics Version 20 Statistical Software (IBM Corp., Armonk, NY, USA). An initial univariate analysis was done to explore the distribution of all the variables. A bivariate analysis was done to test the association between the demographic characteristics of the HCWs and NSI using Chi-square and Fishers exact tests while a multivariate analysis using binary logistic regression model was carried out to determine significant predictors of NSIs. For the purpose of the bivariate/multivariate analysis, the age group of the HCWs was re-coded in two groups of <30 years and 30 years and above while the duration of work was re-coded into <3 years and three years and above. The level of significance was set at $P < 0.05$ at a confidence interval of 95%.

Results

A total of 122 questionnaires was distributed to consenting HCWs in the A and E Department of the University of Benin Teaching Hospital. However, only 98 questionnaires were completely filled and returned giving a response rate of 80.3% (98/122). The HCWs, who participated in the study, included doctors, nurses, paramedics, porters, and housekeepers. Their age ranged from 17 to 57 years with a mean age of 31.3 ± 8.9 years. Higher proportions 55.1% (54/98) of the respondents were females while nurses and paramedics constituted the highest occupation accounting for 40.8% (40/98) and 30.6% (30/98), respectively. Of the HCWs, 37.7% (37/98) have worked for <3 years in the A and E Department while 28.6% (28/98) have worked for more than 5 years [Table 1].

Table 2 shows that the overall prevalence of NSI among the HCWs 12 months preceding the study was 51.0% (50/98). The most common circumstances leading to injuries were recapping of needles, 38.0% (19/50) and patient aggression, 26.0% (13/50). Accidental prick from other HCWs was responsible for 10.0% (5/50) of the injuries. Among those who have had NSIs, more than half (27/50) sustained injuries once, 24.0% (12/50) sustained it twice while only 2.0% (1/50) have sustained injuries five times. Almost two-third (31/50) of the injuries were not reported to the appropriate authorities, and the major reasons stated by the respondents for not reporting injuries were that they were not at risk of contracting HIV, 48.3% (15/31) and the fact that it was not necessary to report injuries, 38.7% (12/31). The uptake of PEP was low among the respondents who sustained NSI as shown by less than a quarter (11/50) taking PEP following an injury. A slightly over half (20/39) of the HCWs felt that PEP was not necessary while a quarter (10/39) did not access PEP because the source patient was HIV negative.

Table 1: Demographic characteristics of respondents

Variables	Frequency (%) (*n*=98)
Age group (years)	
≤20	12 (12.2)
21-30	36 (36.7)
31-40	34 (34.7)
41-50	12 (12.2)
>50	4 (4.2)
Mean age (years)	31.3 (8.9)
Sex	
Male	44 (44.9)
Female	54 (55.1)
Occupation	
Doctors	10 (10.2)
Nurses	40 (40.8)
Paramedics	30 (30.6)
Porters	7 (7.1)
Housekeepers	11 (11.2)
Work duration (years)	
<3	37 (37.7)
3-5	33 (33.7)
>5	28 (28.6)

A higher proportion of respondents were females (55.6%), aged 30 years and above (66.0%), who have worked for 3 years or more (62.3%) experienced NSIs. Concerning the occupation of the respondents, doctors (80.0%) had the highest prevalence of NSI followed by the nurses (70.0%) while the least prevalence was seen among the paramedics. The factors that were found to be significantly associated with NSI among the HCWs include age 30 years and above ($P < 0.01$, odds ratio [OR] =0.28, confidence interval [CI] =0.11–0.70), work duration of 3 years and above ($P < 0.01$, OR = 0.29, CI = 0.11–0.75,), and being a nurse ($P < 0.01$, OR = 3.38, CI = 1.49–9.93) or a paramedic ($P < 0.01$, OR = 0.18, CI = 0.06–0.52). HCWs' gender ($P = 0.32$) and being a doctor ($P = 0.09$), porter ($P = 0.22$), or housekeeper ($P = 0.70$) were not significantly associated with NSIs [Table 3]. The multivariate analysis showed that none of the factors that showed statistical significance on bivariate analysis could significantly predict the occurrence of NSIs among the HCWs [Table 4].

Table 2: Prevalence of NSIs and actions taken by HCWs following injury

Variables	Frequency (%)
NSIs (*n*=98)	
Yes	50 (51.0)
No	48 (49.0)
Circumstances leading to NSI (*n*=50)	
Recapping of needle	19 (38.0)
Patient aggression	13 (26.0)
Handling/transferring specimen	9 (18.0)
Accidental prick from other HCWs	5 (10.0)
Using needle	4 (8.0)
Number of NSI (*n*=50)	
1	27 (54.0)
2	12 (24.0)
3	7 (14.0)
4	3 (6.0)
5	1 (2.0)
Report of NSI (*n*=50)	
Yes	19 (38.0)
No	31 (62.0)
Reasons for not reporting (*n*=31)	
Not at risk of contracting HIV	15 (48.3)
Not necessary	12 (38.7)
Not willing to do HIV test	2 (6.5)
Do not know who to report to	2 (6.5)
Uptake of PEP (*n*=50)	
Yes	11 (22.0)
No	39 (88.0)
Reason for not accessing PEP (*n*=39)	
Not necessary	20 (51.3)
Source person is HIV negative	10 (25.6)
Fear of side effects	5 (12.8)
Not willing to know HIV status	4 (10.3)

HCWs: Healthcare workers, NSIs: Needlestick injuries, PEP: Postexposure prophylaxis

Discussion

The response rate of 80% in this study was comparable to the 81.5% reported in one teaching hospital but higher than the 70.1% reported in another teaching hospital in a study carried out to determine the prevalence of NSI among medical personnel in A and E Department of two teaching hospitals in Malaysia.[12] This may be attributed to the busy and occasional rowdy nature of most A and E Departments of Teaching Hospitals in Nigeria arising from mass casualties which often present following road traffic accidents and other disasters. The majority of the HCWs aged between 21 and 40 years is similar to reports from Minna, Nigeria,[13] and Ethiopia.[14] The nature of work in the A and E Department may require a more active workforce provided by young and active people who are within the productive age group. This group of people requires adequate protection from blood-borne infections that could jeopardize their lives and those of their families. The finding of more females in study may be attributed to the higher proportion of the HCWs being nurses because nursing is a female dominated profession.

The prevalence of NSIs (51.0%) among the HCWs studied was high. This was similar to what was reported in Asaba, Nigeria (52.7%).[8] However, a higher prevalence of 58.2% was reported among nurses in Benin City,[7] and 61.8% was reported among resident doctors in UBTH.[6] Also reported were, 83.8% in Minna, Nigeria,[13] 76.3% in Malawi,[15] 67.9% in Egypt [16] and 80.1% in India.[3] Few studies reported a lower prevalence of 31.2% and 42.0% in Ilorin, Nigeria[9] and the West Indies[17] respectively. The Ilorin study was carried out among HCWs in primary health facilities which are usually less busy when compared to tertiary health facilities, and this may have accounted for the lower prevalence of NSIs. NSI have been documented as the major cause of percutaneous

Table 3: Factors associated with NSIs among the HCWs

Variables	NSIs (%)		OR	95% CI	*P*
	Yes	No			
Age group (years)					
<30	17 (35.4)	31 (64.6)	0.28	0.11-0.70	<0.01*
≥30	33 (66.0)	17 (34.0)			
Sex					
Male	20 (45.5)	24 (54.5)	0.67	0.25-1.60	0.32
Female	30 (55.6)	24 (44.4)			
Occupation					
Doctors	8 (80.0)	2 (20.0)	4.38	0.79-31.81	0.09
Nurses	28 (70.0)	12 (30.0)	3.82	1.49-9.93	<0.01*
Paramedics	7 (23.3)	23 (76.7)	0.18	0.06-0.52	<0.01*
Porters	2 (28.6)	5 (71.4)	0.36	0.05-2.25	0.22
Housekeepers	5 (45.5)	6 (54.5)	0.78	0.19-3.17	0.70
Work duration (years)					
<3	12 (32.4)	25 (67.6)	0.29	0.11-0.75	<0.01*
≥3	38 (62.3)	23 (37.7)			

*Statistically significant. OR: Odds ratio, CI: Confidence interval, HCWs: Healthcare workers, NSIs: Needlestick injuries

Table 4: Logistic regression of factors associated with NSIs among the HCWs

Variables	OR	95% CI	*P*
Age ≥30 years	0.34	0.51-7.21	0.34
Work duration ≥3 years	0.12	0.79-8.17	0.12
Nurses	0.27	0.06-1.17	0.08
Paramedics	3.26	0.18-30.97	0.51

OR: Odds ratio, CI: Confidence interval, HCWs: Healthcare workers, NSIs: Needlestick injuries

injuries in the healthcare setting. This leaves HCWs at a higher risk of blood-borne infections. In a setting, where the HIV prevalence is high as in many developing countries of the world and in the absence of effective postexposure policies, HCWs are therefore at a greater risk of contracting HIV and other blood-borne infections such as HBV and HCV from their patient and eventually transferring it to other patients and their spouses. This situation is inimical to the achievement of Target 6A of the Millennium Development Goal 6 (combat HIV/AIDs, malaria, and other diseases) which is; "have halted by 2015 and begun to reverse the spread of HIV/AIDs."[18]

The prevalence of NSI was high among HCWs aged 30 years and above and those who have worked for 3 years and above. This contrasted a study in Kenya in which young age and lesser years of work experience were risk factors for percutaneous injuries.[4] A possible explanation for this may be due to the fact that the doctors (80%) and nurses (70%) who recorded the highest prevalence of NSIs were relatively older than other HCWs and may have worked for a longer duration in the hospital.

It is worrisome that most of the NSIs were not reported to appropriate authorities so that necessary action can be taken to prevent the spread of blood-borne infections. In this study, only 38.0% of those who sustained NSI reported its occurrence and the major reasons given by them were "no risk of contracting HIV" (48.3%) and "not necessary" (38.7%). Many previous studies have also documented low reporting of injuries among HCWs.[7-9,11,16] This underscores the need to scale up health education programs among HCWs on the need to always report any workplace injuries in the course of carrying out their routine activities. Special attention should be paid to the various components of standard precautions, especially the immediate actions to take following injury, reporting of injuries, and uptake of PEP.

Recapping of needles and patient aggression were the most common circumstances leading to NSIs in this study. Recapping of needles is an age long tradition that has continued to constitute a significant hazard to HCWs as has been demonstrated in many studies in Nigeria.[7,19-21] A study in India, however, reported a low prevalence of 6.8% among nurses in a tertiary care hospital.[22] Mbaisi *et al.* in Kenya reported that handling uncooperative patient and patient movement precipitated the occurrence of sharp injury in 22% and 20% of HCWs, respectively[4] while Ibekwe *et al.* in Benin City reported that restraining of patient was responsible for 12.8% of NSI among resident doctors.[6] There is a need for hospital managements to institute measures aimed at controlling aggressive and uncooperative patients so that they do not constitute potential hazard to HCWs, especially in Emergency Departments.

In this study, the uptake of PEP following injuries was low (22%), and this is consistent with what has been documented in previous studies in our environment and other developing countries of the world.[7,20,21,23,24] However, a study in Ethiopia revealed that 74.2% of HCWs exposed to blood splashes and needle/sharp injuries took PEP[14] while Saoud *et al*.[25] in Libya reported that 88.4% and 70.3% of nurses and doctors, respectively, initiated PEP following exposures. The majority of HCWs who sustained injuries felt it was not necessary to take PEP while a quarter of them did not take PEP because the source patient was HIV negative. It is surprising that many HCWs still express ignorance and misconceptions about the spread of blood-borne infections and PEP. The use of PEP is a veritable tool in the prevention against HIV as it has been shown that if started soon after exposure, PEP can reduce the risk of HIV infection by over 80%.[26] Therefore, hospital authorities should institute a continuing medical education program to sensitize HCWs on infection control measures with particular emphasis on PEP. There is also need for the setting up of a monitoring team that will actively keep watch of all occupational exposures and injuries and ensure that they are reported and managed appropriately.

Our study has a limitation. Information on NSIs was self-reported and was sought for a period of 12 months preceding the study. Therefore, our findings may be prone to both information and recall bias.

Conclusion

The high prevalence of NSIs among the HCWs, especially in doctors and nurses is an indication that HCWs in the A and E Department of the UBTH are at great risk of contracting blood-borne infections. Efforts should be made to ensure that injuries are reported to the relevant authorities in the hospital and appropriate PEP undertaken by the HCWs following NSIs. There is a need for the hospital management to strengthen its infection control policies and ensure implementation of standard precautions as to prevent NSIs among the HCWs.

Financial support and sponsorship

This research was self-sponsored by the researchers.

Conflicts of interest

There are no conflicts of interest.

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