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ORIGINAL RESEARCH

Occupational Risks Prevention Practices Among Medical Waste Handlers in Ogun State, Nigeria

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Abstract

Background: Medical waste handlers are at immediate risk of needle stick injuries and exposure to infectious materials from medical waste. Adequate knowledge and safe practices on the part of the workers are essential for the prevention of nosocomial infections.
Objective: To assess and compare the factors involved in occupational risk prevention practices among medical waste handlers in two tertiary hospitals in Ogun State, Nigeria.
Methods: This descriptive, cross-sectional study compared medical waste handlers and the risk prevention measures available in a specialist hospital and a teaching hospital. The 100 participants were randomly selected and surveyed using an interviewer-administered questionnaire.
Results: The prevalence of needle stick injury at the teaching hospital and specialist hospital were 38% and 28%, respectively. Hepatitis B vaccine uptake was 6% in the teaching hospital compared to 70% at the specialist hospital. There was a significant difference concerning the provision of safety equipment ($p<0.001$), personal protective equipment (PPE) ($p<0.001$), Hepatitis vaccine ($p<0.001$), training ($p<0.001$) and availability of waste management policy ($p = 0.015$) but no significant difference concerning the regular supply of water and soap ($p = 0.494$) between both institutions.
Conclusion: The waste handlers at the specialist hospital were better equipped for safety than those at the teaching hospital. A safer environment, equipment, and training for medical waste handlers are needed to enable them to practise occupational risk prevention more effectively.

Keywords: Medical Waste Handlers, Occupational Risk, Personal Protective Equipment, Prevention Practices, Universal Precautions.

Introduction

Health workers will be effective and productive when the employer provides a safe workplace to sustain social and economic development. The US-CDC recommended that health facilities offer a secure environment for patients and staff

through infection control education and safe and protective equipment. [1,2]

As health services in the hospital improve worldwide, there is an increase in laboratory testing, radiological investigations, care and treatment, all of which lead to the generation of substantial medical waste. Health care wastes are of two major types: the non-hazardous, which constitutes about 85% and the hazardous, which constitutes about 15%. [3]

Occupational risks that expose workers to bloodborne organisms (Human Immunodeficiency Virus, Hepatitis B Virus, Hepatitis C Virus) are mainly from medical wastes and materials generated from medical diagnosis, treatment, research and immunization. These have constituted environmental and public health challenges that need urgent attention in developed and developing countries. [2, 4] Improper waste management causes needle stick injuries, and it was reported that about 2-3 million healthcare workers experience needle stick injuries annually, thus contributing to 40-65% of Hepatitis B and C infections and 4.4% of HIV infections globally. [3, 5] Nevertheless, it has also been proven that waste originating from healthcare facilities, when adequately managed, poses no more significant risks than properly treated municipal or industrial waste. [2]

Health workers, especially those who are directly involved with the collection, segregation, transporting and disposal of wastes, are at more significant risk of exposure to bloodborne infections arising from needle stick injuries and blood and body fluids splashes. The health attendants handle medical wastes in the hospitals; hence, they are at immediate risk of needle stick injuries and exposure to infectious materials [6, 7] and, unfortunately, have limited knowledge of the contents of medical wastes and the risks involved in waste handling. [8] The work environment plays a significant role in the prevention practices of the individual; hence, the Occupational Safety and Health Administration (OSHA) recommends a safe workplace be provided for employees to minimise risk exposures and hazards. The responsibilities of the employers are to provide a safe environment, safe equipment, personal protective equipment (PPE), adequate training, and the formulation and implementation of safety policies. [9] Many organizations, especially in Sub-Saharan Africa, need to adhere to implementing safety policies for low finances. A South Ethiopian study reported that PPE such as face masks, hand gloves, boots and aprons were provided to about 69.4% of the employees, but only 4% had complete PPE. About 50% of the respondents in that study were unsatisfied with their jobs because of unsafe work environments, poor working conditions, poor remuneration and absence of health insurance. [10]

In a mini-review of healthcare waste management in Asian countries, it was reported that the difference in the rate of risk exposures from medical wastes between the developed (U.S.A., Canada) and the developing countries (Asia, Africa) emanates from the support given by the employers through the implementation of waste legislation, provision of waste and PPE, adequate funding, continuous training and rewards from the revenue generated from waste recycling, to the waste handlers. [11] Studies in Ethiopia opined that to practice risk prevention in waste handling; employers must make available waste management manuals, policies, instructional posters, provision of safety equipment, vaccination, manageable injury reporting system and a functioning waste management committee to formulate and implement policies. [7, 12] In Uganda, studies showed that the organizational factors affecting risk prevention practices during waste handling include inadequate PPE, inadequate supply of waste disposal materials, shortage of staff, poor monitoring and supervision of waste management system [13, 14] In Nigeria, studies

have revealed that many health facilities have inadequate personal protective equipment (PPE), irregular training, lack of waste management policy, poor remuneration, poor monitoring and support system; interestingly, these are the factors affecting risk prevention practices [4, 8,11] A study in a federal government-owned hospital on compliance with safety precautions revealed inadequate provision of safety materials, training and active support by the hospital management. Nevertheless, the same facility had standard operation procedures (SOP) displayed in strategic places and a regular running water supply, which influenced the participants' compliance. [15] A comparative study on waste management in selected teaching hospitals also reported that the federal government-owned teaching hospitals had better training for the employees than the state government-owned and private-owned teaching hospitals. [16]

From the above, studies from different countries showed that the employers in most health institutions poorly adhere to OSHA recommendations of providing a safe environment and safety equipment to reduce the risks from waste handling. Some hospitals (federal government-owned, district) were better equipped with safety equipment than the state government-owned and private-owned hospitals; hence, it is expedient for employers of labour to play their roles by providing all that the waste-handling employees will need to adhere to preventive strategies so that exposures to risks with subsequent implications will be reduced. This study was a comparative assessment of the factors involved in occupational risk prevention practices among medical waste handlers in Ogun State, Nigeria, tertiary hospitals.

Methods

Research design

This was a comparative, descriptive, cross-sectional study.

Study area

The study area was Ogun State, in the southwest geo-political zone of Nigeria. The state has a population of 3,751,140 from the 2006 census, consisting of 1,864,907 males and 1,886,233 females and an estimated population of 5.2 million people (2016 projected population). The state has three tertiary hospitals: a specialist hospital owned by the Nigerian Federal Government, a teaching hospital owned by the Ogun State Government, and the third one is a teaching hospital owned by a private religious group.

The study was conducted at the Federal Medical Centre, Abeokuta, located in Abeokuta South Local Government of Ogun State, owned and managed by the Federal Government of Nigeria. It is a 350-bed regional specialist hospital with 250 health attendants. The second study centre was the Olabisi Onabanjo University Teaching Hospital, Sagamu (formerly known as the Ogun State University Teaching Hospital), situated in Sagamu Local Government of Ogun State, with a 380-bed capacity and 156 health attendants. This made the total number of 406 hospital attendants in both facilities.

Sample determination

The minimum sample size was calculated using the Taro Yamane (1967) formula:

$n = N/1+(e)^2$

n = sample size, N = population and e = margin of error (10%)

$$n = \frac{406}{1 + 406\ (0.10 \times 0.10)}$$

n = 80.23

For the study, a minimum of eighty participants was required, but this was rounded off to 100 for both groups.

Study population

The participants were the hospital attendants at the Olabisi Onabanjo University Teaching

Hospital, Sagamu (OOUTH), and the Federal Medical Centre, Abeokuta (FMCA), who were directly involved with the collection, transportation, and disposal of medical waste recruited from the wards, theatres, and intensive care units (ICU).

Inclusion criteria

Hospital attendants involved in waste collection, segregation, and disposal of medical wastes who had permanent employment in the hospitals, worked in the wards, and were available during the duration of the study.

Exclusion criteria

Hospital attendants who were not involved in waste collection, segregation, and disposal had no permanent employment or worked in the hospital's outpatient clinics.

Sampling techniques

A systematic random sampling technique was adopted.

Ogun state has three (3) tertiary hospitals; the two (2) used were selected by random sampling, while the third one was used for a pilot study. The formula for the selection of participants using systematic sampling technique was k=N/n: where "N" is the total population (156) for OOUTH and (250) for FMC. and "n" is the sample size, which was 50 each for the two institutions. Therefore, every third hospital attendant on the ward roster in OOUTH was selected, while every fifth hospital attendant on the ward roster in FMC. was selected. The selected participants who were not on duty were contacted for consent to participate in the study. Those on leave or those who declined enrolment were excluded from the study. Where there was consent refusal, the next attendant on the roster was picked until the desired sample size was achieved.

Data collection instrument and analysis

To collect information from the participants, a structured, interviewer-administered questionnaire was used. The researcher developed the questionnaire after reviewing several literature sources. Five (5) research assistants were employed to assist with data collection.

Data analysis

The completed questionnaire was checked for completeness and accuracy, and the data was analysed using the Statistical Package for Social Sciences (SPSS) version 21. Frequencies and percentages were used to assess sociodemographic variables, while mean and standard deviation were used to summarise continuous variables. The mean and standard deviation were compared using the Student's t-test.

Ethical consideration

Ethical approval certificates (NHREC/28/11/2017 and NHREC/08/10/2015) were obtained from the Health Research Ethics Committees of OOUTH and FMCA, respectively. Prior to recruitment, written informed consent was obtained from all the participants.

Results

The study had two groups: federal-owned (50) and state-owned (50) institutions. Both groups had higher proportions of females than males: 76% in OOUTH and 80% in FMC. The mean age for the OOUTH group was 43.9±9.2 years compared to 43.2 ± 7.7 years for the FMC group. More than three-quarters of the participants from both groups were of Yoruba ethnicity: 92% in OOUTH and 80% in FMC. About two-thirds had secondary education qualification: 64% in the OOUTH group and 66% in the FMC group. About one-fifth of the participants from both groups had tertiary education. The majority were

married and were Christians in both groups. The mean duration of practice for the OOUTH group was 11.3±9.2 years compared to 9.6±7.4 years for the FMC group. History of needle stick injury was recorded among 38% and 28% of the participants in OOUTH and FMC, respectively. Similarly, only 6% had hepatitis B vaccination in the OOUTH group compared to 70% in the FMC group (Table I).

Table I: Frequency distribution of participants by socio-demographic characteristics

Characteristics	*FMC Group n (%)*	*OOUTH Group n (%)*
Age (years)		
26-35	7 (14.0)	12 (24.0)
36-45	25 (50.0)	15 (30.0)
46-55	15 (30.0)	17 (34.0)
56-65	3 (6.0)	6 (12.0)
Sex		
Male	12 (24.0)	10 (20.0)
Female	38 (76.0)	40 (80.0)
Educational Qualification		
Primary	7 (14.0)	7 (14.0)
Secondary	33 (66.0)	32 (64.0)
Tertiary	10 (20.0)	11 (22.0)
Duration of practice (years)		
≤10	30 (60.0)	29 (58.0)
11-20	15 (30.0)	13 (26.0)
21-30	4 (8.0)	7 (14.0)
>30	1 (2.0)	1 (2.0)
Marital status		
Single	7 (14.0)	4 (8.0)
Married	39 (78.0)	41 (82.0)
Separated	1 (2.0)	0 (0.0)
Divorced	1 (2.0)	0 (0.0)
Widowed	2 (4.0)	5 (10.0)
Religion		
Christianity	39 (78.0)	44(88.0)
Islam	11 (22.0)	6(12.0)
Ethnicity		
Yoruba	40 (80.0)	46 (92.0)
Igbo	7 (14.0)	1 (2.0)
Others	3 (6.0)	3 (6.0)

Reinforcing factors of risk prevention practices

Table II shows significant differences in the mean scores between the FMC and OOUTH groups in all areas tested except for the assessment of safety measures compliance by a monitoring team. The FMC group had higher scores in all domains except for the role of wall posters in hand washing.

Enabling factors of risk prevention practices

Table III shows significant differences in the mean values of scores between the FMC and

OOUTH groups, except for the availability of water and soap (p = 0.494). The mean scores were consistently higher in the FMC group, except for the availability of water and soap.

Table II: Comparison of mean scores of reinforcing factors of risk prevention practices in both groups

Statement	*FMC group*	*OOUTH group*	
	Mean / SD	*Mean /SD.*	*p-value*
There is someone to turn to for advice about safety measures in my facility	3.16 ±1.04	2.48 ± 0.86	0.001
Reward for good practice encourages me	2.62 ± 1.19	1.30 ± 0.46	0.000
Observing others practice safety measures encourages me to practice them	3.28 ± 0.97	2.44 ± 0.73	0.000
Handwashing poster on my ward gives me the confidence to practice the correct technique	3.60 ± 0.78	3.08 ± 0.88	0.002
The monitoring team comes to assess safety measures compliance	3.06 ±1.04	3.12 ± 0.87	0.755
I have role models among my peers to emulate as regards safety precaution	3.42 ± 0.88	2.48 ± 0.86	0.000
Evaluation of preventive practices by my superiors encourages my safety compliance	3.14 ± 0.99	2.48 ± 0.95	0.001

Table III: Comparison of mean scores of enabling factors of risk prevention practices in both groups

Statement	*FMC group*	*OOUTH group*	
	Mean / SD	*Mean /SD.*	*p-value*
My employer supplies all equipment to use for my safety	2.84 ± 0.89	1.90 ± 0.58	0.000
Hospital policies and procedures that address safety are available in my hospital	3.34 ± 0.87	1.70 ± 0.65	0.000
There is adequate provision of Hepatitis vaccine for all staff in my facility	3.20 ± 0.95	1.26 ± 0.44	0.000
I am updated with current trends relevant to my work and safety	3.36 ± 0.94	2.24 ± 0.64	0.000
When handling medical waste, I am provided with necessary personal protective equipment	3.12 ± 0.87	1.92 ± 0.67	0.000
Waste equipment and PPE provided are of good quality	3.10 ± 0.10	2.06 ± 0.62	0.000
Water and soap are available to wash hands	3.32 ± 0.79	3.66 ± 0.56	0.494
Training on risk prevention is organized for staff in our facility	2.80 ± 1.03	2.68 ± 0.68	0.015

Discussion

Higher proportions of participants in both groups were females in agreement with a previous report. [10] This might be because housekeeping work in the hospital requires fewer skills and education [10], unlike the study in Bhopal, where the distributions of both sexes were equal among studied medical waste handlers. [6]. Overall, the two groups were not

different in age, religion, ethnicity, and educational background.

The OOUTH group, which belonged to a state-owned hospital, had a higher prevalence of previous needle stick injury (38%), lower than 40% in Iraq, [17] 46.3% in Tanzania, [18] 70.7% in Bhopal [7] and 46.5% among waste scavengers in southwest Nigeria. [8] The prevalence of needle stick injury from both OOUTH and FMC were higher than 13.6- 31.3% reported from Iran. [13] These findings agreed with previous reports that health attendants are at immediate risk of needle stick injuries and exposure to infectious materials from medical waste. [3]

The uptake of Hepatitis B vaccination (HBV) was remarkably poorer in the OOUTH group compared to the FMC group. A comparative study of tertiary and secondary hospitals in Bhopal showed uptake rates of 32.1% and 13.8% in tertiary and secondary hospitals, respectively. [7] These contrast against 32.5% reported in a study from Tanzania [18] and 7.2% in Southern Ethiopia. [19] No uptake of Hepatitis vaccination was obtained among participants studied in Addis Ababa, Ethiopia. [6] The uptake of vaccination was higher in the FMC group in the present study than in all the aforementioned studies outside Nigeria. From the studies reviewed, poor funding, inadequate provision of HBV, and inadequate training on vaccination were reasons for poor vaccination history. [2,6,7,18,19]

Reinforcing factors can strengthen risk prevention and fortify and influence compliance with the prevention practices among workers in an organization. In the present study, the FMC group had higher scores for reinforcing factors regarding social support, information, education and communication (IEC) materials, role modelling and reward systems than the OOUTH group. This observation agrees with a study in a District hospital in southwest Ethiopia [20] and Tanzania among workers in different categories of health facilities ranging from dispensaries to hospitals, where 80% of the participants reported no motivation and 47% had no supportive supervision and this affected their compliance with prevention practices. [18] The finding from the study in a state-owned teaching hospital in the southwest also agrees with the poor social support and inadequate availability of IEC material [21]. Still, a survey in a federally-owned tertiary hospital in Nigeria reported a need for more support and non-availability of IEC materials for safety practices [15].

Enabling factors empower individuals or groups to comply with the practices that prevent risks made available by employers to employees. The FMC group had better scores of enabling factors concerning an adequate supply of safety equipment, provision of training, PPE and Hepatitis vaccination, except for the availability of soap and water compared to the OOUTH group. This finding corroborated the difference observed concerning the relative prevalence of needle stick injuries and Hepatitis B vaccine uptake between both groups. The uptake rate in OOUTH agrees with studies from northern and southern Ethiopia that reported non-availability of safety policies and materials. [14,22] Another study in Uganda concurs with the findings on providing prevention guidelines in higher hospitals than secondary or health centres. [23] Another Nigerian study also reported better training on prevention practices among the workers in federally-owned teaching hospitals compared to state-owned or private-owned hospitals. [16] The poor state of vaccine provision is tantamount to poor enablement in the OOUTH group. This is reflected in the low uptake of the vaccine among participants. It also agrees with a nationwide survey in Nigeria reporting poor uptake of the Hepatitis B vaccine, especially among lower hospitals, suggesting that when workers are inadequately immunized, the risk of infectious diseases is increased among them. [24,

[25] Many studies in Africa revealed that waste handlers need to be more adequately trained due to neglect [24, 26] and poorly supported by employers, thus hindering prevention practices among them. [27, 28]

Conclusion

The study assessed the factors in the facilities and those provided by the employers that help with risk prevention during waste handling. The institution with the lowest available factors showed a higher history of needle stick injuries among its waste handlers. The study recommends that the state-owned facility improve on the provision of safety materials and ensure better Hepatitis vaccine uptake among its workers, especially waste handlers. The federally owned facility needs to intensify the factors that will encourage prevention practices among medical waste handlers.

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