

# Compliance to National Healthcare Waste Management Guidelines by Healthcare Workers and Facilities in Abakaliki South-East Nigeria

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## ABSTRACT

**Background:** Healthcare wastes are wastes generated across different healthcare settings (hospitals, laboratory, nursing homes, etc). Poor management of these wastes potentially exposes health workers, waste handlers, patients and public to infection. **Objectives:** To explore knowledge and practice of healthcare waste management (HCWM) among health workers as well as adherence to national healthcare waste management guidelines by health-care facilities in Abakaliki, Nigeria. **Methodology:** This was a descriptive cross-sectional study of 350 respondents (nurses, medical laboratory scientists and cleaning staff) selected from four healthcare facilities in Abakaliki. Data were collected with semi-structured questionnaires and were analysed using IBM-SPSS version 25. **Results:** The respondents were composed of nurses (49.1%), medical laboratory scientists (32.3%) and cleaning staff (18.6%). The mean age was  $32.6 \pm 4.5$  years and mean work experience was  $4.9 \pm 2.1$  years. Among the respondents, 55(15.7%) had completed secondary education and 284(81.1%) tertiary education. More than three-quarter, 275(78.6%) had received training in HCWM. The mean knowledge and practice scores were 88.2% and 92.1% respectively. The mean facility implementation of national HCWM plan score was 36.4%. **Conclusion:** The study revealed high knowledge and practice of HCWM among respondents and low facility implementation of national HCWM guidelines. It is therefore recommended that health managers should ensure full and proper facility implementation of national HCWM guidelines vis-a-vis provision of standard operating procedures, administrative support and regular staff training program.

**Keywords:** Healthcare workers, Compliance, Waste management, Standard precautions.

## OPEN ACCESS

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## INTRODUCTION

Nigerians are exposed to unnecessary health and environmental risks from unsafe healthcare waste management (HCWM) practices. HCWM is below minimum hygiene standards resulting to healthcare workers, patients and the public being exposed to infections both within healthcare facilities and the surrounding communities where scavengers and children visit uncontrolled healthcare waste dumps. There are also negative impacts on Nigeria's natural resources (air, soil and water).<sup>1</sup>

A survey of several developing countries by World Health Organisation on HCWM showed that 18% to 64% healthcare facilities in these developing countries had inappropriate waste disposal methods.<sup>2</sup> Several previous studies in the developing countries recommended the following as ways to improve HCWM: importance of regulatory framework, management system and staff training program for related personnel and appropriate methods of health care waste disposal.<sup>3-7</sup> A previous study in south-east Nigeria reported that only 1.9% (1/54) hospitals surveyed practiced standard operating procedures of waste disposal while 98.1% (53/54) practiced indiscriminate waste disposal.<sup>8</sup> The study recommended need for regular training and re-training of health care managers and other cadres of healthcare workers on standard methods of HCWM and occupational safety procedures.

World health organisation stressed the need to review the national program to manage healthcare waste after implementation. Thus, this study was aimed at exploring the current status of the HCWM in terms of healthcare workers handling practices, knowledge of internal policies and administration. The study also assessed medical staff and cleaning staff knowledge and awareness of HCWM guidelines.

## METHODOLOGY

This study was carried out among healthcare workers in healthcare facilities (HCFs) in Abakaliki, Ebonyi State Nigeria. The HCFs were Alex Ekwueme

Federal University Teaching Hospital Abakaliki (AEFUTHA 1 &2), National Obstetric Fistula Centre (NOFIC), Mile 4 Hospital and Urban Clinic Covent Road.

These are public health facilities in the capital city of Ebonyi State. The study focused on the two tertiary health facilities, one secondary health facility and one primary healthcare centre as these facilities covered most types of healthcare services, produced a variety of healthcare wastes. These healthcare facilities offer basic services such as outpatient consultations, in-patient care, laboratory services, operations and blood transfusion services. The main waste streams generated in these facilities included sharps, pathological wastes, infectious wastes and general wastes.

This was a descriptive cross-sectional study of 350 respondents (nurses, medical laboratory scientists and cleaning staff) from four public health facilities. The appropriate sample size for a single proportion,  $n = z^2 pq/d^2$  was used to calculate the sample size based on type 1 error of 0.05, a tolerable margin of 0.05 and a prevalence of 53.9% representing the proportion of respondents with good practice of HCWM in a previous study.<sup>9</sup> The study instrument was semi-structured questionnaire which consisted of socio-demographic characteristics, knowledge and practice of HCWM as well as facility adherence to national HCWM guidelines.

Questionnaires were sorted after data collection to identify the ones correctly and completely filled and they were included in the study. Incompletely filled questionnaires were excluded from analysis. Statistical analyses (proportions and mean score percentages) were carried out using IBM-SPSS version 25 and significance level set at  $p < 0.05$ . The mean knowledge score percentage was calculated as follows: sum of correct responses in the knowledge section divided by the product of the number of items and the sample size expressed in percentage. The same method was used for calculating mean practice

score percentage.<sup>10</sup>

Ethical approval was obtained from research and ethics committee of Alex Ekwueme Federal University Teaching Hospital Abakaliki (AEFUTHA/ REC/ VOL. 3/2021/142). Permissions were gotten from health facilities that participated in the study and all consenting respondents were recruited for the study. The study participants were made to know that participation in the study was voluntary and assured that information obtained will be treated anonymously and with confidentiality.

## RESULTS

The mean age was  $32.6 \pm 4.5$  years. Among the respondents in the study, 172 (49.1%) were nurses, 113 (32.3%) medical laboratory scientists and 65 (18.6%) cleaning staff. The mean work experience was  $4.9 \pm 2.1$  years; 55 respondents (15.7%) had completed secondary education and 284 (81.1%) tertiary education and 275 (78.6%) had received

training on HCWM [Table 1].

There was high awareness of HCWM plan among the respondents (91.4%) but only 68%, 59.4% and 63.1% of the study subjects respectively knew that Ebola disease, Lassa fever and HIV infection can be transmitted by improper HCWM. In this study, 6.3% and 10.3% of the study participants do not know that HBV and HCV respectively can be contracted via improper HCWM [Table 2].

The mean practice score of HCWM in the study was 92.1%. However, 8.6% of the respondents did not segregate waste in a specified colour-coded container and 9.7% do not always put sharps into safety boxes. Open method of waste disposal was practiced by 38.8% of the respondents [Table 3]. Table 5 showed low implementation of HCWM guidelines by facilities with mean score of 36.4%.

**Table 1: Socio-demographic characteristics of the respondents n=350**

Variables	Frequency	Percent(%)
<b>Health Facility</b>		
AEFUTHA 1	107	30.6
NOFIC	35	10.0
Mile 4 Hospital	80	22.9
AEFUTHA 2	83	23.7
Urban Clinic	45	12.9
<b>Sex</b>		
Male	125	35.7
Female	225	64.3
<b>Age (years)</b>		
21-30	98	28.0
31-40	231	66.0
41-50	21	6.0
Mean $\pm$ SD	32.6 $\pm$ 4.5	
<b>Educational Level Completed</b>		
No formal education	2	0.6
Primary education	9	2.6
Secondary education	55	15.7
Tertiary education	284	81.1
<b>Work experience (years)</b>		
<1	4	1.1
1-5	236	67.4
6-10	109	31.1
>10	1	0.3
Mean $\pm$ SD	4.9 $\pm$ 2.1	
<b>Previous training on healthcare waste management</b>		
Yes	275	78.6
No	75	32.3
<b>Job description</b>		
Nurse/Midwife	172	49.1
Medical Laboratory Scientist	113	32.3
Cleaning Staff	65	18.6

AEFUTHA = Alex Ekwueme Federal University Teaching Hospital Abakaliki;  
NOFIC = National Obstetric Fistula Centre; SD = Standard Deviation.

**Table 2: Knowledge of healthcare waste management**

Variables	n=350		
	Yes n(%)	No n(%)	Don't know n(%)
Awareness of any healthcare waste management guideline at national, state or local government level	320(91.4)	30(8.6)	0 (0.0)
About the principles of healthcare waste management, "duty of care" principle means that any person that generates waste has a duty to dispose of the waste safely	310(88.6)	17(4.69)	23(6.6)
Healthcare wastes are wastes generated or produced across			
Healthcare setting	340(97.1)	10(2.9)	0(0.0)
Hospitals	336(96.0)	12(3.4)	2(0.6)
Laboratories	329(94.0)	17(4.9)	4(1.1)
Veterinary institutions (slaughter house)	274(78.3)	51(14.6)	25(7.1)
Poor management of healthcare waste can endanger			
Healthcare workers	332(94.9)	12(3.4)	6(1.7)
Patients	318(90.9)	22(6.3)	10(2.9)
The public	313(89.4)	26(7.4)	11(3.1)
Waste handlers	330(94.3)	14(4.0)	6(1.7)
Management of healthcare waste involves			
Waste segregation	338(96.6)	10(2.9)	2(0.6)
Storage	302(86.3)	40(11.4)	8(2.3)
Transportation	317(90.6)	24(6.9)	9(2.6)
Treatment	331(94.6)	19(5.4)	0(0.0)
Diseases that can be transmitted through healthcare waste			
Hepatitis B	328(93.7)	18(5.1)	4(1.1)
Ebola disease	238(68.0)	78(22.3)	34(9.7)
Lassa fever	208(59.4)	115(32.9)	27(7.7)
Hepatitis C	314(89.7)	28(8.0)	8(2.3)
HIV	221(63.1)	106(30.3)	23(6.6)
Factors that contribute to poor healthcare waste management practice			
Lack of healthcare waste management plan	335(95.7)	13(3.7)	2(0.6)
No financial budget for healthcare waste management	314(89.7)	22(6.3)	14(4.0)
Poor knowledge of healthcare workers on proper healthcare waste management produces low efficiency	332(94.9)	12(3.4)	6(1.7)
Lack of materials for proper healthcare waste management practices	321(91.7)	25(7.1)	4(1.1)
Lack of training on healthcare waste management	308(88.0)	28(8.0)	14(4.0)

**Table 3: Practice of healthcare waste management n=350**

Variables	Yes n(%)	No n(%)
	Usage of any healthcare waste management guideline or plan in your facility	334(95.4)
Minimizing the generation of healthcare waste while working	328(93.7)	22(6.3)
Segregating waste in a specified colour coded container	320(91.4)	30(8.6)
Always putting sharps in safety boxes	316(90.3)	34(9.7)
Waste containers are properly labeled in your facility	330(94.3)	20(5.7)
Empty of waste container in your facility	317(90.6)	33(9.4)
There is specific secured areas for storage of healthcare waste in your facility	340(97.1)	10(2.9)
Treatment of healthcare waste before disposal	311(88.9)	39(11.1)
Methods of waste disposal where you work		
Open dumping site	136(38.8)	
Incineration	206(58.9)	
Sanitary landfill	8 (2.3)	

**Table 4: Awareness of national healthcare waste management guidelines' recommendations n=350**

Description	GU n(%)	U n(%)	NS n(%)	A n(%)	VMA n(%)	%positive response
Healthcare facilities must have healthcare waste management officer with adequate budgeting, provision for protective devices, storage facilities and appropriate laundry facilities	2(0.6)	4(1.1)	6(1.7)	121(34.6)	217(62.0)	96.6
Each health facility should have regular training for waste handlers and other staff	0 (0.0)	14(4.0)	8(2.3)	101(28.9)	227(64.9)	93.7
Each healthcare facility should be financially liable for the safe management of any waste it generates	0(0.0)	8(2.3)	10(2.9)	104(29.7)	228(65.1)	94.9
All healthcare facility should establish accounting procedures to document cost they incur managing health care wastes	0(0.0)	20(5.7)	12(3.4)	96(27.4)	222(63.4)	90.9

GU = Gross unaware, U = Unaware, NS = Not sure, A = Aware, VMA = Very much aware.

**Table 5: Existence and implementation national healthcare waste management plan n=350**

Description	DNK n(%)	NE n(%)	EBNI n(%)	EBPI n(%)	EAFI n(%)	%positive response
Existence of facility or hospital-based healthcare waste management committee	24(6.9)	4(1.1)	11(3.1)	169(48.3)	142(40.6)	88.9
A written healthcare waste management policy and strategic plan i.e. standard operating procedures in place to guide day-to-day healthcare waste management operations	20(5.7)	2(0.6)	16(4.6)	171(48.9)	141(40.3)	89.1
Administrative support for procedures in plan including quality assurance	20(5.7)	4(1.1)	18(5.1)	194(55.4)	114(32.6)	88.0
A staff training program for implementation of the plan	26(7.4)	2(0.6)	17(4.9)	193(55.1)	112(32.0)	87.1

DNK= Do not know, NE= Not existing, EBNI= Existing but not implemented, EBPI= Existing but partially implemented, EAFI= Existing and fully implemented.

## DISCUSSION

The mean knowledge score of healthcare waste management in this study was high (88.2%). This was similar to study in Enugu among 115 health workers which reported that 80.9% of the respondents had appropriate knowledge of HCWM.<sup>11</sup> A research in Kampala Uganda also showed that majority of health workers had high knowledge of HCWM.<sup>12</sup> This is however in contrast to study carried out in Ethiopia where only 47.7% of the respondents had good knowledge of HCWM.<sup>13</sup> The high level of appropriate knowledge in this study might be attributed to high educational level of 81.1% of the respondents, mean age work experience of  $4.9 \pm 2.1$  years and 78.6% of the study subjects having had

previous training on HCWM. This is similar to an observation in a study in Thailand which showed high knowledge was attributed to more than half of the respondents (67.7%) having completed bachelor degrees and had more than five years work experience.<sup>14</sup> High educational attainment, years of work experience and previous training on HCWM as well as high knowledge of HCWM in the present study can enhance standard handling procedure which creates a safe workplace and environment. High level of adequate knowledge in this study is encouraging as studies have reported that lack of knowledge of dangers of improper waste by health care workers as the major obstacles to medical waste management.

In this study, respondents' knowledge of diseases transmitted by healthcare workers (HCW) was 6.3% (HBV), 10.3% (HCV), 36.9% (HIV) and 40.6% (Lassa fever). These low knowledge levels about these diseases transmission by HCW are worrisome and have serious health implications. In the year 2000, World Health Organisation reported that 21 million healthcare workers all over the world were infected with hepatitis B virus, two million infected with hepatitis C infection and 260,000 with HIV following occupational exposure.<sup>15</sup> The risk of occupational exposure to hazardous healthcare waste is more in the developing countries as 90% of health care workers were reported to be at risk.<sup>16</sup> Exposure of health care staff to infected blood and body fluids are the main route of transmission of blood borne pathogens especially hepatitis B, C and HIV.<sup>17</sup> This study has shown that there is a need for regular training on HCWM and healthcare workers should be made to know of the diseases that can be transmitted through improper healthcare waste management. The knowledge will help in protecting oneself from infections from these deadly diseases by observing safety precautions.

The mean practice score of HCWM in this study was high (92.1%). In view of the large number of patients that continuously flood in our healthcare facilities on daily basis, a considerable amount of biomedical wastes are generated and require efficient practice for the disposal. Improper collection, storage treatment and disposal can contribute to serious environmental damage and human diseases. In spite of high level of practice of HCWM reported by the respondents, 8.6% of the study subjects did not practice segregation of wastes at source generations, 9.7% did not always discard sharps into safety boxes. There was practice of open dumping as reported by 38.85% of respondents in their various facilities and only 58.9% study participants reported use of incineration as method of waste disposal. Standard health care waste management recommended incineration of hazardous products from health facilities.<sup>18,19</sup> The findings also indicated that healthcare wastes were

not properly collected, segregated and disposed in an appropriate, safe and sanitary manner. The open dumping and lack of incinerators to treat waste materials can potentially expose health workers, waste handlers, patients and public to infection and injuries.

From this study the following factors were identified by respondents as contributing to poor healthcare waste management. They were lack of healthcare waste management plan (95.7%), no financial budget for healthcare waste management (89.7%), work inefficiency as a result of poor knowledge of healthcare workers on proper HCWM (94.9%), lack of materials needed for proper HCWM practices (91.7%) and lack of training on HCWM (88.0%). Assessment of respondents' awareness of the HCWM plan recommendations showed that there was need for each health facility to have regular training for waste handlers and other staff (93.7%) and also to have HCWM officer with adequate budget, provision for protective devices, storage facilities and laundry facilities (96.6%). However, reports on the assessment of the existence and implementation of national HCWM guidelines showed that only 32% of the respondents indicated positively that their facility has a staff training program for implementation of the HCWM guidelines, 36% indicated that there is administrative support for procedures in plan including quality assurance, 40.3% indicated that there is a written HCWM policy and strategic plan (standard operating procedures in place to guide day to day HCWM operations, and 40.6% showed that there is existence of facility or hospital- based HCWM committee.

## CONCLUSION

This study has revealed high knowledge and practice of HCWM among respondents and low facility implementation of national HCWM guidelines. It is therefore recommended that health managers should ensure full and proper facility implementation of national HCWM guidelines vis-

a-vis provision of standard operating procedures, administrative support and regular staff training program.

#### Disclosure

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**Authors' contributions** - BII conceptualized and designed the study. BII, CUA and NCE collected the data. BII analyzed and interpreted the data. BII, CUA and NCE wrote the manuscript. All authors critically reviewed and approved the final draft of the manuscript.

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