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KNOWLEDGE OF HAZARDOUS MEDICAL WASTE DISPOSAL AMONG PRIMARY HEALTHCARE WORKERS IN PLATEAU STATE, NIGERIA

BY

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Abstract

This study assessed knowledge of hazardous medical waste disposal among primary healthcare workers in Plateau state, Nigeria. To achieve this purpose, ex-post facto research design was used. A total sample of 300 healthcare workers was used for the study. The instrument used for the study was researcher developed close ended questionnaire. Out of the 300 copies of questionnaire distributed, 297 or 99.0% were retrieved and considered valid for analyses. Inferential statistics of one sample t-test was used to analyse the formulated hypotheses at 0.05 probability level. The results revealed that the knowledge of primary healthcare workers on hazardous medical waste disposal in Plateau state is significantly positive (p=0.000). Based on the results, it was concluded that primary healthcare workers in Plateau state have knowledge about hazardous medical waste disposal. Based on the conclusion, it was recommended that health educators should carry out sensitization campaigns targeted at healthcare workers through refresher trainings and mass campaigns to further enlighten healthcare workers on medical waste disposal so as to further sustain the existing knowledge of medical waste disposal among the healthcare workers in the state.

Keywords: Disposal, Hazardous, Healthcare, Knowledge, Medical waste.

Introduction

Across the world today waste generation has continued to become an issue of great concern. Generation of wastes has steadily been on the increase and it continues to pose treat to the environment as well as public health risk to individuals. Mondal (2018) categorised medical waste under hazardous wastes and further emphasised that wastes are classified as hazardous if they exhibit any of four primary characterises based on physical or chemical properties of toxicity, reactivity ignitability and corrosively. Medical wastes include human tissue from surgery, used bandages and hypoderm needles. MedPro (2019) defined medical waste as any kind of waste that contains infectious material (or material that is *potentially* infectious). This includes any waste generated by medical and health workers in the healthcare facility. Medical waste contains body fluids such as blood and or other contaminants which can expose one to infection. Kukreja (2019) defined medical waste as any waste material that is considered to be of a bio-hazardous nature.

According to WHO *(*2017*)*, medical waste are wastes generated during medical research, testing, diagnosis, immunization, or treatment of either human beings or animals. Some examples are culture dishes, glassware, bandages, gloves, discarded sharps like needles or scalpels, swabs and tissues. Healthcare facilities like hospitals, dental clinics, nursing homes, physician's offices generate a large amount of medical waste daily (Rinkesh, 2019). The waste generated includes a broad range of materials like needles, chemicals, blood, body parts, razor blades, broken tubes, suction devices, gloves, gowns, syringes, medical devices, pharmaceuticals and saturated dressings.

It is important to note that healthcare wastes, if not properly managed, could pose an even greater threat and hazards than the original diseases (Babanyara, Ibrahim, Garba, Bogoro, & Abubakar, 2013). It is the duty of healthcare workers at healthcare centres to take care of medical waste disposal. Poor handling and disposal of medical wastes has a great impact both directly and indirectly on staff, patient and the environment (Nwachukwu, Orji &Ugbogu, 2013; Awodele, Adewoye, &Oparah, 2016). This is because the hospitals represent a unique environment, providing healthcare to patients and work environment for healthcare workers and other staffs. In this study knowledge refers to knowledge of medical waste disposal which is operationalized as the awareness of medical waste disposal among health care workers.

Knowledge of medical waste disposal is a key variable in any discussion of health care facilities regulation and in the evaluation of waste disposal. Acquiring knowledge about medical waste disposal is an important step toward gaining access to and then using suitable methods in a timely and effective manner. Having information or knowledge of medical waste disposal will help individuals and healthcare workers to appropriately handle and dispose of medical waste (Akkajit, Romin, &Assawadithalerd, 2020).

Reports from studies conducted in Botswana, Nigeria, India among others revealed that healthcare workers are aware of medical waste management/disposal (Mathur, Dwivedi, Hassan, &Misra, 2011; Adogu, Ubajaka & Nebuwa, 2014; Singh, Gupta, Kumari, &Verma, 2014; Mugabi, Hattingh, & Chima, 2018). Although this is a good indication that healthcare workers are adequately educated on the subject matter but in contrast to this report Makhura (2016) reported poor knowledge of medical waste disposal among healthcare workers in Mpumalanga province of South Africa. Gupta, Shukla and Tyagi, (2017) also reported same in their study in Lucknow. In Ethiopia and KwaZulu-Natal inadequate knowledge of healthcare waste management was also reported (Olaifa, Govender & Ross, 2018;Deress, Jemal, Girma, & Adane, 2019). This poor knowledge of medical waste management among the personnels is indeed a great concern because this singular problem can result into disease spread and cross infection within the hospital and community setting if not addressed promptly.

In many developing countries, medical waste disposal is not properly carried out, and there are no clearly defined regulations and a lack of operational standards (Mainali, Gupta, &Sapkota, 2014). Disposal of medical waste mixed with municipal solid waste is

likely to occur in clinics due to the small quantity of medical waste generated, the high cost of collection and disposal, and a lack of enforcement from the local authorities (Akkajit, Romin, &Assawadithalerd, 2020).

The various methods of Health Care Wastes (HCW) disposal include incineration, wet and dry thermal treatment, chemical disinfection, irradiation and biological degradation including the sanitary landfill and burial of the waste (Oyekale & Oyekale, 2017). Final disposal method is influenced by several factors including waste characteristics, quantity of wastes, capability of the healthcare facility to handle the quantity of waste, occupational health and safety considerations, public acceptability, options available for final disposal and cost considerations. In many countries, HCW is collected with the rest of the waste stream, mixed with municipal waste in roadside collecting bins and disposed of similarly, thereby posing a great health risk to municipal workers, the public and the environment (Oyekale & Oyekale, 2017).

The use of skips has been terminated in many parts of northern Nigeria since 2012. Skips were found to be linked to lack of cleanliness and most urban residents were dissatisfied with its use. The current operating systems in Nigeria are open ground disposal and in the remaining skips. The researchers observed that health care wastes in most of the Primary Health Care Centres in Plateau State are often disposed of in open dump sites within the health care facilities. Some of these wastes are harmful and do not degrade; rather it pollutes the soil and water bodies close to the health care facilities. This increases the risk of human contacts with hazardous and highly infectious diseases to the entire population of Plateau State. Plateau state is one of the 36 states in Nigeria and carved from former Benue state on 23 September 1987 located on 120 15'N 7 0 30E Coordinate in the North Central geopolitical Zone. The management of medical waste is the mandate of ministry of environment and co-ordinate by the State Environmental Protection Agency (SEPA).

The medical waste disposal method used is mostly the dumping method used is mostly the dumping method which takes long time be evacuated, creating more hazard to the environment. Communities without access to transfer stations resort to open disposal methods which include burning, burying, using of wastes as animal feeds and indiscriminate disposal. There is rampant littering caused by the indiscriminate disposal of medical wastes in storm drainage channels, road verges and open lots. The carelessly disposed wastes block storm water drains causing floods and also cause health hazards and poor aesthetics. Hence the purpose of this study is to assess knowledge of hazardous medical waste disposal among primary healthcare workers in Plateau State, Nigeria.

Research Question

Do primary healthcare workers have knowledge of hazardous medical waste disposal in Plateau State Nigeria?

Hypothesis

Primary healthcare workers knowledge of hazardous medical waste disposal in Plateau state is not significant.

Methodology

To achieve the purpose of this study the researchers employed an ex-post-facto research design. The population of the study comprised of 3, 912 public primary health care workers in Plateau State, Nigeria (Plateau State Primary Health Care Development Agency (PHCDA), 2021). The sample size for the study was 300 healthcare workers. The sample size for the study was derived using the procedure for determining sample size proposed by Dessel (2013). To arrive at the above stated sample size, multi-stage sampling procedure was used as follows:

Plateau state was stratified into the already existing senatorial district Plateau North, South and Central. Simple random sampling technique was used to select one (1) Local Government Area from each of the Senatorial District of the State using the balloting method. Simple random sampling procedure was used to select one PHC from each LGA selected using balloting. Proportionate sampling technique was employed by the researchers to determine the sample size that will be gotten from each of the health care facility selected for the study using the proportion formula. The researchers employed convenience sampling technique at the health care facilities selected for the study to get the respondents based on their availability to answer the questionnaire.

The instrument that was used for data collection is a researcher developed questionnaire titled "Assessment of Knowledge of Medical Waste Disposal Questionnaire (AKMWDQ)". The research instrument was made up of seven (7) sections, section A to G. To score the respondents based on what they reported concerning an item on the questionnaire a four (4) point modified Likert scale rating was used as thus; strongly agreed (SA) 4 points, agree (A) 3 points, disagree (D) 2 point and strongly disagree (SD) 1 point. Thus, any mean score of response that is 2.5 and above it was considered positive while any mean score below 2.5 was considered negative. To validate the research instrument, five (5) experts conducted a face and content validity of the research instrument. Three (3) of which were from the Department of Human Kinetics and Health Education, Ahmadu Bello University, Zaria while two (2) were from the College of Medical Sciences, Ahmadu Bello University, Zaria. The observations and suggestions made by these experts were implemented by the researchers and a clean draft of the questionnaire was produced.

The data collected was analysed using the following statistical tools. Descriptive statistics of frequency and percentage was used to describe the demographic characteristics of the respondents. Mean and standard deviation was used to answer the research question. One – Sample t-test was used to analyse the formulated hypothesis at 0.05 level of significance.

Results

Table 1: Frequency and Means of respondent's demographic characteristics.

Variables	Variable options	Frequency	Mean
Age range	18 – 29 years	54	18.2
	30 – 39 years	82	27.6
	40 – 49 years	109	36.7
	Above 49years	52	17.5
	Total	**297**	**100.0**
Cadre	Community Health Office (CHO)	61	20.5
	Community Health Extension Worker (CHEW)	115	38.7
	Junior Community Health Extension Worker (JCHEW)	73	24.6
	Laboratory Technician	21	7.1
	Laboratory Assistant	3	1.0
	Nurse	12	4.0
	Midwife	6	2.0
	Attendant	6	2.0
	Total	**297**	**100.0**
Gender	Male	103	34.7
	Female	194	65.3
Zone	Plateau North	9	3.0
	Plateau South	63	21.2
	Plateau Central	225	75.8
	Total	**297**	**100.0**
Years of Experience	1 – 2 years	31	10.4
	3 – 5 years	51	17.2
	Above 5years	215	72.4
	Total	**297**	**100.0**
Level of Education	PhD	4	1.3
	Masters	6	2.0
	B.Sc.	33	11.1
	CHEW	94	31.6
	JCHEW	85	28.6
	Dip. CHO	75	25.3
	Total	**297**	**100.0**

Result on Table 1 shows that 18.2% of the Healthcare workers were between 18 and 29 years age range. Those within the 30 to 39 years age bracket were 27.6% and 36.7% were between 40 and 49years. Those who were above 49 years were 17.5% of the total respondents involved in the study. The age distribution reflected the normal working ages of healthcare workers in the state. In terms of their cadres, 20.5% were of Community Health Office (CHO) rank, 38.7% were of the Community Health Extension Worker (CHEW) designation while 24.6% were Junior Community Health Extension Worker (JCHEW). The Laboratory Technician were 7.1%, Laboratory Assistant, 1.0%, Nurses, 4.0% while those who were Midwife and Attendants were 2.0% each respectively among

the total respondents. The classifications showed that all healthcare workers responsible for medical wastes disposal in the Healthcare facilities within the state could be said to be fairly represented in the study.

Of the total respondents, 34.7% were males and 65.3% were female. The predominance of females in the study is associated with the number of Nurses and Attendants who were mostly female in the selected Healthcare units. For zone representation, 3.0% were from Plateau North, 21.2% from Plateau South and 75.8% from Plateau Central. The dominance of respondents from Plateau Central was more associated with urbanization and proximity of healthcare units among others.

The years of experience on the job is expected to improve on medical wastes disposal by the Primary Healthcare Workers. In the table, most (72.4%) of the healthcare workers had above 5years of experience on the job. Those with between 3 to 5years of experience on the job were 17.2%. Only 10.4% of the healthcare workers had less than 3years of working experience among the respondents involved in the study. By these years of experience on the job, the respondents would be expected to give valid information on medical wastes disposal in their respective healthcare facilities across the state.

In terms of highest educational attainment by the healthcare workers those who had diploma certificate in Community Health Office (CHO) were 25.3%. Those with Junior Community Health Extension Worker (JCHEW) certificate were 28.6% while 31.6% had Community Health Extension Worker (CHEW) certification. Respondents with B. SC were 11.1% and 2.0% had Master degree. Only 1.3% of the respondents had Doctorate degree (Ph. D). These classifications showed that all the respondents were healthcare professionals and would have adequate information on knowledge of medical wastes disposal in Primary Healthcare in Plateau state.

Research Question**:** Do primary healthcare workers have knowledge of hazardous medical waste disposal in Plateau State Nigeria?

Table 2: Mean score on knowledge of hazardous wastes disposal by the primary healthcare workers

Sn	Knowledge of hazardous medical wastes disposal	Mean	Std. Dev.
1	Syringes and needles are disposed in red wastes bin.	3.05	0.756
2	Disposing human tissue is in yellow wastes bin.	3.02	0.746
3	Body fluid is disposed in brown wastes bin.	2.69	0.740
4	Patient with highly infection diseases should be in isolation ward.	3.26	0.929
5	Swabs and bandages are disposed in blue wastes bin.	2.86	0.860
6	Batteries are disposed in brown wastes bin.	2.86	0.800
7	Contaminated drugs should not be returned back.	2.81	0.975
8	Mercury is disposed in red wastes bin.	2.64	0.815
9	Aerosol cans cannot be thrown into trash receptacle.	2.72	0.837
10	Unused liquids are disposed in yellow wastes bin	2.81	0.742
	Aggregate mean	2.87	0.486
	(Decision mean = 2.50)		

Table 2 revealed the aggregate mean of 2.87 which implies that, the primary healthcare workers have adequate knowledge of hazardous medical wastes disposal in the selected Healthcare units involved in the study. They responded that syringes and needles were to be disposed in red wastes bin and that human tissues were to be disposed in yellow wastes bin while body fluids were to be disposed in brown wastes bin. They were of the knowledge that patients with highly infection diseases should be in isolation ward and that swabs and bandages were to be disposed in blue wastes bin. The healthcare workers exhibited knowledge in relation to disposal of batteries which they were of the view should be disposed in brown wastes bin and contaminated drugs which they agreed should not be returned back to store. They acknowledged that mercury should be disposed in red wastes bin and that aerosol cans cannot be thrown into trash basket while unused liquid should be disposed in yellow wastes bin. The aggregate mean score of 2.87 with a standard deviation of 0.486 clearly indicated that, primary healthcare workers have adequate knowledge of hazardous medical wastes disposal methods in the selected healthcare units across the state.

Hypothesis**:** Primary healthcare workers knowledge of hazardous medical waste disposal, in Plateau state is not significant.

Table 3: One sample t-test on knowledge of hazardous medical wastes disposal by Primary healthcare workers in Plateau State

Variables	N	Mean	Std. Dev.	Std. Error	t-value	df	p-value
Knowledge of hazardous wastes	297	2.87	0.486	0.028	13.217	296	0.000
Test mean	297	2.50	0.000	0.000			

(t-critical = 1.96, $p < 0.05$)

The respondents' knowledge of hazardous medical wastes disposal as revealed in Table 3 is significantly adequate. The mean score of 2.87 was significantly higher than the benchmark of 2.50. The observed t-value for the test was 13.217 with a p-value of 0.000 ($p < 0.05$) obtained at degree of freedom 296. These observations provided sufficient evidence for rejecting the null hypothesis. The null hypothesis that, primary healthcare workers' knowledge of hazardous medical wastes disposal in Plateau state is not significant is therefore rejected.

Discussions

This study assessed knowledge of medical wastes disposal among primary healthcare workers in Plateau state, Nigeria. From analysis of data collected for the study and tests of hypotheses, it was found that the knowledge of primary healthcare workers on hazardous medical wastes disposal in Plateau State is significantly positive (p=0.000).

The finding of this study is in discord with the findings of Deress, Jemal, Girma, and Adane, (2019) who assessed knowledge, attitude, and practice of waste handlers about

medical waste management in Debre Markos town healthcare facilities, in north-west Ethiopia. The study revealed that 25 (45.5%) of the study participants had adequate knowledge. This implies poor knowledge of medical waste management among the personnels. The finding of this study is also not in consonance with the report from the study conducted by Olaifa, Govender and Ross, (2018) who assessed knowledge, attitudes and practices of healthcare workers about healthcare waste management at a district hospital in KwaZulu-Natal. The result of the study revealed that knowledge of HCW management was generally inadequate. The findings of this study is also in discord with the report from the study conducted by Gupta, Shukla and Tyagi, (2017) which assessed the knowledge and practice of bio-medical waste management among the health care personnel in selected primary health care centres in Lucknow. The result of the study revealed lack of knowledge and awareness about bio-medical waste management amongst primary healthcare workers which results in inadequate handling and management of medical wastes. The finding of this study is also not in consonance with the study conducted by Makhura (2016) who assessed the knowledge and practices of health care workers on medical waste disposal at a hospital in the Mpumalanga Province in South Africa. Result of the study revealed that a high percentage of health care workers do not have adequate knowledge regarding disposal of medical waste.

The finding of this study is also in agreement with the report from the study conducted by Mugabi, Hattingh, and Chima, (2018) which assessed knowledge, attitudes, and practices of doctors, nurses, laboratory technicians, and housekeeping staff, regarding medical waste management at a tertiary hospital in Gaborone, Botswana. The result of the study revealed that 90.5% (572/632) of the healthcare workers were knowledgeable about medical waste management. The finding of this study is in agreement with the report from the study conducted by Adogu, Ubajaka and Nebuwa, (2014) who assessed the knowledge and practice of medical waste management among healthcare workers at a General hospital in Anambra, Nigeria. The study revealed that 75% of doctors and 66.7% of nurses were aware of medical waste handling. The findings of this study agree with the report from the study conducted by Mathur, Dwivedi, Hassan, and Misra, (2011) who assessed knowledge, attitude, and practices of doctors, nurses, laboratory technicians, and sanitary staff regarding biomedical waste management. The study revealed that doctors, nurses, and laboratory technicians have better knowledge than sanitary staff regarding biomedical waste management. The finding of this study is also in line with the finding from the study conducted by Singh, Gupta, Kumari, and Verma, (2014) who assessed knowledge, Attitude and Practices (KAP) regarding healthcare waste management among healthcare personnel in Lucknow District, Uttar Pradesh, India. The result of the study revealed that 83.3% of medical/dental doctors and students had knowledge about waste management plan and its authorization.

Conclusion

Primary healthcare workers in Plateau state have knowledge about hazardous medical waste disposal.

Recommendation

Health educators should carry out sensitization campaigns targeted at healthcare workers through refresher trainings and mass campaigns to further enlighten healthcare workers on medical waste disposal so as to further sustain the existing knowledge of medical waste disposal among the healthcare workers in the state.

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