Assessment of medical waste disposal practice in Owerri Municipal- A preliminary review

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Abstract
Introduction
Medical waste (MW) can be generated in hospitals, clinics and places where diagnosis and treatment are conducted. The appropriate disposal of these medical wastes remains animmense concern in view of the potential public health hazard associated with it. The study assessed the medical waste disposal practices in selected hospitals in Owerri.
Methods
Data was collected using three instruments (questionnaire, interview and site visitation). Three public (hospital A, B, C) and three private (hospital D, E, F) which provide services to citizens was assessed. Data analysis was done with SPSS version 23. Two types of statistical tools were employed in this study, inferential and descriptive statistics.Levelof significance at p < 0.05.
Results
There were more female respondents (71.8%) than males (28.2%). More than half of the respondents (65.4%) are less than 40 years of age while 72.5% of them are married. The major designations were nurses (43%) in the clinic (42.1%). More than half of the respondents (73.8%) have less than 10 years of experience and the most common medical waste generated in the hospital wasSharp Waste (81.2%), followed by General waste (74.4%). Majority of the respondents (88.7%) reported that dumpsters are provided in the hospital andcolour coded (83.2%). The most common method of waste disposal reported was incineration (61.8%), followed by open burning (39.5%). 85% of the health workers have good practice of medical waste disposal with 64% and32% reported that the main source of their training was in-service training (64.1%) and conferences (31.7%) respectively. 31.1% of the respondents reported that waste is evacuated from the facility daily. There is a significant association between the knowledge of healthcare workers and MWD practices (p < 0.001, OR = 19.505, 95% C.I = 7.428 – 51.214). Health workers with good knowledge of medical waste disposal are 20 times more likely to have good practice than those with poor knowledge.
Conclusions
A good knowledge of proper medical waste disposal amongst health workers will improve good MWD practices as shown by this study. However, there is need for capacity building at all levels and also policies and guidelines formulations.

I. Introduction

Medical waste disposal (MWD) is a vitalsubject as it poses potential health risks to the environment (Adnane et al, 2013, Patience Abor, 2007). It is also of greater importance due to its potential environmental hazards and public health risks with high propensity to result into epidemics (Dehghani, 2008).

It remains a major challenge, predominantly, in Low and middle income countries(LMIC)limited byfinancial, economic, social problems and inadequate training of staff responsible for handling of the waste (Alagoz 2008). Inappropriatedisposal methods applied during handling and disposal of medical waste (MW) is an increasing significant health and environmental hazards due to the contagious nature and unpleasant smell of the waste (Hossain et al 2011, Patwary et al, 2009, Tamplin et al 2004).Although the current medical waste disposal (MWD) practices differ in each healthcare facility, they share similar challenges (Tsakona et al 2007).

In Nigeria, as in other LMIC, fewcitizens are aware that medical waste contributes significantly to pollution and hazards in the environment. This is evidenced by lack of specific policy to curb the danger of MW generated in healthcare facilities (HCF) (Akinwale et al, 2009). It is vital to note that medical wastes, can pose a greater dangerthan the original ailment. It is the obligation of healthcare facilities to ensure appropriate MWD practices. (Patil et al, 2005). Notably, impropercontrol and disposal of MW impacts all citizens directly or indirectly.

Medical waste is generated following daily activities in HCFs, which includes sharps, human body parts and other infectious materials (Baveja et al 2000).

The World Health Organization (WHO) estimates an annual average of 8 million new cases of Hepatitis B virus (HBV), 4.7 million cases of Hepatitis C virus (HCV) and 80,000 cases of Human Immunodeficiency Virus (HIV) due to unsafe sharps disposal and poor MWD(WHO, 1999).

Sharps and other contaminated equipment are commonly scavenged from waste dump site. The far reaching negative environmental impact of MW includes disease transmission by bacteria, virus and other microorganisms, deforming the fragrance and aesthetics' of the environment, as well as pollution of the soil and water bodies by MW (Chua T et al 2012). Proper medical waste disposal in HCFs depends on good knowledge and a committed waste disposal team with careful planning and detailed facility legislation engaging all Health workers with adequate financing (WHO, 2005).

Finally, it is appropriate that each healthcare facility will need to assess their peculiar challenges and adopt awaste disposalplan that is suitable to their economic status and sustainable for use(Manyele, 2004, Stephen et al 2011).

This is an issue taking central place in the national health policies of many countries however, in most urban areas in Nigeria there are often no systematic approach to MWD,However recently the House of Representative of the Federal Republic of Nigeria condemned the indiscriminate disposal of waste from HCFs, charging the government at all levels to design and enforce a standard healthcare waste disposal system (The punch Newspaper, 2022). The majority of the limitation is very often because health issues compete with other sectors of the economy for the available scarce resources. Notably, medical wastes are disposed together with other wastes, posing a great health hazard to the public and environment (Alagoz et al 2008, Bdour et al, 2007). Medical waste should be separated from other municipal waste stream (Bdour et al, 2007, Kgathi, 2001).

Fig. 1

Storage of general waste at one of the Healthcare facility
Therefore, this study assessed the medical waste disposal practices in selected hospitals in Owerri.

II.   Materials & Method
Design & setting

Study Area

The research work wasdone to assess the MWD practices in selected public and private healthcare facilities (HCFs) located in Owerri municipal. The HCFs were chosen for the study because of patient population and the varieties of care provided in these HCFs which have a propensity to generate hazardous wastes. These HCFs render clinical services: medical, surgical, pediatric care, obstetrics, gynecological and radiological services that generate MWs that is specific to such facilities.

Imo State also known as Igbo: Ọra Imo is a state in the South-East geopolitical zone of Nigeria, bordered to the north by Anambra State, Rivers State to the east and south, and Abia State to the west.[5] It takes its name from the Imo River which flows along the state's eastern border. The state capital is Owerri and its state nickname is the "Eastern Heartland."Of the 36 states, Imo is the third smallest in area but is fourteenth most populous with an estimated population of over 5.4 million as of 2016. **Owerri Municipal** is a Local Government Area in Imo State, Nigeria. Its headquarters is in the city of Owerri. It has an area of 58 km² and a population of 127,213 according to the 2006 census. Owerri city sits at the intersection of roads from Port Harcourt, Onitsha, Aba, Orlu, Okigwe and Umuahia.

STUDY POPULATION
The study population in this research will include health workers of the health facilities in Owerri municipal in Imo State. This includes the public and private healthcare facilities. The public HCFs are owned by the federal and state governments while the private HCFs are owned by individuals. The distribution is shown in table below.
Selection of facilities
Six (6) HCFs were selected for the exercise, using stratified, simple random sampling methods. The HCFs were stratified into private and public based on the proprietorship of the facility. This approach ensured that the various categories of hospitals operational in Owerri were included in the study andcoded to ensure confidentiality. We studied hospitals that provide general medical, surgical, pediatric, maternity and a range of specialist services. The three (3) selected public hospitals include the Federal Medical Center, Government House Clinic, Nigerian Police Medical Services. Three (3) private HCFs were also selected out of the private HCFs in OwerriUmezurike Specialist Hospital, Milkyway Specialist Hospital, St David Hospital using both simple random and convenience sampling methods. The hospitals were coded A, B, C, D, E, F. The three public hospitals (A, B, C) are among the largest and leading healthcare institutions in Owerri and, indeed, the oldest and most advanced facilities in Owerri, while C,D,E for the three Private HCFs.
Healthcare Facility Inclusion Criteria
The public HCFs located in Owerri that render specialist medical services in surgery, obstetrics and gynecology, pediatrics, internal medicine, medical laboratory and pharmacy and should have in-patient services. The private HCFs located in Owerri that provide specialist medical services in surgery, obstetrics and gynecology, pediatrics, internal medicine, medical laboratory and pharmacy and should have in-patient services.
Healthcare Facility Exclusion criteria
Hospitals that do not provide services in all the four clinical specialties. Hospitals without in-patient, laboratory, or pharmacy facilities.
Inclusion criteria for HCFs
The staff of the HCFs who are actively involved in providing clinical services for up to minimum period of one year.
Staff involved in waste management in the HCFs
Top management staff of the HCFs
Exclusion criteria for HCFs
Health workers that are no longer actively involved in providing clinical services in the HCFs.
The staff of the HCFs who are actively involved in providing clinical services less than one year.
SAMPLE SIZE
The sample size for the study will be determined using Krejcie and Morgan Formula for a known population. It is as follows:
$n = \chi^2 NP(1-P) / d^2 (N-1) + \chi^2 P(1-P)$
where n = required sample size
χ^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841)
N = the population size (1570)
P = the population proportion (assumed to be .50 since this would provide the maximum sample size).
d = the degree of accuracy expressed as a proportion (.05).
n = 3.841 x 1570 x 0.5(1 − 0.5) / (0.05)^2 (1570 − 1) + 3.841 x 0.5(1 − 0.5)
n = 1508/4.88
n = 309
The sample size for the study will be 309
Data collection
A catalog of the waste generated in each of the sampled hospital in the study area was carried out. The type of waste generated was identified through direct surveillance (site visitation) and use of questionnaire (sections of the questionnaire are; demographic Information, description of hospital, knowledge about the waste characterization, assessment of medical waste disposal practice, Information about the personnel involved in the

management of waste. Healthcare workers were interviewed to obtain the level of training of its staff. In each hospital, the questionnaires were administered to the doctors, nurses, laboratory officers and domestic workers and cleaners who were randomly selected for this purpose based on the proportion of staff in each hospital (see Table 1).

Table 1 Socio-demographic Characteristics of Respondents
The method adopted for this study follows the procedure used by Longe and Williams [25]. This involves the three instruments which are Survey questionnaire administration, Site visitation and in − depth interview.
Analysis
Statistical Package for Social Sciences (SPSS version 23) was used for the analysis of the data. To determine the level of significance of association between variables at 95 % confidence level (±5 % sampling error). Level of significance was set at $p \leq 0.05$.
Ethical consideration and participants consent
Ethical approval for this study was obtained from institutions Health Research and Ethics Committee. The procedures were explained to the individual participants and thereafter their consent to participate in the study was obtained. The participants that declined not to be part of the study were excluded. Confidentiality was assured by excluding all the names of the hospital surveyed.

III.   Results

Two hundred and sixty-three (263) questionnaires were fully completed out of the 308 questionnaires distributed in this study, giving a response rate of 87 % as at the time of this evaluation. There were more female respondents (71.8%) than males (28.2%). More than half of the respondents (65.4%) are less than 40 years of age while 72.5% of them are married. Their major designations include: Nurse (43%), Health attendant (19.1%), Laboratory scientist (17.8%) and doctor (11.3%). Their qualifications include consultant (5.2%), senior registrar (4.5%), registrar (2.3%), house officer (3.9%), RNO (9.4%), Intern (12.9%), mid wife (14.2%) and other health qualifications (47.6%). Many of the respondents were from the following departments: clinic (42.1%), theatre (13.6%), ward (17.8%), Lab (18.4%), pharmacy (3.9%), physiotherapy (1%) and health records (3.2%). The table shows that 39.2% of the respondents have less than 6 years of experience, 46.6% have 6 to 15 years of experience, 8.4% have 16 to 20 years of experience while 5.8% have more than years of experience. More than half of the respondents (73.8%) have less than 10 years of experience.

Table 2 shows that the most common medical waste generated in the hospital is Sharp Waste (81.2%), followed by General waste (74.4%), Pathological Waste (54.7%) and pharmaceutical waste (44.3%) in that order. Other waste includes Genotoxic waste (27.2%), Radioactive waste (22.3%) and Chemical waste (29.8%). The table shows that majority of the respondents (88.7%) reported that dumpsters are provided in the hospital. Most of them (65.3%) reported 11 to 25 dumpsters provided and that the dumpsters are colour coded (83.2%).

Figure 1 shows that the most common method of waste disposal used in the hospital was incineration (61.8%), followed by open burning (39.5%), composting (24.9%), burying (23.6%), autoclaving (20.1%), fermentation (11.0%) and recycling (5.5%) in that order.Figure 2 shows that 263 (85%) of the health workers have good practice of medical waste disposal. Figure 3 shows that 142 health workers have received training on medical waste disposal, 91 (64.1%) and 45 (31.7%) reported that the main source of their training was in-service training (64.1%) and conferences (31.7%) respectively.Figure 4 shows that out of 290 respondents that wear PPEs, 215 (74%) wear them always.

Figure 5 shows that 98.6% of the respondents' wear hand gloves, 92.2% wear face masks, 33% wear safety boots, 30.7% wear cover-alls while 24.9% wear safety goggles

Figure 6 shows that 31.1% of the respondents reported that waste is evacuated from the facility daily, 23% said twice weekly, 23.9% reported thrice weekly while 22% does not know.

Table 4 shows that most of the health workers (98.4%) disagree that segregation of Medical Waste can be done by putting all the MW into one container. Majority of the health workers are in agreement that General MW should be put in black containers (86.1%), Red colored waste container is for highly infectious MW (88.3%), Lead box is used for collecting radioactive waste (68%), Sharp wastes (needles) should be recapped before disposal (57.6%), 67.6% respondent reported MW should be treated before disposal. There should be specific storage area for MW in HCFs (90%), Storage areas should be secured (91.9%), MW is treated by chemical disinfection and incinerator (60.2%)and Incinerator and land fill are MW disposal techniques (70.6%). They disagree that Sharp wastes are better disposed with general MW (24.9%).

Figure 7 shows that most of the health workers' major source of knowledge on medical waste disposal is self-studying.

Figure 8 shows that 286 (93%) of the health workers have good knowledge of medical waste disposal

Table 5 shows a significant association between the knowledge of healthcare workers and MWD practices in the selected hospitals in Owerri (p < 0.001, OR = 19.505, 95% C.I = 7.428 − 51.214). Health

workers with good knowledge of medical waste disposal are 20 times more likely to have good practice than those with poor knowledge. The null hypothesis is hereby rejected and the alternative accepted. Therefore, there is a significant association between the knowledge of healthcare workers and MWD practices in the selected hospitals in Owerri.

IV.   Discussion

The majority of the respondents were nurses. This issimilar to the study by (Joshua et al 2014) which was carried out in HCF in Zaria - Nigeria where majority (37 %) were nurses. The nurses constitute a large population of the HCF staff and are posted to majority of the departments and logically are largely involved in waste collection and disposal in each unit.

It is quite clear that for efficient waste disposal plan, the quantity and variations in the waste generated in each facility must be considered. The findings in this study corroborate some rates recorded in Souss-Massa-Draa, where an average rate of 0.53 kg/bed/day was recorded (Adnane et al 2013). Likewise, a study carried out in 2008 by Abdulla et al., showed that waste weighted average was 0.83 kg/bed/day in Jordan and 1.22 kg/bed/day as reported by Ruoyan et al., in 2010 as weighted average rate in China (WHO 2006, Abdullah 2013). The earlier study done by Longe and Williams, in Lagos State, reported an average generation rate of 0.57 kg/bed/day (Longe et al, 2006). The reduction that was noted in this study for the average generation rate may be attributed to proper segregation of infectious waste, adequate categorization and disposal of the waste.

Waste generated from various activities performed in hospitals include general and medical wastes. The general waste emanates from administrative activities, housekeeping, food preparation, activities of health-care establishments and may also include waste generated during maintenance of health-care premises. This type of waste may be similar to household and city wastes.

While the wastes generated in the health facilities include cultures, stocks of infectious agents, pathological, blood and other fluids, sharps, surgery and laboratory wastes, wastes from food preparation, radioactive wastes, wastes from dialysis procedures, biological wastes, cardboard, paper documents and discarded linens. Between 75 and 90 % of the waste produced by health-care facilities is non-risk or general health-care waste, which is comparable to domestic waste, while about only 25 % is regarded as hazardous and may create a variety of health risks (WHO, 2005).

Waste generation source, categorization, quantity and quality are the key issues to decide an effective medical waste disposal practice (Adnane,2013). The Health workers in the surveyed HCFs had adequate knowledge of the various categories of the wastes generated.

Two-third of all the respondents rightly categorizes both the general and infectious waste which thus leads to proper segregation of the waste. A further analysis indicates that higher number of nurses rightly identified items that constitute MW more than other profession. The justification for this observation was witnessed during the in-depth interview sessions, where nurses displayed higher knowledge about the medical waste categorization than others. This is due to the fact that they go for more training, both in-house and those organized outside their facilities on hospital waste management and also with the inclusion of the capacity building sessions.

In general, respondents are aware of the fact that medical waste can be generated during diagnosis, treatment, medical research, given the high proportion of respondents who provided the right answer to an enquiry on this issue.

Segregation of medical waste using the color code is key to achieving a thorough medical waste disposal. In the study 98% of respondentsshowedknowledge ofthe segregation of medical waste at the point of generation. This is in consonance with the findings of Asadullah, et al. (Asadullah, 2013) which indicated that 90.4 % of respondents were of the view that segregation of waste should be at the point of generation. It is vital to note that medical waste segregation is invaluable in reducing the hazard associated with medical waste. This is achieved by the use of colour coded or labeled containers to encourage effective separation infectious waste from general waste.

Less than a quarter of the respondents don't use safety boxes for sharp disposal and this is in agreement with the regulation of WHO which ensures that the sharps are properly secured and do not fall out of the container and it should only be three-quarters filled prior to disposal [30].

A high percentage of respondents understand color codes for identification of waste and this indicates their level of understanding which is essential in appropriatedisposal of medical waste. This is also consistent with the findings of Abdullah and Al- Mukhtar in 2013 where about 79.2 % of the respondents uses color coding for proper identification, however a contraryfinding was noted in 2005 by Al-Khatib and Joshua et al in Zaria. where none of the HCFspractice color coding for separation of waste. (Abdullah & Al-Mukhtar, 2013, Al-Khatib et al , 2005).

Majority of the health workers were in agreement that General MW should be put in black containers (86.1%), Red colored waste container is for highly infectious MW (88.3%), Lead box is used for collecting

radioactive waste (68%). There was satisfactory knowledge of color coding of wastes which is an essential factor for the proper waste disposal practice. Proper segregation is achieved by making use of actual colored containers or colored liners to effectively separate infectious waste from general waste. WHO, 2006. The World Health Organization proposed that HCFs should provide plastic bags or plastic bins for medical wastes and they should have different color indicators namely, Black, Yellow and Red for general, infectious and highly infectious waste respectively. Bags and containers for highly infectious waste should be marked with Biohazard symbol (Pruss et al, 1999). The use of a brown indicator is also encouraged by WHO for pharmaceutical waste especially expired drugs but this is seldom used in HCFs. Health workers with good knowledge of medical waste disposal are 20 times more likely to have good practice than those with poor knowledge. Therefore, there is a significant association between the knowledge of healthcare workers and MWD practices in the selected HCFs.Medical wastes generated in hospitals are collected on a daily basis and transported to a temporary storage center within the hospital. 31.1% of the respondents reported that waste is evacuated from the facility daily, 23% said twice weekly, 23.9% reported thrice weekly.Domestic staff and waste handlers are responsible for collection of the medical wastes from the wards to the on-site storage in all the hospitals.

As important as personal protective equipment is to all medical waste handlers, the respondentsshowed over 74% use PPEs. majority (98.6%) of the respondents wear hand gloves, 92.2% wear face masks, 33% wear safety boots, 30.7% wear cover-alls while 24.9% wear safety goggles. This is consistent with the recommended standard by WHO which requires the use of heavy duty gloves, boots and apron when handling waste (Pruss et al, 1999). A study which was carried out in Tehran University by Dehghani et al in 2008 reported the importance of compliance with WHO standard by using the complete personal protective wear. Safety shoes or industrial boots should also be encouraged because they help to protect the feet against the risk of sharp being accidentally dropped, thereby causing a prick. There is need to properly equip and educate those in charge of on-site waste handling, given the great danger associated with this task. The use of adequate and complete protective clothing is very vital.

The study also noticed other reasons for poor MWD practices in the HCFstoinclude lack of definite policies, lack of budget allocation, lack of guiding rules and regulations and lack of implementation.

V.   Conclusion

Despite the challenges associated with MWD especially the lack of policies and regulations as stipulated by WHO. There is little progress in the proper disposal of medical waste in Owerri Municipal because of the following: The MWD practices in the various HCFs studied are similar except for hospital Awhere the medical waste is collected and segregated. This system is in congruence with WHO specifications however; uniformity in MWD practices should be ensured in all hospitals. The level of knowledge among the workers corresponds to improved practice however; continuous training of the hospital staff on MWD is encouraged.

Policies and guidelines should be established in all the three tiers of government (federal, state and local government) as mandated so as to improve waste disposal practices in the state and region. M

Abbreviations
HAI: hospital acquired infection
*HBC:*hepatitis C virus
*HBV:*hepatitis B virus
*HCF:*healthcare facility
*MW:*medical waste
*MWD:*Medical Waste Disposal
*WHO:*World Health Organization

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Acknowledgements

Tables and Figures

Table 1: Demographic characteristics of the respondents

	Frequency	Percent
Sex		
Male	87	28.2
Female	222	71.8
Age		
<21	11	3.6
21 - 30	85	27.5
31 - 40	106	34.3
41 - 50	76	24.6
51 - 60	31	10.0
Marital Status		
Single	85	27.5
Married	224	72.5
Designation		
Doctor	35	11.3
Nurse	133	43.0
Pharmacist	7	2.3
Laboratory scientist	55	17.8
Record	4	1.3
Health attendant	59	19.1
Orthopedics	2	0.6
Physiotherapist	3	1.0
Clerical	3	1.0
Prosthetist	3	1.0
Clinical assistant	3	1.0
Biochemist	2	0.6

Qualification		
Consultant	16	5.2
Senior registrar	14	4.5
Registrar	7	2.3
House officer	12	3.9
RNO	29	9.4
Intern	40	12.9
Mid wife	44	14.2
Other health workers	147	47.6
Department		
Clinic	130	42.1
Theatre	42	13.6
Ward	55	17.8
Lab	57	18.4
Pharmacy	12	3.9
Physiotherapy	3	1.0
Health Records	10	3.2
Years of experience		
<6	121	39.2
6 – 10	72	23.3
11 – 15	72	23.3
16 – 20	26	8.4
> 20	18	5.8
Years of employment in the selected facility		
<6	145	46.9
6 – 10	83	26.9
11 – 15	50	16.2
16 – 20	18	5.8
> 20	13	4.2

Table 1 shows that there were more female respondents (71.8%) than males (28.2%). More than half of the respondents (65.4%) are less than 40 years of age while 72.5% of them are married. Their major designations include: nurse (43%), Health attendant (19.1%), Laboratory scientist (17.8%) and doctor (11.3%). Their qualifications include consultant (5.2%), senior registrar (4.5%), registrar (2.3%), house officer (3.9%), RNO (9.4%), Intern (12.9%), mid wife (14.2%) and other health qualifications (47.6%). Many of the respondents were from the following departments: clinic (42.1%), theatre (13.6%), ward (17.8%), Lab (18.4%), pharmacy (3.9%), physiotherapy (1%) and health records (3.2%). The table shows that 39.2% of the respondents have less than 6 years of experience, 46.6% have 6 to 15 years of experience, 8.4% have 16 to 20 years of experience while 5.8% have more than years of experience. More than half of the respondents (73.8%) have less than 10 years of experience.

Table 2: Types of medical waste

	Frequency	Percent
Infectious Waste (anything contaminated)	212	68.6
Sharp Waste (e.g needles, broken glass and razor)	251	81.2
Pathological Waste (human tissue, body parts, blood and body fluids)	169	54.7
Pharmaceutical waste: unused and expired drugs, creams, pills and antibiotics	137	44.3
Genotoxic waste	84	27.2
Radioactive waste	69	22.3
Chemical wastes	92	29.8
General waste is all other non-hazardous waste	230	74.4
Are Dumpsters provided in the hospital	274	88.7
1 – 5	29	10.6
6 – 10	32	11.7
11 – 15	54	19.7
16 – 20	59	21.5
21 – 25	66	24.1
≥25	34	12.4
Are they Colour coded?		
Yes	228	83.2
No	46	16.8

Table 2 shows that the most common medical waste generated in the hospital is Sharp Waste (81.2%), followed by General waste (74.4%), Pathological Waste (54.7%) and pharmaceutical waste (44.3%) in that order. Other waste includes Genotoxic waste (27.2%), Radioactive waste (22.3%) and Chemical waste (29.8%). The table shows that majority of the respondents (88.7%) reported that dumpsters are provided in the hospital. Most of them (65.3%) reported 11 to 25 dumpsters provided and that the dumpsters are colour coded (83.2%).

HYPOTHESIS TESTING

Ho1: There is no significant association between the knowledge of healthcare workers and MWD practices in the selected hospitals in Owerri

Table 5: Association between the knowledge of healthcare workers and MWD practices in the selected hospitals in Owerri

Practice	Knowledge		P value	OR	95% C.I for OR
	Good n (%)	Poor n (%)			
Good	256 (89.5)	7 (30.4)	< 0.001	19.505	7.428 – 51.214
Poor	30 (10.5)	16 (69.6)			

Table 5 shows a significant association between the knowledge of healthcare workers and MWD practices in the selected hospitals in Owerri (p < 0.001, OR = 19.505, 95% C.I = 7.428 – 51.214). Health workers with good knowledge of medical waste disposal are 20 times more likely to have good practice than those with poor knowledge. The null hypothesis is hereby rejected and the alternative accepted. Therefore, there is a significant association between the knowledge of healthcare workers and MWD practices in the selected hospitals in Owerri.