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HEALTH WORKERS' KNOWLEDGE AND ATTITUDE TOWARDS HEALTHCARE WASTE (HCW) MANAGEMENT IN THE FEDERAL MEDICAL CENTRE, UMUAHIA

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Abstract

Purpose: To enhance the management of healthcare waste and prevent injuries and the spread of diseases, healthcare workers must have appropriate knowledge of sustainable Health Care Waste Management (HCWM) techniques. This study assessed the knowledge and the attitude of health professionals in the Federal Medical Centre, Umuahia, towards Health Care Waste Management (HCWM).

Methodology: A structured questionnaire was used to conduct a cross-sectional survey of 319 participants, yielding 313 responses.

Findings: From the result, it was deduced that the health workers' knowledge of HCWM was satisfactory; 82.7% had knowledge of the World Health Organization (WHO) recommended standards on HCWM. However, the result also showed that 59.40% of the respondents had not received any training on HCWM in recent years. In terms of their attitude, their responses to questions suggest they have a positive mindset towards their role in HCWM. 85.90% of the health workers practised waste collection by utilizing colour-coded containers and plastic bags. The utilization of other segregation methods was measured, recording mean exceeding the acceptable mean score of 2.5 except for coloured-coded containers (2.08) and plastic bags (2.05). The practice of self-protection from risk was evaluated by determining respondents' use of personal protective equipment (PPE) during waste handling. The recommended PPEs were always in use, excluding the safety goggles.

Unique contribution to theory, practice and policy: The study calls for continuous supportive supervision and capacity building (training) among the health workers to ensure effective HCW

practice and sustainability. The hospital administration needs to enforce strict biomedical waste management regulations.

Keywords: *health care waste, waste management, health workers, medical waste*

Introduction

Healthcare wastes are potentially dangerous and polluting, and their safe management and disposal is a matter of continuing public health concern. Although not a high-volume waste stream, it is challenging to manage due to its potential risks such as the transmission of infection, sharps injury, and long-term environment impact, from products such as pharmaceutical and chemotherapy treatments. According to WHO (2018) and Padamanabhan and Barik (2019), environmental risks such as contamination of drinking, surface, and groundwaters due to disposal of untreated healthcare wastes in landfills, and open dumpsites; release of pollutants into the air and others can arise from poor disposal of HCW. Unfortunately, waste management oversights continue to occur at every point of the disposal process. Bearing all this in mind, adequate knowledge of proper healthcare waste handling and management is critical for the health worker. According to both the Conference of the Parties to the Basel Convention on the Control of Trans-boundary Movements of Hazardous Waste and their Disposal's Technical Guidelines on Environmentally Sound Management of Biomedical and Health-Care Waste (2002) and WHO (2018), health-care waste is classified into Hazardous healthcare waste and non-hazardous healthcare waste. Hazardous consists of Infectious waste, sharps waste, pathological waste, pharmaceutical waste, cytotoxic waste, chemical waste and radioactive waste. Non-hazardous waste, on the other hand, is waste that poses no significant biological, chemical, radioactive, or physical threat.

Training and equipping of health-care staff are crucial in the efforts to minimize the spread of secondary infections. The health worker is the first point of contact for healthcare waste and is most often the generator, hence the need for adequate knowledge of sustainable and accurate waste management techniques is essential. Knowledgeable staff can also help patients and visitors to understand their role in maintaining good hygiene; to become more responsible for the wastes they produce and prevent occupational and public health exposures to the hazards associated with health-care waste (Mondal & Satyanarayana, 2018). Considering the numerous threats posed by inadequate management of healthcare waste, the health worker has need to know the exact procedure to follow to ensure proper collection, storage, and disposal of health care waste. The World health Organization listed inadequate training in proper waste management and lack of awareness about the health hazards related to health-care waste as two major reasons for the failure of waste management amongst others that include, absence of waste management and disposal systems, insufficient financial and human resources and the low priority given to the topic (WHO, 2018).

The WHO has established the procedure for the adequate management of waste which is adopted by all countries with some improvements made by the developing and more developed economies. The World Health Organization (2017) recommends segregation, collection, transportation, treatment, and disposal as the protocol to follow for adequate healthcare waste management to increase efficiency, decrease the cost-of-service delivery and protect the health of the health worker, patient and safeguard the environment. Segregation is recommended to begin with the healthcare provider and/or patient and caregiver who produces each waste item, use of labelled waste containers during segregation to identify the source, keep track of the types and quantities of waste produced in each area. In Nigeria, the guideline for managing healthcare waste is stipulated in the 2013 National healthcare waste management policy.

Many studies have shown a gap in appropriate management of the waste class in most developing countries. Awodele et al., (2016), Abah and Ohimain (2011), Adeoye et al., (2018), and Sapkota et al., (2014) all demonstrated the need for improvement in waste management practises in their study areas. A number of studies have also been undertaken to assess the knowledge and attitude of health workers towards healthcare waste management in a number of health facilities in Nigeria (Okechukwu et al., 2013; Uchechukwu et al., 2017), however none has been conducted at the Federal Medical Centre Umuahia, Abia State. As such, the aim of this research was to assess the knowledge and attitude of health professionals in FMC, Umuahia towards HCW management as well as determine the level of usage(practice) of recommended HCW management techniques.

Materials and methods

Description of study area

The Federal Medical Centre is one of the three tertiary hospitals in Abia State. It is in the heart of Umuahia in Abia State; it is situated in the South-eastern part of Nigeria. It is comprised of departments such as Emergency, Ear, Nose and Throat (ENT), Maternity section, Oncology amongst others. Within its premises is the NSIA Umuahia Diagnostic Centre (NUDC) (Federal Medical Centre [FMC] Umuahia, 1991).

Figure 1: Entrance view of the study area

Study design and data collection

This cross-sectional descriptive study quantitatively explored the knowledge and attitude of health workers in Federal Medical Centre Umuahia towards healthcare waste management. Data was collected primarily using a structured questionnaire. Per data from the human resource department, the clinical staff strength is as follows: 518 nurses, 20 physiotherapists, 15 orthotists and prosthetists, 30 laboratory scientists/technicians, 30 record staff, 20 dieticians, 41 pharmacists, 18 environmental health officers, 60 hospital attendants, and 413 doctors, making a total of 1,165. Assuming a confidence level of 95%, a population proportion of 0.5 and an error margin of 0.05, the sample size was determined to be 290 using the Raosoft sample size calculator. A 10% attrition rate was factored in, resulting in a sample size of 319. Using the percentage representation of healthcare workers, the number of respondents to be sampled in each group was obtained as follows. 113 doctors, 142 nurses, 11 pharmacists, 6 physiotherapists, 6 dieticians, 4 orthotists and prosthetists, 8 laboratory scientists, 5 environmental health officers, 16 hospital attendants, and 8 record staff. The data collection tool employed in this study is a structured questionnaire. The questionnaire was developed by studying previous research and the WHO's recommendation assessment tool (Basel Convention, Secretariat & World Health Organization, 2005). It is comprised of 2 parts, namely the socio-demographic section (Section A) and healthcare waste management practices (Section B to Section F). Copies of the questionnaire were distributed to health workers to collect primary data on existing health waste management practices, such as the mode and frequency of waste collection, the availability of waste management resources, and the challenges of managing waste disposal in the sampled hospital. The research instrument was self-administered to the respondents in the health facility and collected as agreed upon. Of the 319 copies of the questionnaire shared, 313 were retrieved. Simple random sampling by balloting with replacement was adopted in the sampling of respondents.

Data Analysis and presentation

Data regarding the demographic information of respondents and the current situation of healthcare waste management practices were extracted from the questionnaire. The Microsoft Office Excel and Statistical Package for Social Sciences (SPSS version 21.0) programmes were used to analyze the data. Frequencies, percentages, means, and standard deviations were presented in tables and charts.

Results

Table 1 summarizes the sociodemographic characteristics of the cross-sectional health survey participants. 218 (69.6 percent) of the 313 respondents were female, while 95 (30.4 percent) were male. The results indicated that the majority of health workers (35.8%) were between the ages of 30 and 39, and a significant proportion (51.4%) had less than ten years of experience as health workers.

Table 1: Socio-demographic characteristics of the health workers (N=313)

Variables	Frequency	Percentage
Age range		
Less than 30	43	13.7
30-39	112	35.8
40-49	82	26.2
50 and above	76	24.3
Gender		
Male	95	30.4
Female	218	69.6
Designation		
Doctors	73	23.3
Nurses	127	40.6
Others	113	36.1
Marital status		
Never married	120	38.3
Married	170	54.3
Others	23	7.3
Years of experience		
Less than 10 years	161	51.4
10 years and above	152	48.6

Source: Field survey, 2020

Knowledge of HCW Management among respondents

The results in Table 2 show the level of knowledge on healthcare waste management among the study hospital's health workers. The findings on all the variables examined are as follows: knowledge on the importance of healthcare waste management (2.88), comprehend colour coding for HCW (2.66), use of different labelled puncture proof plastic containers for collection of infectious and non-infectious waste (2.94), use of gloves during waste handling (2.92), heard of segregation in HCW (2.72), use of waste bins (2.91), comprehend segregation in HCW (2.35) and infectious waste treatment before disposal (2.35).

Table 2: Knowledge of Healthcare Waste management among respondents

Responses	Yes (3)	I don't know (2)	No (1)	Total	Mean
Healthcare waste management is important.	287(861)	20(40)	6(1)	902	2.88
Understand what HCW all is about.	255(765)	16(32)	42(42)	839	2.68
Know the colour coding for HCW.	252(756)	32(48)	29(29)	833	2.66
Different labelled puncture proof plastic containers for collection of infectious and non-infectious waste.	269(807)	35(105)	9(9)	921	2.94
Infectious wastes are treated before disposal.	165(495)	94(188)	54(54)	737	2.35
Use gloves during handling of waste.	298(894)	5(10)	10(10)	914	2.92
Heard of segregation in HCW.	252(756)	34(68)	27(27)	851	2.72
Understand segregation in HCW.	134(402)	156(312)	23(23)	737	2.35
Use of waste bin.	299(897)	0(0)	14(14)	911	2.91
Have knowledge on WHO standard on safe HCWM.	259(777)	0(0)	54(54)	831	2.65

Acceptable mean (X) = 2.0,
Figures in parenthesis are the Likert frequencies

Awareness of hospital healthcare waste management plan

Table 3 displays the knowledge of the respondents on vital information concerning waste management in the study hospital. A greater percentage of the health workers had adequate knowledge of all the variables assessed. 89.5% were aware of the presence of safety instructions about HCW, 74.1% affirmed that they had access to the HCWM guideline document, and 73.2% admitted the existence of a written policy on HCWM.

Table 3: Awareness of hospital healthcare waste management plan

Responses	Yes	No
Have safety instructions about HCW at workplace.	280(89.5)	33(10.5)
Have access to guideline document on HCWM.	232(74.1)	81(25.9)
Have written policy on HCW management in workplace.	229(73.2)	84(26.8)
Have knowledge on WHO standard on safe HCWM.	259(82.7)	54(17.3)
Provision of site waste management.	285(91.1)	28(8.9)

Figures in parenthesis are the percentage values

Training on Healthcare waste management

The number of respondents who have received training on healthcare waste management is depicted in Figure 2. As can be observed, a higher proportion of workers (59.40 percent) have never received training in healthcare waste management.

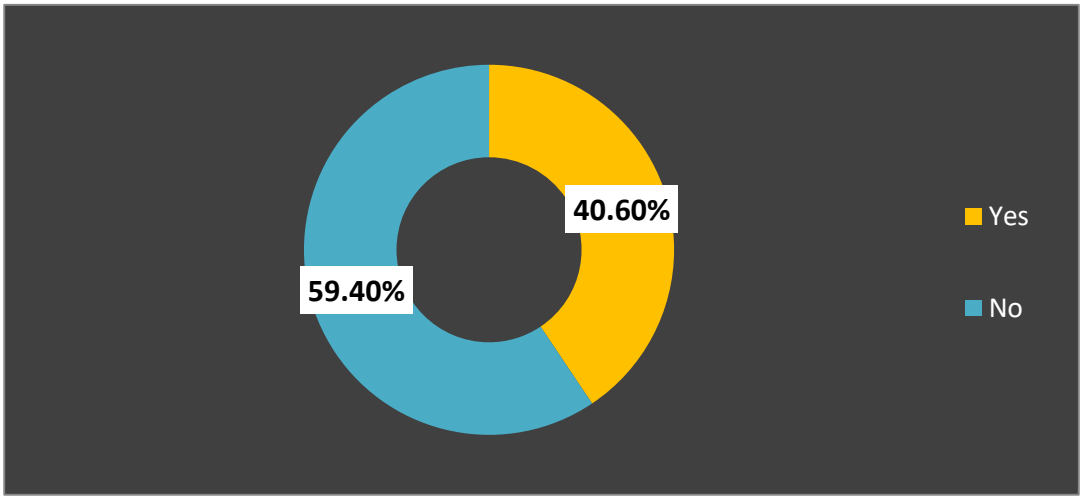

Figure 2: Distribution of respondents according to training on HCW management

Practice of waste segregation into infectious and non-infectious

Table 4 summarizes the availability and application of various recommended waste segregation methods. The 4-point Likert scale analysis of the level of use of segregation methods for HCW management as reported by health workers in FMC revealed that puncture-proof containers (3.90) and conveyors (3.58) were the most frequently used mediums for HCW segregation, whereas colour-coded bags (2.08) and plastic bags (2.05) had a mean less than 2.5, indicating that they were insufficiently used. Figure 3 shows a visual presentation of the findings.

Table 4: Utilization of HCW Segregation Methods

Responses	AU	SU	RU	NU	Total	Mean
Puncture proof container	295(1180)	11(33)	2(4)	5(10)	1222	3.90
Coloured waste containers	140(560)	10(30)	0(0)	163(163)	333	1.06
Conveyor	250(1000)	8(24)	43(86)	12(12)	1122	3.58
Plastic bag	151(453)	11(33)	2(6)	149(149)	641	2.05
Colour-coded container/bag	109(436)	2(6)	8(16)	194(194)	652	2.08

Acceptable mean (X) = 2.5, Figures in parenthesis are the Likert frequencies
AU= Always Used, SU = Sometimes Used, RU = Rarely Used and NU= Never Used

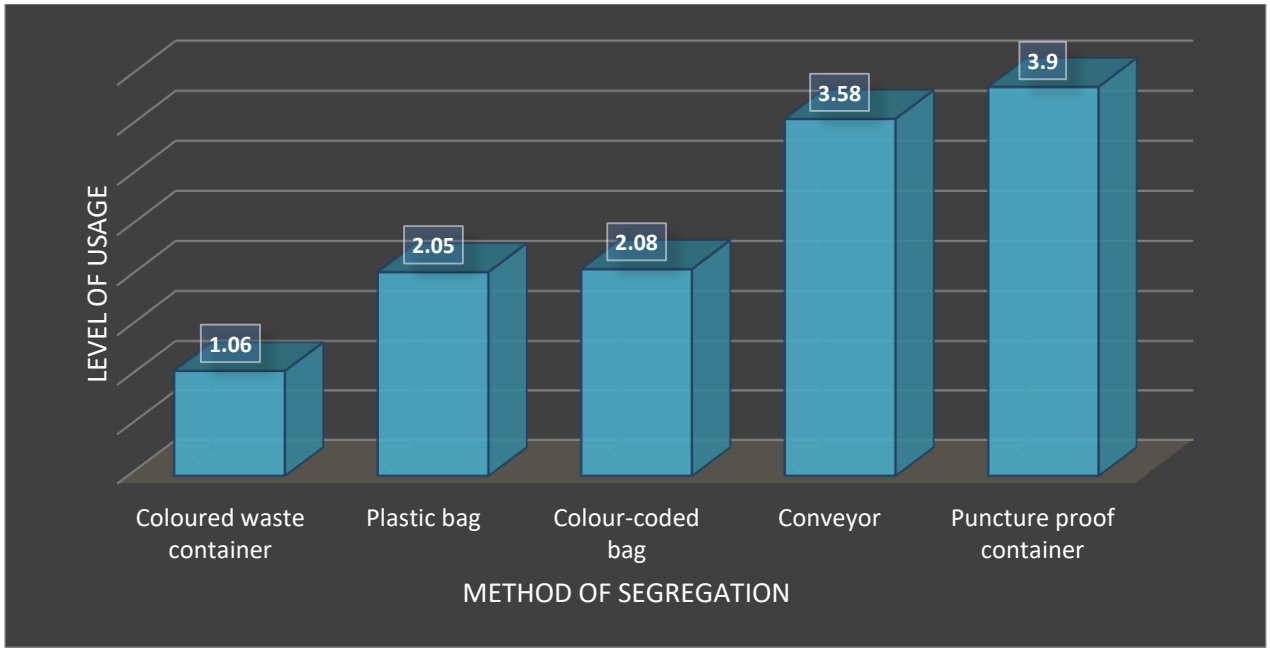

Figure 3: Use of various segregation methods in the health facility.

The practice of waste collection using colour-coded containers and plastic bags for HCW collection

The distribution of respondents in Figure 4 is based on their use of color-coded containers and plastic bags for HCW collection. The study discovered that more than half of health workers (85.90%) collected HCWs using color-coded containers and plastic bags, as opposed to the few (14.10%) who did not.

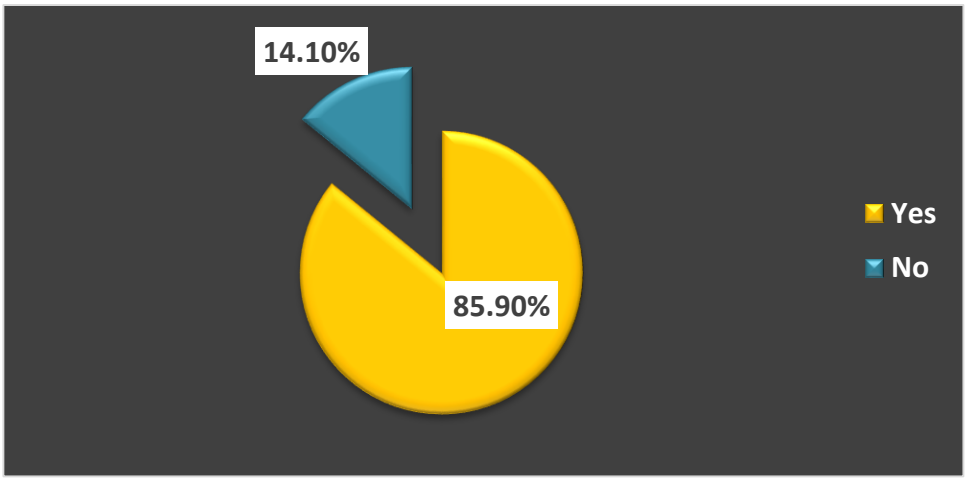

Figure 4: Distribution of Respondents according to the use of colour-coded Containers and plastic bags for HCW Collection

Attitude of Respondents towards HCW Management

The result on the attitude of respondents towards HCW management at FMC, Umuahia is shown in table 5. The results indicate that 63.55% of the respondents agreed that safe management of HCW is an issue (1.38). Nonetheless, their attitude towards HCW management being the sole responsibility of orderlies and cleaners was indifferent (1.90). Almost all the respondents (90.42%) disagreed when asked whether HCW management is not their concern (1.17). They were, however, in agreement (had a mean score greater than 2.0) and willing to participate in a voluntary program to improve their knowledge of HCW (2.90), an incinerator should be installed in a hospital for HCWM (2.92), and everyone is at risk of HCW (2.80).

Table 5: Attitude of Respondents towards HCW Management

Responses	Agree	Indifferent	Disagree	Total	Mean
Safe management of HCW is not an issue.	4(12)	110(220)	199(199)	431	1.38
HCW management is the sole responsibility of orderlies and cleaners.	7(21)	268(536)	38(38)	595	1.90
HCW management is not my concern.	26(78)	4(8)	283(283)	369	1.17
Willing to attend voluntary programme to upgrade my knowledge on HCWM.	291(873)	13(26)	9(9)	909	2.90
Incinerator should be set up in hospital for HCWM.	298(894)	5(10)	10(10)	914	2.92
Everybody is at risk to HCW.	279(837)	6(12)	28(28)	877	2.80

Acceptable mean (X) = 2.0
Figures in parenthesis are the Likert frequencies

Usage of Personal Protective Equipment for waste management

The result on the level of usage of PPE for waste management among waste handlers in FMC is shown in Table 6. The result showed that all personal protective equipment (PPE) such as heavy-duty gloves (3.93), protection clothes (4.05), safety shoes (4.12), apron (3.84), face mask (3.98) and head cap (2.90) were in use and recorded mean score above 3.0 except eye goggles (2.36) that were rarely in use with a mean score below 2.5

Table 6: Level of Usage of PPE for waste management among waste handlers

Usage	AU	SU	RU	NU	Total	Mean
Heavy duty gloves	295(1180)	16(48)	0(0)	2(2)	1230	3.93
Protection clothes	298(1237)	7(21)	3(6)	5(5)	1269	4.05
Safety shoes	289(1228)	18(54)	2(4)	4(4)	1290	4.12
Eye goggles	55(220)	16(48)	230(460)	12(12)	740	2.36
Apron	286(1144)	16(48)	0(0)	11(11)	1203	3.84
Mask	307(1228)	6(8)	0(0)	0(0)	1246	3.98
Head cap	42(168)	237(711)	2(4)	32(32)	915	2.90

Acceptable mean (X) = 2.5
Figures in parenthesis are the Likert frequencies
UA= Always Used, SU = Sometimes Used, Rarely Used and NU= Never Used

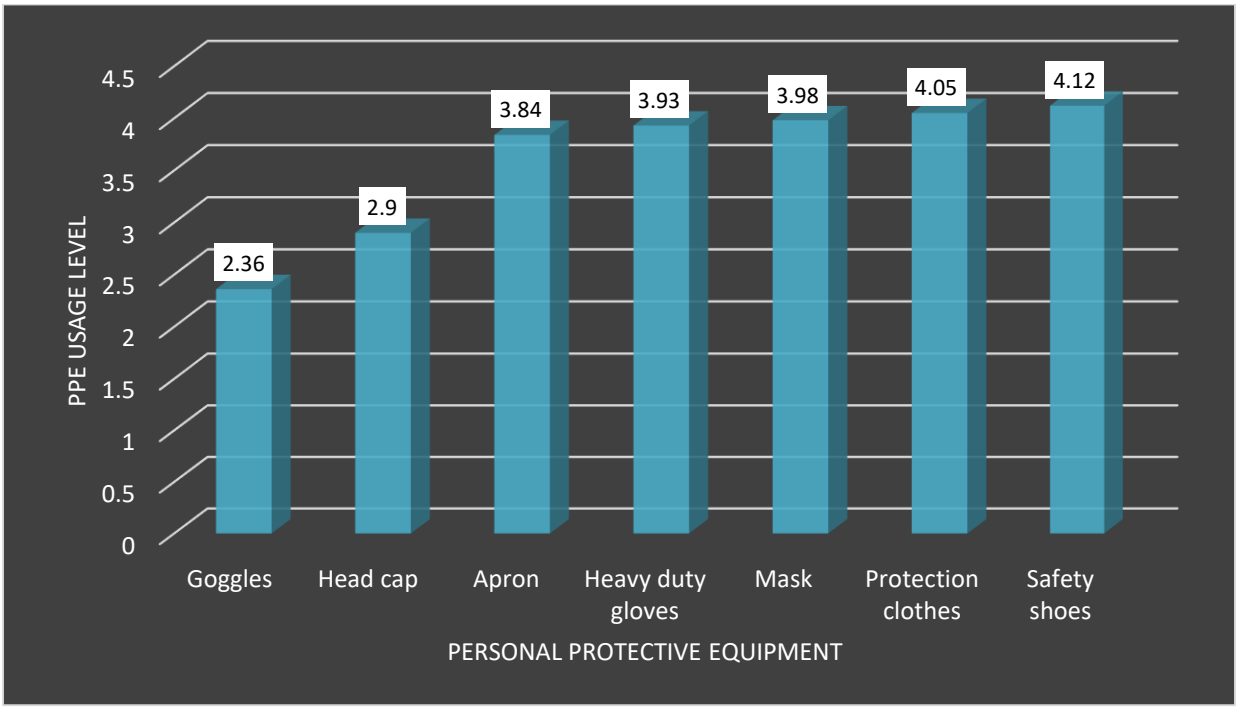

Figure 5: Level of usage of Personal Protective Equipment (PPE)

Discussion

In this study, recruited healthcare workers were assessed on their knowledge, attitude and practice of healthcare waste management. Overall, the respondents had good knowledge of HCW management. Although, all the variables that were used to measure knowledge had mean scores above 2.00, concerning their understanding of waste segregation, the percentage of health workers who were unsure and responded positively was 49.84% and 42.81%, respectively. This showed that the respondents had deficient knowledge of the variable. This contrasts with the studies of Adogu et al., (2014) and Maluni et al., (2018), who found that a greater percentage of their respondents had high knowledge of waste segregation. The respondents also affirmed the availability of a waste management plan and policy. This result is similar to the study of Uchechukwu et al., (2017) in a tertiary hospital in Enugu, Nigeria.

It was disheartening to note that over half of the respondents (59.40%) did not have any training on HCW management. Uchechukwu et al., (2017) and Kuchibanda and Mayo (2015) had similar results and also noted that younger health workers did not seem to be interested in waste management or acquiring training in it. The same was reported by Mugabi et al., (2018) at a tertiary hospital in Botswana where training and awareness of recycling of medical waste had a low score. Mane et al. (2016) reported that only 16.3% of participants in their study had received any training in healthcare waste management (HCWM), which is consistent with the study findings. Kumar et al., (2015) and Al-Khatib (2014) noted that training on HCW management is considered critical to the success of any waste management programme as it improves the knowledge of health workers, boosts their cooperation with HCW programmes and influences their practices of HCW management. Most responders also expressed an interest in attending programs aimed at improving their understanding of HCWM.

Segregation of health-care waste at the source of generation is key to achieving a sound HCWM as it ensures better handling of the infectious components of this waste (Onoh et al., 2019). The respondents indicated the use of puncture-proof containers and conveyors (3.58) as mediums for the segregation of HCW in the study hospital. This was consistent with the results from a study in India where 96.9% of respondents agreed that waste should be segregated (Mane et al., 2016). According to Adogu et al., (2014), the use of different color-coding bags for segregation is one of the most important parts of healthcare waste management rules, yet this study found that coloured waste containers, plastic bags, and colour-coded bags were insufficiently utilized. This is against the findings of Mugabi et al., (2018), who observed a high level of practice and use of a colour-coding system in the hospital under study for waste segregation. 85.9 percent of the respondents indicated that waste collection was undertaken using plastic bags and colour-coded bags. The World Health Organization (2005) documented that the use of a colour coding systems

aims at ensuring an immediate and unequivocal identification of the hazards associated with the type of HCW that is managed or treated.

Attitude towards HCWM was fair, a greater number of the respondents (89.13%) agreed that HCW was a source of risk to everyone, including them. It has been shown that health workers are more likely to be cautious and take necessary measures when they realize that HCW poses a risk (Yenesew et al., 2012). They also affirmed that they have a role to play in HCW management. However, over half of the health workers were indifferent when asked whether HCWM was the sole responsibility of cleaners or designated staff. This shows a poor attitude towards the need for health professionals to be involved in HCW management.

As regards the use of personal protective equipment during waste handling, all PPEs recommended were always used except the eye or safety googles. The respondents pointed out that eye goggles were not sufficiently provided by the hospital administration, hence their inability to use them when required. Similar findings were also reported by Mugabi et al. (2018) and Deress et al. (2019). Although Deress et al., (2019) noted comparable results, they observed that the PPE rarely used by workers during waste handling is the safety boot.

Conclusion

Interestingly, the study found high knowledge of HCW management among the health workers, although with a low number of trained workers on HCWM. As emphasized by the World Health Organization, training and continuing education are integral parts of the health-care waste management system. Staff training leads to a more informed workforce, which is the foundation for achieving higher standards of infection control. When healthcare personnel are properly sensitized to the importance of waste management, they become advocates for best practices and help to improve and sustain a good waste management system.

The attitude towards the practice of HCWM among the health workers, including the use of PPE, was satisfactory. However, there is a need to make sufficient provision of PPEs, for instance the eye goggles, which respondents said were inadequate. The study calls for continuous supportive supervision and capacity-building (training) among the health workers to ensure effective HCW practice and sustainability. Intensifying training and continuous support for all health workers with an emphasis on the implications of proper HCW management on costs and risks to human and environmental health should be a paramount goal. More so, refresher training on HCW management is important for already trained personnel in promoting proper HCW practices among health workers. In addition, strict implementation of biomedical waste management rules must be enforced by the hospital management. More attention should be directed at healthcare attendants to close the yawning gap in their knowledge and practice of medical waste management.

Disclosure of conflict of interest

None.

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