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Factors Influencing Adherence to Hazardous Waste Management Policy Frameworks among Health Workers in Private Hospitals in Nairobi County – Kenya

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Abstract

Purpose: This study, therefore, sought to investigate the factors influencing the adherence to hazardous waste management guidelines among healthcare workers in private hospitals in Nairobi County. The specific objectives of the study included; determining the level of adherence to proper HCWM practices among health workers, identifying the individual related factors that influence adherence to proper HCWM practices among health workers, and identifying the health facility-related (institutional) factors that influence adherence to proper HCWM practices in 4 selected hospitals in Nairobi County Kenya. From the population of 900 healthcare workers from 4 levels 4 facilities, random sampling was applied to identify the 90 respondents.

Methodology: Data analysis and reporting was done using appropriate quantitative methods.

Findings: The findings from this study show that the level of adherence to hazardous waste management policies among healthcare workers in private level four hospitals in Nairobi County is low. Despite the high level of awareness by the health workers on the important measures of collection, segregation, treatment, transportation and disposal of waste, the level of performance on the same is low. This is greatly attributable to negligence and unfavorable attitude towards healthcare waste management practices among healthcare workers.

Unique contribution to theory, policy and practice: Based on the study findings, we would recommend the improvement of hazardous waste management efficiency.

Keywords: *Hazardous Waste Management Guidelines, Individual Related Factors, Institutional Factors and Health Workers*

Introduction

All the wastes generated within laboratories conducting medical procedures, research centers, and healthcare facilities, in addition to the waste originating from home-based healthcare services are referred to as healthcare wastes (HCW),(Muluken et al., 2014). HCW is considered hazardous when it consists of one or more of the following characteristics: contains infectious agents; it is genotoxic; contains toxic or hazardous chemicals or pharmaceuticals; is radioactive, and contains sharps (Ferreira & Teixeira, 2010). According to World Health Organization(WHO),hazardous wastes from healthcare and medical facilities cause over 250,000 HIV infections, 2 million hepatitis C virus (HCV) infections, and 21 million hepatitis B virus (HBV) infections globally (WHO, 2018).WHO further reports that if hazardous wastes are not properly managed, the risk of new infections could even be higher than the current status; HBV (30% of all new infections), HCV (39% of all new infections), and HIV (4% of all new infections) (WHO, 2018).

Waste management is defined as all the activities and actions needed to dispose of waste from its inception to its final disposal. Healthcare waste management HCWM involves the collection, segregation, treatment, transportation, and disposal of wastes (Hossain et al., 2018).It also involves the supervision of these operations and aftercare of disposal to ensure the wastes do not cause harm to persons (Snr et al., 2021).This study investigates the factors that influence the proper management of healthcare wastes to prevent these harmful effects of hazardous wastes.

Globally, United Nation Environmental Program, estimates that the amount of healthcare waste generated in health facilities, nursing homes, and research institutions will quadruple by the year 2025(UNEP,2020) This is attributed to increasing technological advancement and population, leading to expansion of research and healthcare institutions; hence, increasing amounts of wastes generated. UNEP (2020) further reports that over 1.5 million people die each year from healthcare waste-related diseases from hospital wastes consisting of hazardous substances. WHO reports that 80% of medical wastes are non-hazardous while the remaining percentage; hazardous (15% infectious, 5% sharps (1%) toxic chemicals, pharmaceuticals (3%), genotoxic, and 1 % radioactive waste) (WHO, 2018).However, the global figures are not consistent with many low-and-middle-income countries, for instance, 26.5% of the waste produced in Nigeria Abah & Ohimain, (2011)and 25% in Pakistan ,Ali et al, (2016) are hazardous. More than half of waste generated in Kenya is also considered hazardous due to poor waste management practices within healthcare facilities (Abah&Ohimain, 2011). According to a mini-review by Ali et al .,(2017), most low-and-middle-income countries have poor waste-segregation practices and limited safe waste disposal systems, leading to more than 50% of the wastes generated being considered infectious. Nwachukwu et al., (2013) discussed that health care industries in Low- and Middle-income countries and especially sub-Saharan African countries are faced with enforcement and compliance as their biggest challenges, in addition to fraud and tender irregularities in Health care waste management (HCWM).

According to a study done by Fazzo et al.,(2017), hazardous wastes promote various types of cancer when exposed to elements from expired chemicals or mercury; can negatively influence the

development of fetuses, and can also cause damage to the nervous system. Other than the threat that hazardous wastes have on human health; they can also cause a serious threat to the environment. WHO, (2020) reported that the disposal of untreated health care wastes in landfills can lead to the contamination of drinking, surface, and ground waters if those landfills are not properly constructed? The treatment of health care wastes with chemical disinfectants can result in the release of chemical substances into the environment if those substances are not handled, stored, and disposed of in an environmentally sound manner (Awad et al., 2018).

In Kenya, a report by World Bank-funded Health Sector Support project on healthcare waste management (HCWM) stated that the level of HCWM performance by healthcare facilities was 14% (policies and procedures - 5.6%, management and oversight -16.2%, logistics, and budget - 20%, training and occupational health -20%, and treatment and infrastructure - 9.4%)(World Bank Project, 2020). Additionally, a survey done in 5 private healthcare facilities in Kenya found that none of the institutions had an HCWM strategic plan and only 1 had a waste management officer who headed the waste management team and conducted surveillance on waste handling within the facilities (Marege, 2014). Moreover, another research on HCWM practices in private healthcare facilities concluded that all the waste generated within the institutions was rendered hazardous because of inadequate waste segregation and therefore all the wastes had to be treated before disposal (J. W. Maina, 2018). Taegtmeyer et al., (2008) also observed that 78% of private hospitals in Kenya had waste storage facilities that were easily accessible and not secure and 90% transported waste manually, which is a serious public health risk. 55% of private medical facilities in Kenya had functioning incinerators within the facilities (Taegtmeyer et al., 2008). However, all the incinerators within these facilities are the De Montfort type with no measure of controlling air emissions, hence, is a great contributor to air pollution. Only 66% of private health facilities use NEMA accredited waste collectors, the rest dispose of their wastes within their premises, either by open-pit or landfill (Taegtmeyer et al., 2008).

Despite the existence of hazardous waste management enforcement under the Environmental Management and Coordination Act of 1999 in Kenya, proper waste management practices in hospitals have not yet been achieved (Haregu et al., 2017)(Njue et al., 2015). Previous studies attributed the challenge of poor healthcare waste management in Kenya to low or no budgetary allocations in the hospitals, lack of awareness on disposal regulations, poor monitoring schemes in the waste management programs, and use of poor technology (Makori, 2018). To further address the problem of HCWM in Kenya, the ministry of health (MOH) in collaboration with CDC, through PATH has developed strategies for a national strategic plan for health care facilities. The strategic plan gives the following responsibilities to healthcare facilities: to ensure that questionnaires and checklists are used to monitor HCW stream through each unit of the health facility; develop a register indicating waste movement at each section of HCW stream; to ensure that after summarization of filled checklist, the list should be collected every week and sent to district HCWM team; and hold monthly meetings with all staff at all carders to report on the progress of HCWM strategies (Ministry of Health, 2020).

Healthcare workers have a pre-eminent role in the hospital management of hazardous waste based on relevant guidelines (Caniato et al., 2015; US EPA, 2014). However, several challenges exist, especially in Low- and Middle-income countries including a lack of proper regulatory enforcements owing to poor structural hazardous waste management guidelines in hospitals (Caniato et al., 2015). While healthcare workers in Kenya have positive attitudes towards good HCWM practices, their knowledge about hazardous waste handling is limited (Maina, 2018). For example, research done in Kenya reported that about three-quarters of the health workers re-cap used needles, have low immunization rates against tetanus and HBV, and the rate of needle-stick injuries was at 6% in the previous month.(Ngari, 2009).World Health Organization reported that the most common factors associated with poor HCWM practices include inadequate training in proper waste management, lack of awareness about the health hazards related to healthcare waste, absence of waste management and disposal systems, insufficient financial and human resources and the low priority given to the topic (WHO,2018).

The level of adherence to HCWM guidelines among healthcare workers and waste handlers done by Njue et al. (2015) in Thika sub-County reported a 16% level of adherence among healthcare workers, meaning that compliance to the set HCWM guidelines is still a big challenge in Kenya (Njue et al., 2015).A study done in Kenya by Japan International Cooperation Agency reported that HCWM practices in both private and public medical and research facilities did not comply with international requirements which guaranteed safe and environmental friendly management of HCW(Rushton, 2003). The results from previous studies conducted in Kenya indicate that healthcare workers, waste handlers, patients, and the general public are at great risk of environmental and health hazards associated with HCW because of poor adherence rates. This study aims to determine the factors that influence the adherence of healthcare workers to hazardous healthcare wastes frameworks.

Problem Statement

According to WHO, millions of patients suffer injuries or die from unsafe and poor-quality health care globally every year (WHO, 2019). In 2011, the Occupational Health and Safety Agency (OSHA) reported that employees suffered about 253,700 work-related injuries and illnesses in hospitals (Jha et al., 2013). This is equivalent to a rate of 6.8 injuries and illnesses for every 100 full-time employees. Although the national and county governments across nations have tried to lay down systems that have positively influenced the management of hospital waste (World Health Organization, 2018), a review by (The Center for Disease Dynamics, Economics & Policy, 2011) established that these laid down system has experienced drawbacks since some healthcare workers are not well equipped to adhere to the policy frameworks. (Aung T et al., 2019). A good universal health coverage (UHC) system relies heavily on patient safety and quality (PSQ). Despite this universally agreed-upon premise, significant harm is still being done, with one out of every ten patients suffering harm while obtaining health care in hospitals. However, especially in low- and middle-income nations, there is a conspicuous shortage of evidence on UHC-PSQ convergence. Institutional attempts have been made within the World Health Organization. (Alhumaid S. et al.,

2021). To assist in bridging this gap, the World Health Organization (WHO) has been established. Delivery is one of the six system blocks in WHO's Health System Framework. Each system component must also address accessibility and availability, as well as safety and quality. Universal health coverage (UHC) is often seen as an uniting platform for achieving progress on SDG 3 for health. The SDGs and the Universal Health Coverage (UHC) have produced new demands and opportunities for improving basic health care. (Triguero A. et al., 2016). Multiple measures within and outside the health system are needed to improve frontline services. Better data and evidence syntheses, as well as expertise with various service delivery methods and novel skill-mix techniques, are all critical. In Kenya, hazardous waste management in hospitals has become a major challenge largely attributed to indiscriminate dumping, irregular collection, poor storage, and inadequate resources necessary for proper management (Kasozi & Von Blottnitz, 2010).

A report by Okweso, (2016) indicated that hazardous waste produced in hospitals form a significant part of the waste generated in Nairobi County. Most medical and health institutions in Kenya have not adopted a sharp management system; waste reduction and initiatives for the avoidance of hazardous wastes (Calderon, 2006). Hospitals have also not installed adequate safe treatment and disposal mechanisms, hence, lack of secure methods of HCW collection and transportation (Calderon, 2006). Due to poor HCWM systems within most healthcare facilities in Kenya, workers in support services allied to healthcare, visitors to healthcare establishments, patients in healthcare establishments or receiving home care, healthcare auxiliaries, and hospital maintenance personnel, medical doctors, and nurses are all at risk of infections from hazardous wastes (Houghton C. et al., 2020). Generally, direct or indirect contact to hospital hazardous waste or contaminants released or emitted by HCW can lead to diseases with multi-factor etiology (Porta et al., 2009). For example, epidemiological studies on acute exposures to hospital hazardous waste have presented evidence on the development of respiratory, digestive, and dermatological symptoms, also the association between chronic exposures to these waste and growth inhibitions, reproduction impairments, low birth weights, and cancer developments have been observed (Fazzo et al., 2017; Porta et al., 2009). In Nairobi County where hospital hazardous waste management practices are a challenge, equivalent health impacts of exposure to the waste are expected.

Despite the existence of policy frameworks on hazardous waste management in Kenya, most health facilities do not adhere to such frameworks and thus poor hazardous waste management practices among healthcare workers in Nairobi County hospitals (Ministry of Health, 2014). Factors contributing to the poor management practices of hazardous waste among healthcare workers in hospitals, especially adherence to relevant guidelines as a requisite to proper waste management practices remain largely underexplored (Haregu, 2017; Kasozi, 2010). This study therefore seeks to fill this gap by determination of these factors contributing to the poor management practices and was therefore the primary aim of the study.

Objectives of the Study

i To determine the level of adherence to proper HCWM practices among healthcare workers in selected private in Nairobi County Kenya.

ii To identify the individual related factors that influence adherence to proper HCWM practices among healthcare workers in selected hospitals in Nairobi County Kenya.
iii To identify the health facility-related (institutional) factors that influence adherence to proper HCWM practices in selected hospitals in Nairobi County Kenya.

Literature Review

Theory of planned behavior

This study primarily relied on the Theory of Planned Behavior (TPB) which suggest that a person's behavior is determined by their intention to perform the behavior which is a function of their attitude toward the behavior (Hackman & Knowlden, 2014). According to Hackman and Knowlden (2014), people's intention to perform a certain behavior or task is determined by their attitude towards the behavior and the subjective norms regarding the behavior. The theory of planned behavior states that behavioral achievements depend on both the intention and ability to perform such behaviors (Peters & Templin, 2010). The study will also draw on systems theory which is relevant because the adherence to the HCWM frameworks by healthcare workers depends on the internal systems placed by the health facility. The theory is important in this study as it explains what influences the health worker's behavior to adhere to HWM practices. The theories, however, only consider the intrinsic factors that affect an individual's behavior but do not explain the institutional factors. According to Peters and Templin (2010), the limitation of this theory is that it assumes that a person has all the necessary opportunities and resources to be successful in executing the desired behavior. Godin and Kok (1996) affirm that the theory of planned behavior does not consider environmental or economic factors that may influence an individual's intention to perform a behavior. It is for this reason that this study also considered systems theory. This theory will consider both organizational and external factors that affect health worker's adherence to HWM practices that this study is interested in.

Theory of reasoned action

The TPB model's predictive efficacy for both behavioral intentions and behaviors has been supported by meta-analytic evaluations (Armitage & Conner, 2001; Godin & Kok, 1996; Sheeran, 2002). About 40–50% of the variance in intentions and 20–40% of the variance in behavior is often explained by the hypothesis. Depending on the action and situation, the relative importance of each of the three components (attitudes, norms, and perceived behavioral control) varies. Subjective norms are usually the least reliable predictor, though this could be due to measurement difficulties or people's denial of social pressures' influence. The model is better at predicting some health behaviors and in most cases, intentions are good and will be applied in this study to determine the factors that influence adherence to HCWM practices.

System Theory

System theory is a strategy in the management of healthcare waste among healthcare workers that enables the exploration of different systems that affect an operation and how operations affect the systems (Wilkinson, 2011). Since there are many parts of the system that work to achieve one

goal, system theory determines that if one part of the system is compromised then it affects the subsequent parts of the entire system (Wilkinson, 2011). Another study done by Meadows, (2008) claimed that since system elements are rationally connected, the events produced by parts of a system are more important in achieving the purpose of understanding the whole system. To analyze the relationship between parts of an organization (for example, healthcare workers) and their environment, the goal of an organization must be adopted as a system (Mele et al., 2010b). Therefore, to obtain value, all parts of the system should work together in synchrony to achieve better and sustainable HCW management systems either within individual organizations or in the external environment (Georgiou, 2007). This theory is relevant because the adherence to the HCWM frameworks by healthcare workers depends on the internal systems placed by the health facility. Every health institution, whether private or public must adhere to the set legal frameworks that have been passed by both the local or national government regulations. Additionally, the system approach of management stated that knowledge is not derived from understanding single parts of a problem but the whole parts of the problem (Wilkinson, 2011) and denotes that knowledge comes with doing (Arnold & Wade, 2015). Therefore, healthcare workers and organizations who follow the safety guidelines when handling HCW can develop a better system because they learn from their mistakes. The main focus in this study was the internal existing factors and the knowledge and understanding of the existing system that affects adherence.

Conceptual Framework

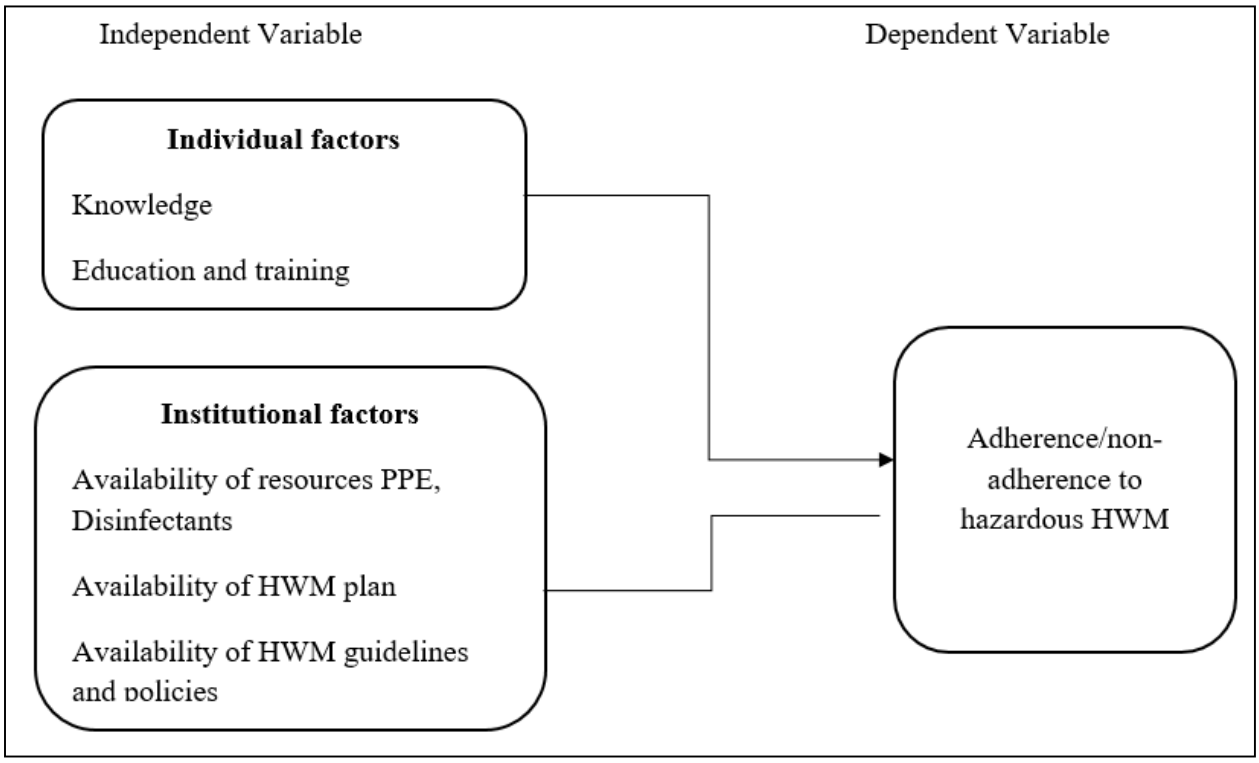

Figure 1: Conceptual Framework

Research Methodology

A descriptive research design was used whereby a survey was conducted using questionnaires as the main tools for data collection. Healthcare workers who were responsible for offering direct care to the patients and those offering cleanliness services within this selected level 4 private hospitals in Nairobi Metropolitan were sampled. The inclusion criteria were; healthcare workers who had worked in the current hospital for at least six months and are in the following divisions: Head of departments, attendants and ancillary, housekeeping, waste management unit, infection control unit, and administration. The 4 selected private hospitals within Nairobi consisting of 900 healthcare workers who were directly involved in the generation and handling of healthcare wastes. The study adopted the sample size of 100 respondents using a determination formula as defined by Mugenda (Ministry of Health, 2014). Systematic stratified sampling was employed in this study. Data was collected by interviewing healthcare workers from various departments/wards/units to gather information on HCWM practices. The participants in this study were purposively selected. Questionnaires were the main tool for data collection.

Broadsheets of paper were used to code the data collected using questionnaires. Microsoft Excel software and Statistical Package for Social Science (SPSS) were used to process and analyze all the data collected. The data was presented in tables and graphs. Frequencies and percentages were used as tools of data analysis. The strength of the relationship between the dependent variable (Y)

and a series of independent variables were statistically measured using regression analysis. The regression formula is:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + u$$

Where Y is the dependent variable (adherence to HCWM policy framework by healthcare workers), *a* is the *Y*-intercept, occurring when $X_1 = X_2X_3 = 0$, *X* is the variable that predicts Y, X_1 is existing systems, X_2 is the legal framework, X_3 is the level of knowledge, *b* is the slope and *u* is the regression residue.

Results

Institutional related factors that influence adherence to proper health care waste management.

Level of understanding of the system used by the hospital in waste management

More than 87% (n=87) a half of the respondents understood clearly the system used by the respective hospital in waste management.

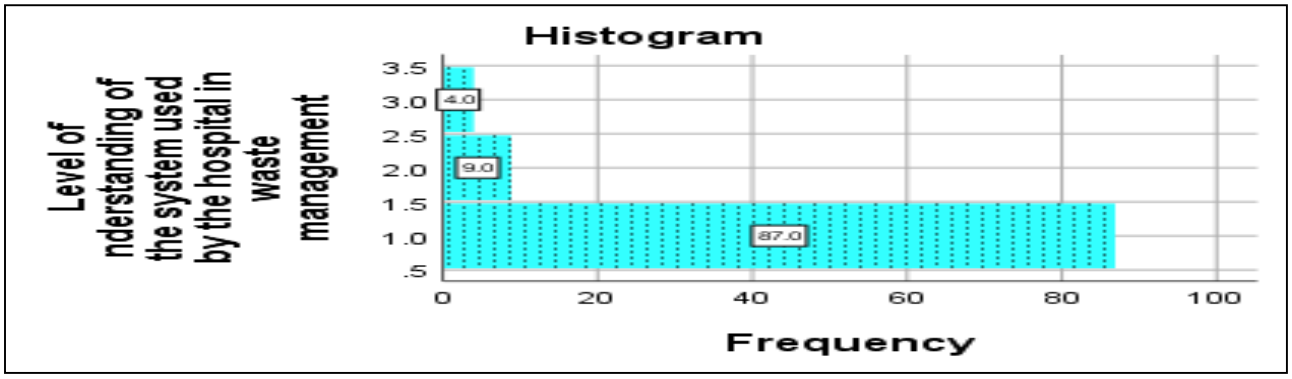

Figure 2: systems used by the hospital in waste management

Waste segregation.

More than half (78%) of the participants knew that segregation of waste is a role of all health workers.

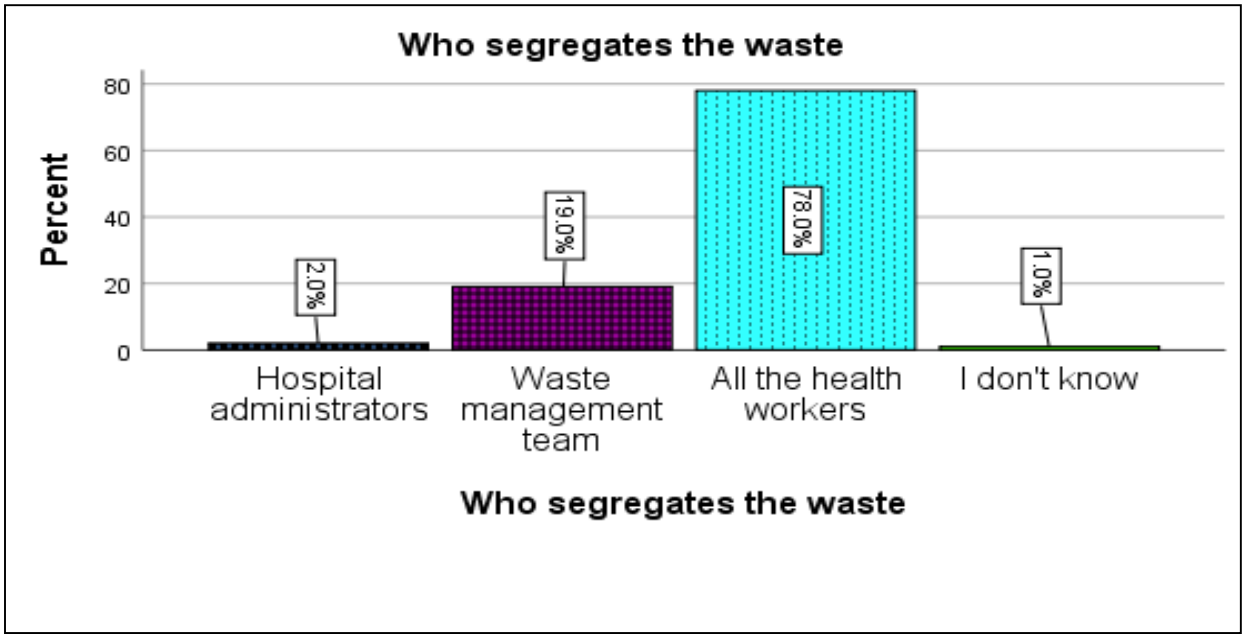

Figure 3: waste segregation

Waste labeling.

52%of the respondents knew that waste labeling was done by all health workers.

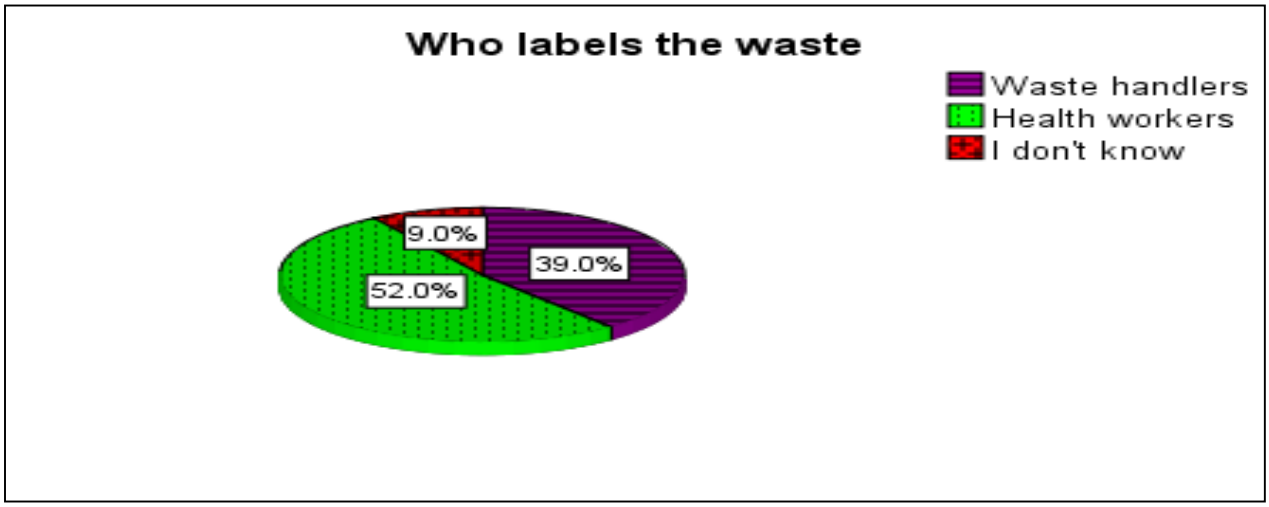

Figure 4: waste labelling

Practices of waste management

48%of the respondents acknowledged that waste labeling is done at the site of segregation. Outsourcing was the most common method of dealing with waste. 62%. Sanitary staff were mostly involved in hospital waste disposal n=49%

Table 1: Practices of waste management

Variable	Number(N)	Percent (%)
Place of waste labeling		
At the segregation site	48	48%
At the storage place	9	9%
Where generated	43	43%
Methods used in dealing with waste management		
Sterilization	10	10%
Use of chemicals	2	2%
Incineration	24	24%
Burying	2	2%
Outsourcing	62	62%
People involved in actual waste disposal		
Sanitary staff	49	49%
Casual laborers	10	10%
Trained personnel	41	41%

Presence of an incinerator

Only 20%of the facilities had an incinerator.

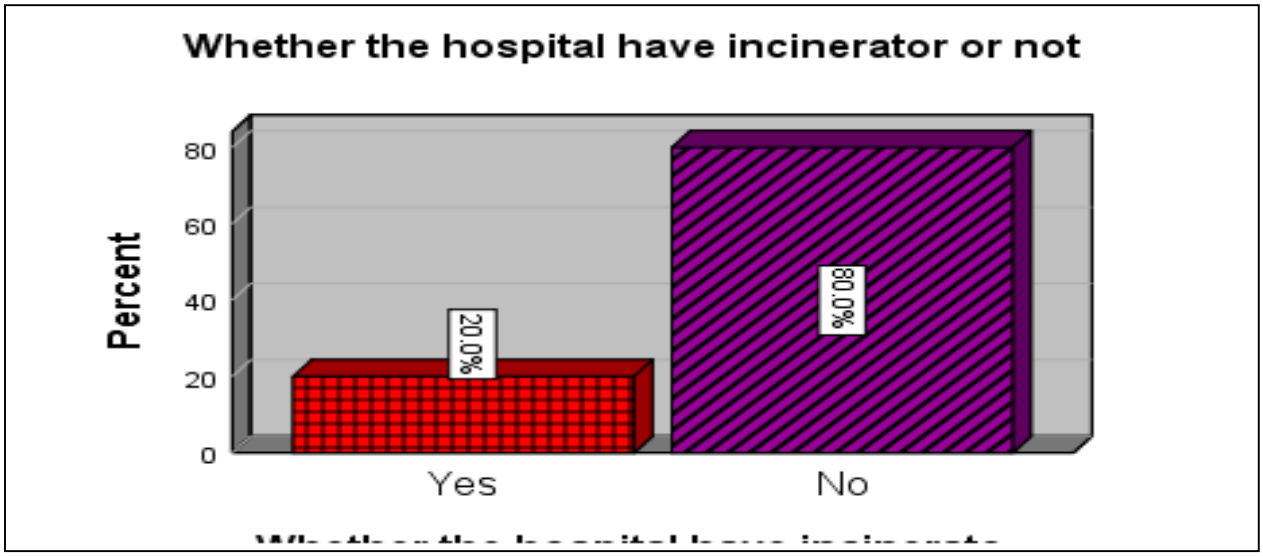

Figure 5: presence of incinerator

Level of Adherence to Healthcare Waste Management.

The number of respondents with a high level of adherence was 24%. More than half of the respondents had a low level of adherence.

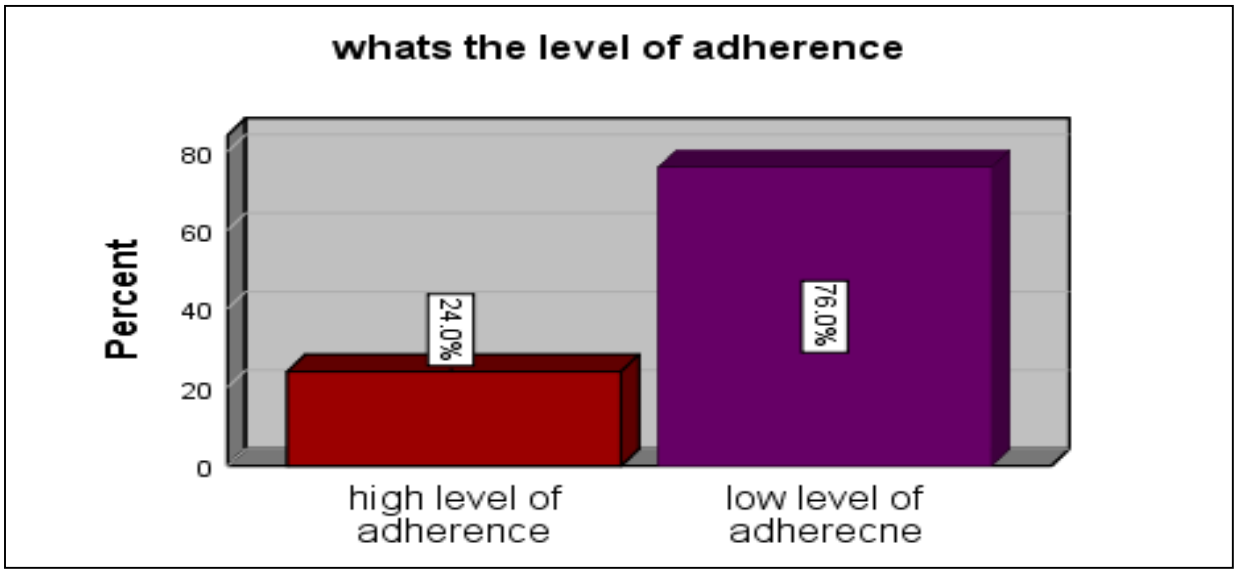

Figure 6: level of adherence

Knowledge /awareness on hazardous waste management.

There was a relatively high level of awareness on the practices regarding hazardous waste management policy frameworks as shown in table 2 below

Table 2: knowledge /awareness on hazardous waste management

Variable	Very high (%)	High (%)	Average (%)	Low (%)	not at all (%)
Awareness of medical waste segregation	44	22	15	9	10
Knowledge of biohazard symbol	64	8	11	3	14
Eight categories of medical waste	27	25	31	2	15
guidelines for color coding in work place	53	18	12	6	11
Puncture proof containers for sharps	71	14	9	5	1
The correct bag for disposal of cytotoxic drugs	38	20	8	7	27
The correct bag for intravenous sets, catheters and tubes	56	13	13	8	10
Aware if HIV can be transmitted through medical waste	89	8	2	0	1
Awareness of medical waste regulation	44	22	15	9	10
Aware that hepatitis B and C can be transmitted through medical waste	88	7	3	1	1
Knowledge if PPEs are necessary when handling medical waste	89	7	3	0	1
When to discard medical waste from the bin	66	16	8	4	6
Application of methods of medical waste treatment	50	18	18	5	9
Necessity of disinfection of medical waste	73	14	5	2	6
Use of bleaching solution 0.5% for disinfection	62	17	10	3	8
Maximum time for medical waste to be kept in hospital premises is 48 hours	46	12	21	7	14

Level of adherence to healthcare waste management with regards to attendance of training on HCWM.

Those who had attended training on health care waste management had a higher level of adherence to proper HCWM as compared to those who had not attended a training before as seen in figure 7 below.

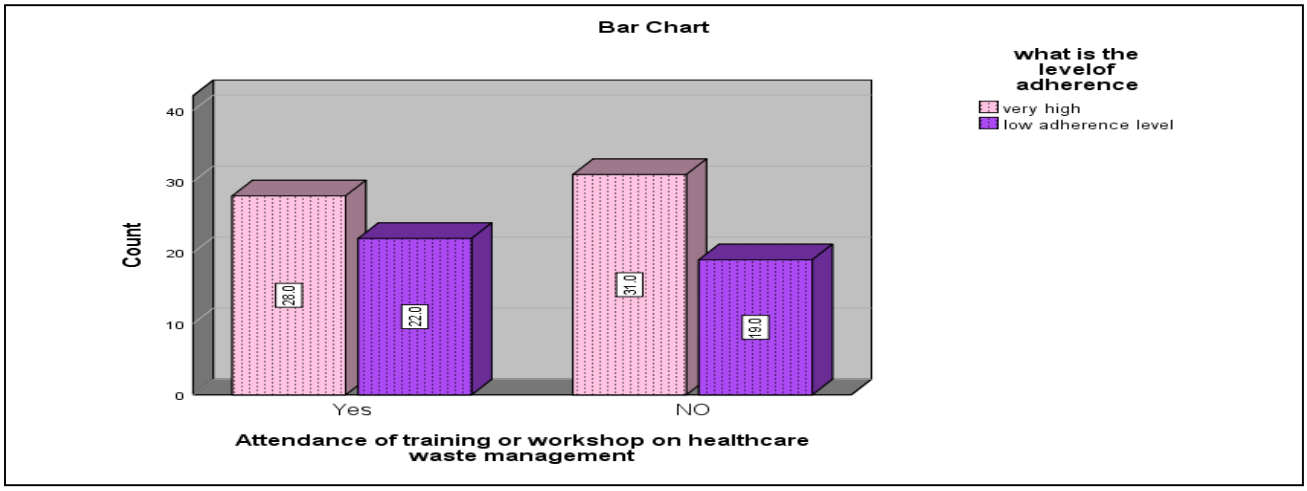

Figure 7 Level of adherence in relation to attendance of training on health care

Level of adherence in relation to socio-demographic factors affecting adherence to factors waste management.

According to this study, level of education was significantly related to adherence to proper HCWM practices. (p=0.005). Vaccination status for hepatitis B and tetanus was also significant to level of adherence to HCWM. (P=0.040). Although the association was not significant at p value <0.05, a majority of the respondents who had a high level of adherence to health care waste management were female and respondents between 20-30years of age.

Table 3: Level of adherence in relation to socio-demographic factors affecting adherence to factors

Variable	Level of adherence		TOTAL	Chi(x2)	Df	P
	High level of adherence	Low level of adherence				
Gender	N (%)	N (%)				
Male	6(25.0%)	35(46.1)	41(100)	3.342	2	0.068
Female	18(75.0)	41(53.9)	59(100)			
TOTAL	24(100)	76(100)	100(100)			
Age						
20-30years	16(66.7)	47(61.8)	63(63)	0.750	3	0.861
31_40years	7(29.2)	23(30.3)	30(30)			
41-50years	1(4.2)	4(5.3)	5(5)			
51 years and above	0(0)	2(2.6)	100(100)			
TOTAL	24(100)	76(100)	100(100)			
Level of education						
Certificate	15(62.5)	23(30.3)	38(38.0)	12.774	3	0.005
Diploma	5(20.8)	35(46.1)	40(40.0)			
Degree	2(8.3)	17(22.4)	19(19.0)			
Masters	2(8.3)	1(1.3)	100(100)			
TOTAL	24(100)	76(100)				
Years of experience						
Below 1 year	5(20.8)	16(21.1)	21(21)	1.616	3	0.656
1-5years	15(62.5)	53(53)	53(53)			
6-10years	2(8.3)	14(14)	14(14)			
11years and above	2(8.3)	12(12)	12(12)			
TOTAL	24(100)	100(100)	100(100)			
Area of work						
Emergency room	1(4.2)	9(11.8)	10(10)			
Medical/surgical	0(0)	18(23.7)	18(18)	16.168	9	0.063
Pediatrics	0(0)	2(2.6)	2(2)			
Oncology	0(0)	1(1.3)	1(1)			
Lab	0(0)	4(5.2)	4(4)			
Pharmacy	0(0)	1(1.3)	1(1)			
Critical care	1(4.2)	3(3.9)	4(4)			
Dialysis	0(0)	2(2.6)	2(2)			
Obs /Gynae	2(8.3)	4(5.3)	6(6)			
Housekeeping	20(83.3)	32(42.1)	52(52)			
TOTAL	24(100)	74(100)	100(100)			

Variable	Level of adherence		TOTAL	Chi(x2)	Df	P
	High level of adherence	Low level of adherence				
Training on waste management						
Yes	9(37.5)	40(52.6)	49(49)	1.671	1	0.196
No	15(62.5)	36(47.4)	51(51)			
TOTAL	24(100)	76(100)	100(100)			
Training attended						
IPC	2(8.3)	14(18.4)	16(16)	2. 120	2	0.347
Waste management	7(29.2)	26(34.2)	33(33)			
None	15(62.5)	36(47.4)	51(51)			
TOTAL	24(100)	76(100)	100(100)			
Number of needle stick injuries in the past 12 months						
0-5 injuries	23(95.8)	72(94.7)	95(95)	1.691	2	0.429
6-10 injuries	0(0)	3(3.9)	3(3)			
11-15injuries	1(4.2)	1(1.)	2(2.0)			
TOTAL	24(100)	76(400)	100(100)			
Whether vaccinated for hepatitis B and Tetanus or not						
Yes	16(66.7)	65(85.5)	81(81)	4.216	1	0.040
No	8(33.3)	11(14.5)	19(19)			
TOTAL	24(100)	76(100)	100(100)			

Individual related factors in relation to participation in health care waste management

This study found a true significance between attendance of training and adherence to the biomedical symbol, medical waste regulation, guidelines on color coding, correct bags for intravenous sets, catheters and tubes and application of methods of medical waste treatment. (p=0.035, p=0.002, p=0.032, p=0.010) respectively. These variables were thus deemed dependent.

Table 4: Individual related factors in relation to participation in health care waste management

Variable	Attendance of training or workshops on waste management. Yes N (%)	No N (%)	TOTAL	Chi(x2)	Df	P
Awareness of medical waste regulation						
Fully aware	38(76.0)	28(56)	66(66)	4.456	1	0.035
Partially aware	12(24)	22(44)	34(34)			
TOTAL	50(100)	50(100)	100(100)			
Knowledge of the biohazard symbol						
Fully aware	43(86.0)	29(58)	72(72)	9.722	1	0.002
Partially aware	7(14)	21(42)	28(28)			
TOTAL	50(100)	50(100)	100(100)			
guidelines for color coding in workplace						
Fully aware	41(82) 71(71		71(71)	5.877	1	
Partially aware	9(18)	29(29)	29(29)			
Total	80(100)	100(100)	100(100)			
The correct bag for Iv sets, catheters and tubes						
Fully aware	39(78)	29(58)	68(68)	4.596	1	0.032
Partially aware	11(22)	21(42)	32(32)			
Total	50(100)	100(100)	10(100(			
Aware that hepatitis B and C can be transmitted through medical waste						
Fully aware	48(96)	47(94)	95(95)	0.211	1	0.646
Partially aware	2(4)	3(6)	5(5)			
TOTAL	50(100)	50(100)	100(100)			
Application of methods of medical waste treatment						
Fully aware	40(80)	28(56)	68(68)	6.618	1	0.010
Partially aware	(20)	22(40)	32(32)			
TOTAL	50(100)	50(100)	100(100)			

Conclusion

The findings from this study show that the level of adherence to hazardous waste management policies among healthcare workers in private level four hospitals in Nairobi County is low. Despite the high level of awareness by the health workers on the important measures of collection, segregation, treatment, transportation and disposal of waste, the level of performance on the same is low. This is greatly attributable to negligence and unfavorable attitude towards healthcare waste management practices among healthcare workers.

Recommendations

This study has shown that the level of adherence towards Proper HCWM is still very low among private level 4 hospitals in Kenya. This is related to both individual and facility related factors. In light of this, it is recommended that:

1. Continuous workshops and training on utilization of the available policy frameworks and guidelines on hazardous waste management need to be reinforced as a better strategy to mitigate the low adherence levels.
2. The health care delivery models and societal structures need to be improved highly in order to mitigate the burden of COVID 19 on hazardous waste management given the enormous burden posed by this pandemic and any other public health challenge to avoid watering down the efforts made.
3. Prioritization and allocation of resources to interventions with maximum impact on hazardous waste management needs to be done.

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