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Individual-Related 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 individual related factors influencing the adherence to hazardous waste management guidelines among healthcare workers 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 contribution of individual related factors towards 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 individual related factors on hazardous waste management among healthcare workers.

Keywords: *Hazardous Waste Management Guidelines, Individual Related 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 individual related 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 individual realted 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 a 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 the individual realted factors contributing to the poor management practices and was therefore the primary aim of the study.

Objective of the Study

To identify the individual related factors that influence adherence to proper HCWM practices among healthcare workers in selected hospitals in Nairobi County Kenya.

Literature Review

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.

Conceptual Framework

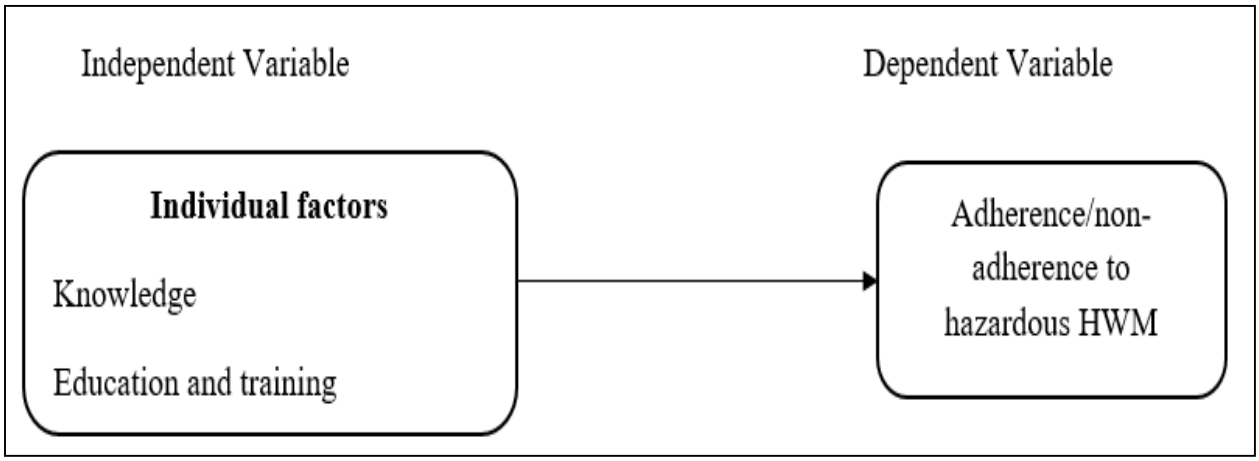

Figure 1: Conceptual Framework

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.

Results

Socio-demographic characteristics of the respondents

Respondents totaling 100 were recruited. Most 63.0% (n=63) of them were between 20-30 years of age. Out of the 100 participants, 59% (n = 59) were females. Respondents with diploma level education were the majority 40% (n =40). The highest number of respondents had between 1-5 years of experience, 53% (n=53). Most of the respondents were from the housekeeping and waste handling department, 52% (n=52). A majority of the respondents were nurses. 34% (n=34). More than half, 53% (n=53) of the respondents had never attended any training on waste management. Of those who had attended, 33% of them had attended a training on waste management. 95% of the respondents had had 0-5 needle stick injuries in the past 12 months. A majority of the respondents, 81% (n=81), had vaccinated themselves against hepatitis B and tetanus. The socio-demographic characteristics of the respondents are as shown below in table (Table 1).

Table 1: Socio-demographic characteristics of respondents.

Characteristics	Number	Percent (%)
Age in years		
20-30years	63	63
31-40years	30	30
41-50 years	5	5
51 years and above	2	2
Gender		
Male	41	41
Female	59	59
Level of education		
Certificate	38	38
Diploma	40	40
Degree	19	19
Masters	3	3
Years of experience		
Below 1 year	21	21
1-5 years	53	53
6-10years	14	14
11 years and above	12	12
Training on waste management		
Yes	47	47
No	53	53
Training attended		
Ipc	16	16
Waste management	33	33
None	51	51
Number of needle stick injuries		
0_5 injuries	95	95
6_10injuries	3	3
11-15injuries	2	2
Whether vaccinated		
Yes	81	81
No	19	19

Profession/designation.

A majority of the respondents were nurses (34%). Doctors, administrators, laboratory, housekeeping, physiotherapy and nutritionists comprised 10%, 3%, 4%, 47% and 2% respectively. 19% of the respondents worked in none of the hospital departments and 26% of them worked in other departments.

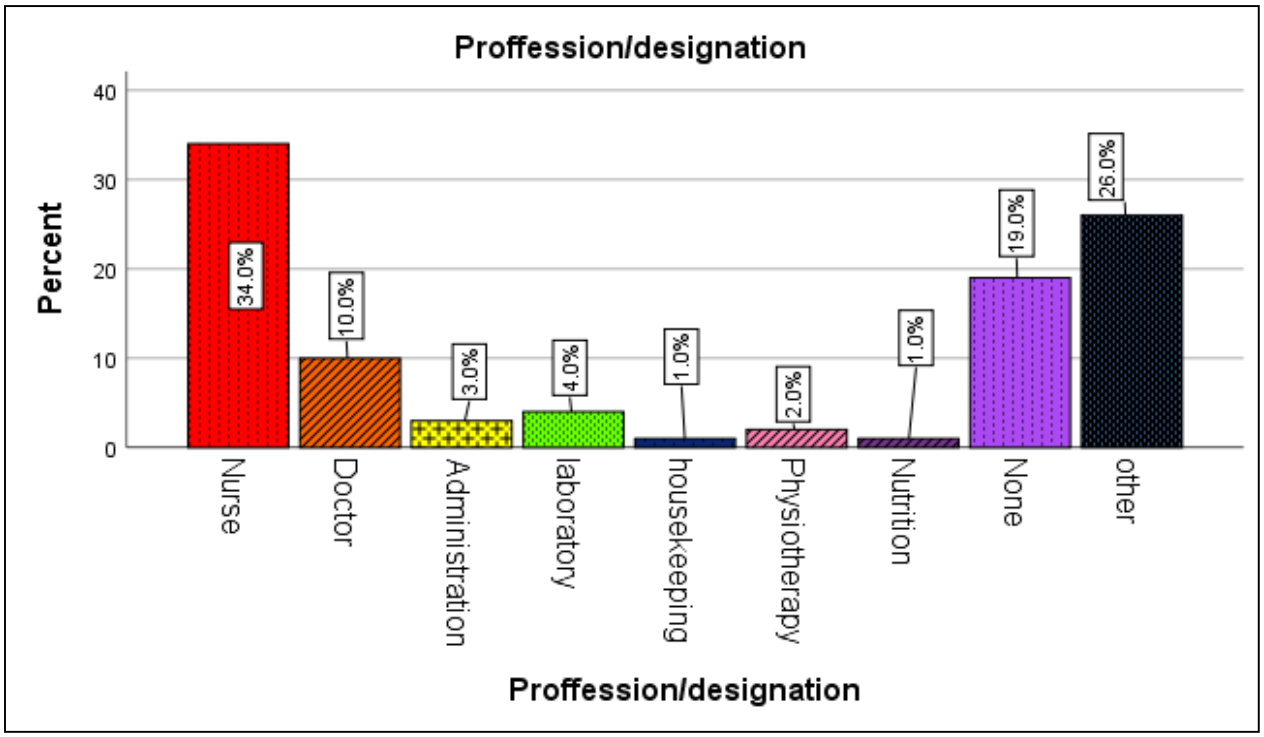

Figure 1: profession

On the practices on hazardous waste management, there was a significant difference among nurses and other waste handlers including doctors, administration, laboratory personnel, housekeeping, pharmacists, physiotherapists and nutritionist on awareness of the maximum time for medical waste to be kept in the hospital premises being 48 hours (x=14.730, df=8p=0.065), application of methods of medical waste treatment (x=19.88811, df=8, p=0.010), the correct bag for intravenous sets, catheters and tubes, (x=23.039, df=8, p=0.003) guidelines for color coding (x=24.551, df=8,p=0.002), awareness of medical waste regulation (x=32.734, df=8, p=0.000) with a positive bias on nurses.

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

Variable	Attendance of training or workshops on waste management.		TOTAL	Chi(x2)	Df	P
	Yes N (%)	No N (%)				
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)			

Discussion

Individual related factors that influence adherence to proper HCWM practices among healthcare workers.

63% of the respondents were aged between 20-30 years and a majority of the respondents with high adherence to HCWM were also within this age bracket. 53% of the respondents had 1-5 years of experience. 59% of the respondents in this study were female. This is similar to the findings from a study done in Uganda on factors influencing adherence to proper HCWM practices among healthcare workers where 58.8% of the respondents were female. (Josephine et. al, 2020). Although gender was not statistically significant to adherence to HCWM, most of the personnel who had a high adherence to HCWM practices are female (p=0.068). In this study, nurses were more likely to have higher adherence to HCWM practices as compared to other waste handlers in different departments. This can be linked to the presence of on-site HCW segregation containers at their waste generation points hence were more motivated to segregate the hazardous waste.

Applying theory of reasoned action to factors influencing adherence to proper HCWM practices among healthcare workers in private level 4 hospitals in Nairobi County.

The theory of reasoned action suggests that a person's behavior is determined by their intention to perform the behavior with a belief that the behavior will lead to the intended outcome. The findings of this study agree with this theory clearly elaborated by the positive relationship between attendance of training and workshops on proper HCWM and the practices geared towards the same. Those who had attended trainings and workshops on health care waste management had a higher likelihood of adherence to proper HCWM as compared to those who had not. Furthermore, they had a greater awareness on the measures necessary for proper. Healthcare waste management including medical waste segregation, biohazard symbol, color coding, disposal of cytotoxic waste and catheters and many more. This study thus confirms the suggestion of the theory of reasoned action that if people evaluate the suggested behavior as a positive attitude and if they think others want them to perform the behavior, this results in a higher intention and are more likely to perform the behavior. According to this theory the intentions may not always result in behavior depending on ability factors and barriers to action. This is true evidenced by the low levels of adherence to proper HCWM despite the high level of awareness on the practices and the existing hospital framework and policies.

Conclusion

The findings from this study show that the level of contribution of individual related factors towards 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

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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